1st INTERNATIONAL CONFERENCE ON EMERGING COMPUTATION INTELLIGENCE (ICECI-23)

11-12 February 2023

Conference Report & Book of Abstract

EDITORS

Prof. Aasim Zafar
Dr. Arman Rasool Faridi

ORGANISED BY

Department of Computer Science
Aligarh Muslim University
Aligarh-202002, U.P., India

ALIGARH MUSLIM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
ALIGARH

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ALIGARH MUSLIM UNIVERSITY
ALIGARH

Aligarh Muslim University (AMU) occupies a unique position amongst universities and institutions of higher learning in the country. It was established in 1920 and evolved out of the Muhammadan Anglo-Oriental College (MAO) which was set up on 7 January 1877 by the great visionary and social reformer, Sir Syed Ahmad Khan. From its very inception, it has kept its door open to the members of all communities and from all corners of the country and the world. The Aligarh Muslim University is the realization of a vision which was broad, far-reaching and realistic. Spread over 467.6 hectares in the city of Aligarh, Uttar Pradesh, Aligarh Muslim University offers more than 300 courses in the traditional and modern branches of education. It draws students from all states in India and from different countries, especially Africa, West Asia and Southeast Asia. In some courses, seats are reserved for students from SAARC and Commonwealth Countries. AMU Aligarh is a high-ranking University among institutions of higher learning. The University is open to all irrespective of caste, creed, religion or gender.

In spite of the establishment of a number of universities and institutions of higher learning all over the country, AMU has been maintaining its national and international character as an institution of excellence. The University now has 13 faculties comprising 117 teaching departments, 3 academies and 21 centres and institutes. The University has three centres of study outside Aligarh at Murshidabad (West Bengal), Mallapurum (Kerala) and Kishanganj (Bihar). A special feature of the University is its residential character with most of the staff and students residing on the campus. There are 19 halls of residence for students with 80 hostels. The University maintains one primary, seven High schools (including one for the Visually Challenged), and two Senior Secondary schools for boys and girls. The University also offers courses in Indian, Oriental and Western Languages.

Aligarh Muslim University provides both taalim and tarbiyat and opportunities for cross-cultural interaction, where India/s north and south, east and west are brought linguistically, culturally and emotionally closer in this educative experience of living together. AMU, Aligarh is a living symbol of the composite culture of India and a bulwark of its secular principles.

DEPARTMENT OF COMPUTER SCIENCE
ALIGARH MUSLIM UNIVERSITY, ALIGARH

The Department of Computer Science, AMU is one of the oldest and pioneer departments of Computer Science and Information Technology in India. The Department is one of the growing departments of computer science in India, which has been witnessed by various reputed ranking agencies such as Times Higher, India today, NIRF etc.

It came into the existence in the year 1971 with the installation of IBM1130 Computing System, under the umbrella of Computer Centre and later blossomed into an independent department known as "Department of Computer Science" in the year 1988.
In the year 1980, VAX11/780 system was purchased from DEC (USA) and installed at the centre, which is one of the first computer systems in India. The approval of two new programmes, a three-year Master of Computer Science and Applications (MCA) and one year Post Graduate Diploma in Computer Science Applications (PGDCA) by the standing committee of the UGC in the year 1982 and the formal introduction of these courses from the session 1983-84, were one of the major landmarks in the development of Computer Science department.

The Department offers various programmes like Ph.D., MCA, M.Sc. in (Cyber Security & Digital Forensics), PGEDP, PGDCP and B.Sc. (Hons.) Computer Applications. Syllabi of these programmes are designed considering the requirement of time as well as the demand of the IT industry. In the year 2009, Department of Computer Science witnessed a major breakthrough with the introduction of Ph.D. in order to provide an opportunity to the young and enthusiastic IT professionals to walk over that extra yard, which makes a vital difference and contribute towards the ongoing IT research and development. In the year 2021, a new program M.Sc. (Cyber Security & Digital Forensics) has been introduced to train and produce experts in the area of cyber security and digital forensics. The guidance and cooperation of the experienced and expert faculty members of the department is one of the attracting features of the department, which enlivens the students to stretch their wings, so that they can fly higher than their dreams and serve the country. The Department has state of the art infrastructure in terms of modern conference room, smart class rooms and well-equipped separate computing labs for research scholars, undergraduate and post graduate students.

In consequence to their arduous training and exposure with the state of the arts professional programs offered, the students graduating from this department get placed in the leading IT industries even before the completion of their final semesters. There are plethora of companies, like TCS, Accenture, Infosys, IBM, JK Techno soft, HCL, Info system, NIC, Wipro, Bharti Telesoft, etc., that recruits the passing out students each year through

campus placement. The last semester students have provision of four to six months rigorous training in the leading IT companies and other reputed organizations.

Front view of Department of Computer Science

ALIGARH MUSLIM UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
ALIGARH

INTERNATIONAL CONFERENCE ON EMERGING COMPUTATIONAL INTELLIGENCE (ICECI'23)
FEBRUARY 11-12, 2023

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Honorable Vice-Chancellor
Aligarh Muslim University
Aligarh

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Faculty of Science
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Aligarh

Convener

Prof. Aasim Zafar
Chairperson
Department of Computer Science
Aligarh Muslim University
Aligarh

Message from the Vice Chancellor

1. I am happy to learn that the Department of Computer Science, is organizing the 1st International Conference on Emerging Computational Intelligence ICECI'23, from 11th to 12th Feb 23.

2. Aligarh Muslim University has always stood as a bastion of academic excellence, fostering a spirit of inquiry, inclusivity, and cultural understanding. The Department of Computer Science, AMU, is one of the highest ranked departments in its pursuit of technological advancement, and this Conference exemplifies this commitment.

3. Computer science, an ever-changing field, delves into algorithms, software engineering, AI, and cyber security. Amid rising demand for computational skills, computer science departments play a vital role in educating students and advancing knowledge, leaving an indelible mark on modern technology and daily life. This Conference represents an opportunity to broaden our horizons, encouraging fresh perspectives and academic camaraderie. It is a commitment towards promoting the emerging technologies in the field.

4. I commend the efforts of the organizers and wish the Conference and its participant's success.

(Prof. Tariq Mansoor)

Message from the Dean

I am delighted to extend my warmest welcome to the 1st international Conference on the Emerging Computational Intelligence (ICECI) 2023. As the dean of the faculty of science I am immensely proud to see the efforts from the department of computer science, in this domain.

Computer science, as the primary language of modern technology, spans boundaries and combines various fields and areas. Through the study of computer science, we discover the many intricacies of innovation and problem-solving in our common technological landscape. Aligarh Muslim University, a renowned institution of higher learning, has long emphasized the importance of cultivating academic excellence in cutting-edge technologies and computational methodologies, as well as instilling intellectual curiosity in the field of computer science.

Conference represents a gathering of minds, a melting pot of ideas, and a form for sharing knowledge and expertise. It is an invaluable platform for scholars and researchers to engage in thoughtful dialogue and collaborative research contributing to the advancement of computational knowledge and its practical applications in society.

I extend my heartfelt appreciation to the organizers for the dedicated efforts and making the ICECI'23 a reality, and I am confident that this conference will foster interdisciplinary collaboration, intellectual growth, and a deeper appreciation for the role of cutting-edge technologies and advancements in the field of computer science. I extend my best wishes for the success of this important conference organized by the department of computer science.

(Prof. Mohammad Ashraf)

Message from the Chairperson

I am delighted to offer a heartfelt welcome to all the attendees, speakers, and participants of the 1st International Conference on Emerging Computational Intelligence (ICECI'23). As the Chairperson of the Department of Computer Science at Aligarh Muslim University and the Convener of this conference, it brings me great pride and enthusiasm to oversee this significant gathering.

The purpose of this conference is to bring together researchers worldwide who have an interest in diverse areas, including but not limited to Optimization, Artificial Intelligence, Computational Intelligence, Machine Learning, Evolutionary Computation, Cyber Security, Fuzzy Logic, Signal Processing Theory and methods, Blockchain, Cloud Computing, Fog Computing, Internet of Things, Wireless Sensor Networks and many more.

As we convene at this conference, we unite a rich reservoir of knowledge, a variety of viewpoints, and a collective enthusiasm for the field of linguistics. Our conversations and engagements will contribute to the emergence of fresh perspectives, the sharing of ideas and the cultivation of collaborative efforts across disciplines. I want to express my heartfelt gratitude to the esteemed guests, invited speakers, participants, and every member of our dedicated team for their enthusiasm and contributions to making this conference a great success. I would be failing in my duty if I do not mention the financial support from USTM, Meghalaya, ZMQ Development and AHA Technocrats along with Mr. Ajmal Sufiyan, USA, Mr. Iqbal Nazravi, Oman, Mr. Tufail Ahmad, Qatar and the batch of MCA 2006 for making it possible to host such a grand event.

(Prof. Aasim Zafar)

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Conference Report

1.1 ICECI-2023 SCHEDULE

The International Conference on Emerging Computation Intelligence (ICECI 2023) was held in hybrid mode at Aligarh Muslim University in Aligarh, Uttar Pradesh, India. Organized by the Department of Computer Science, the conference took place on February 11-12, 2023.

This conference is intended for researchers worldwide with interests in areas including, but not limited to, Optimization, Artificial Intelligence, Computational Intelligence, Machine Learning, Evolutionary Computation, Cyber Security, Fuzzy Logic, Signal Processing Theory and its methods, Blockchain, Cloud Computing, Fog Computing, Internet of Things, Wireless Sensor Networks, and various disorders and diseases. Applications of Machine Learning and Computational Intelligence techniques in other domains were also welcomed. The schedule of the conference is as follows:

Day-1 Schedule, Saturday, 11.02.2023

Inaugural Session (Time 10:00 am-11:00 am)

Invite dignitaries on stage	10:00 – 10:05 AM
Recitation from the Holy Qur'an	10:05 – 10:10 AM
Welcome address by the Convener (Prof. Aasim Zafar)	10:10 – 10:15 AM
Address by the Guest of Honor (Prof. M. Salim Beg, Dept of Electronics Engg.)	10:15 – 10:20 AM
Address by the Keynote Speaker (Prof. A.Q. Ansari, JMI)	10:20 – 10:35 AM
Address by the Chief Guest (Prof. Wasim Ahmad, APC, AMU)	10:35 – 10:45 AM
Vote of Thanks (Dr. Arman Rasool Faridi)	10:45 – 10:50 AM
University Tarana, National Anthem	10:50 – 11:00 AM
High Tea	11:05 AM

Plenary Session I (Time 11:45 am-01:30 pm)

Lecture 1:	Multimedia forensics for fake content classification	Prof. Minoru Kuribayashi
Lecture 2	Neutrosophic Logic: A Paradigm Shift in Logic Theory	Prof. Abdul Quaiyum Ansari

Technical Session I (Time 03:00 pm-04:30 pm)

Track 1: Artificial Intelligence Applications

Mode: Physical
Chairs: Prof. Nesar Ahmad, Dr. Nadeem Akhtar
Coordinator: Prof. Mohammad Ubaidullah Bokhari
Facilitators: Faraz Masood, Afa, Deepika Kaushik

Track 2: Soft Computing & Deep Learning

Mode: Physical
Chairs: Prof. Saiful Islam, Dr. Mohammad Shahid
Coordinator: Prof. Tamanna Siddiqui
Facilitators: Khalid Anwar, Uroos Saleem, S.M Hamza Husain

Track 3: Artificial Intelligence & Machine Learning

Mode: Virtual
Chairs: Prof. Himanshu Aggarwal, Dr. Khaleel Ahmad
Coordinator: Dr. Suhel Mustajab
Facilitators: Mahfooz Alam, Rufaida Haq, Sheetal S.

Track 4: Cloud Computing & IoT

Mode: Virtual
Chairs: Prof. Mansaf Alam, Dr. Sultan Ahmad Coordinator: Mr. Shahid Masood
Facilitators: Md. Luqman, Md Faizal, Abha S.

Track 5: Data Mining & Machine Learning

Mode: Virtual
Chairs: Dr. Mushtaq Ahmad, Dr. Achintya Singhal
Coordinator: Dr. Mohammad Sajid
Facilitators: Munir Salmony, Tauseef, Sonal V.

Day-2 Schedule, Sunday, 12.02.2023

Plenary Session II (Time 10:00 am-11:30 am)

Lecture 1:	Peer to Peer Networking: An Overview	Prof. Y.N. Singh
Lecture 2	Industry 4.0 meets Data Science The pathway for Society 5.0	Prof. (Dr.) Ajith Abraham
Lecture 3:	Social Bots - Key Enablers for Emerging Threats in Online Social Networks. Open Challenges, Opportunities & Research Directions	Prof. Muhammad Abulaish

Technical Session II (Time 12:00 pm-01:30 pm)

Track 6: Machine Learning & Advanced

Mode: Physical
Chairs: Prof. M.M. Sufyan Beg, Dr. Shakir Ali Coordinator: Ms. Sehba Masood
Facilitators: Faraz Masood, Afa, Deepika Kaushik

Track 7: Machine Learning and Security

Applications Mode: Physical
Chairs: Dr. Salma Shaheen, Dr. Tameem Ahmad
Coordinator: Dr. Swaleha Zubair
Facilitators: Khalid Anwar, Uroos Saleem, S.M Hamza Husain

Track 8: Computing Applications

Mode: Virtual
Chairs: Prof. Salman A. Moiz, Dr. Shuchi Sethi Coordinator: Dr. Faisal Anwer
Facilitators: Mahfooz Alam, Rufaida Haq, Sheetal S.

Track 9: Network Security

Mode: Virtual
Chairs: Prof. Abdul Wahid, Dr. Asif Irshad Khan Coordinator: Dr. Shafiqul Abidin
Facilitators: Md. Luqman, Md Faizal, Abha S.

Track 10: Deep Learning

Mode: Virtual
Chairs: Prof. Vijey Thayananthan, Dr. JawedAhmad Coordinator: Dr. Mohammad Nadeem
Facilitators: Munir Salmony, Tauseef, Sonal Varshney

Industry Talk (Time 02:30 pm-03:30 pm)

Talk 1:	MLOPs in road survey context	Dr. Adel Saleh Ali Al-Raimi
Talk 2:	Towards a successful DL Model	Dr. Mohammad Jibreel
Talk 3:	Technology for Development	Mr. Akram Ahmad

Valedictory Session (Time 04:00 pm-05:00 pm)

Convener

Prof. Aasim Zafar

Valedictory Session

The International Conference on Emerging Computational Intelligence (ICECI 2023) was held on February 11-12, 2023, organized by the Department of Computer Science at Aligarh Muslim University in Aligarh, Uttar Pradesh, India.

Day-2 Schedule, Sunday, 12.02.2023 (Time 04:00 pm-05:00 pm)

Invite dignitaries on stage	04:00 – 04:05 PM
Recitation from the Holy Qur'an	04:05 – 04:10 PM
Conference report by the Convener	04:10 – 04:20 PM
Address by the first Guest of Honor (Prof. Pervez Mahmood Khan, Director, PMNF Computer Centre, AMU.)	04:20 – 04:25 PM
Address by the second Guest of Honor (Prof. Afifullah Khan, OSD Development)	04:25 – 04:30 PM
Best paper certificates & Memorabilia distribution	04:30 – 04:40 PM
Address by the Chief Guest (Prof. Abdul Alim, DSW, AMU)	04:40 – 04:50 PM
Vote of Thanks (Dr. Mohammad Sajid)	04:50 – 04:55 PM
University Tarana, National Anthem	04:55 – 05:00 PM

ORGANIZING CHAIR

Dr. Suhel Mustajab, Dr. Arman Rasool Faridi, Dr. Swaleha Zubair, Dr. Shafiqul Abidin, Dr. Mohammad Sajid

1.2 INAUGURAL SESSION REPORT

[Distinguished guest on the dais in the Inaugural Session]

The Inaugural Session of the **International Conference of Emerging Computational Intelligence (ICECI-2023),** organized by the **Department of Computer Science,** was held on **11th of February 2023** at the Jawaharlal Nehru Medical College Auditorium (JNMC), AMU. The session began precisely at 10:00 a.m. IST. The conference had a strong focus on the field of AI and its applications, including machine learning and deep learning, as well as computational intelligence and its role in decision-making and data mining.

***[Qari Mohammad Arif Haqqi** reciting the Holy Quran]*

The session began with the introduction of prominent dignitaries, who were acknowledged and requested to take a seat on the dais. The session was opened with the recitation and translation of the Holy Quran by **Qari Mohammad Arif Haqqi**.

The session commenced with a welcome address by **Prof. Aasim Zafar,** Chairperson, Department of Computer Science, Aligarh Muslim University, Aligarh. He gave a brief introduction of the guests, outlining their accomplishments and profiles. He also provided information about the conference's program, explaining how the development of computer technology has impacted people's lives practically in every way. He assured participants that the two days of this conference would offer a unique opportunity for them to widen their perspectives, learn from one another, and encourage fresh partnerships. "*You will have the chance to hear cutting-edge research, network with peers, and participate in thought-provoking conversations throughout the following two days,*". He added that the two-day program had 15 sessions, including 10 technical sessions and 2 plenary sessions.

***[Prof. Aasim Zafar** during the Welcoming Speech]*

The Guest of Honor, **Prof. Mirza Salim Beg** from the Department of Electronics Engineering, Aligarh Muslim University, was called upon next to give his key insights on the event. He started by thanking the organizing committee and gave a brief note on the development of the Department of Computer Science. He spoke about the achievements of the department and its success in research and teaching activities. He declared, "*The way they have been active in research, teaching activities, and research is something we are proud of"*. In his speech, he also mentioned the improved ranking of the department, as it was ranked in the **Times Higher Education, UK.** The department was among the seven departments of the university that were mentioned in the list. He shared his views on how AI is shaping the future and the role of researchers in contributing to this rapidly growing field. The speaker's address was an eye-opener, providing insights into the dynamic and ever-evolving world of AI. He continued by saying, "*In the coming years, the field of computational intelligence will grow faster and will have a part in all aspects of life."* He closed by urging the audience to cherish their time spent at AMU and enjoy its hospitality.

***[Prof. M. Salim Beg** during his speech]*

This was followed by the keynote speech delivered by **Prof. Abdul Qayyum Ansari,** Professor, Jamia Millia Islamia, New Delhi. The speaker delved into the history of the Master of Computer Applications (MCA) program and its introduction to the academic world. In his speech, he mentioned the celebrations around the nation on "Aazadi ka Amrit Mahotsav" and the presidency of the G20 event. Along with these celebrations, he emphasized that the nation also needs to celebrate the success of computer science in India, he said. He spoke about the history of the field and the importance of research and innovation. Prof. Ansari discussed the advancements made in the field and shared his fond memory of using the VAX 11/780 machine during his student days at Aligarh Muslim University. He also emphasized the current state of research in artificial intelligence and its progress in India.

*[**Prof. A.Q. Ansari** during his Keynote speech in the inaugural session]*

According to him, a good student is not someone who performs well only in an educational system, but rather someone who has excellent values, contributes to society, and is aware of the environment. At the end, he encouraged the audience to take away memorable experiences from the university campus and expressed his pride in visiting the campus.

Next, the Chief Guest of the session, **Prof. Wasim Ahmad,** Director of Academic Programmes Committee, Aligarh Muslim University, was called upon. He shared memories of his student life, highlighting his personal experiences with the computer from his first encounter to the present day. He reminisced about punch cards introduced them to the Computer Center. He spoke about how Aligarh Muslim University was a pioneer in introducing computerization by being the first university to provide computerized report cards in 1975. He also highlighted the point about how the university went from having one computer center to three completely different units at that time. He emphasized the rapid advancement of technology, particularly in the field of artificial intelligence, cyber security, cloud computing and other ongoing research areas in India.

*[**Prof. Wasim Ahmad** during his speech]*

Towards the end, he mentioned the improving world ranking of the university, specifically the Department of Computer Science, despite its limited resources.

***[Dr. Arman Rasool Faridi** with the Vote of Thanks]*

Finally, the Inaugural Session was concluded by a vote of thanks by **Dr. Arman Rasool Faridi,** the organizing chair. He expressed his gratitude to the members on the dais: the chief guest, the convener, the guest of honor, and also the delegates and listeners present physically and those watching live. He gave applause and a heartfelt appreciation to various committee members, reviewers, expert speakers, university authorities, student volunteers and everyone who contributed to the conference, including sponsors who helped make it a success.

The session came to an end with a performance of the University Tarana and the National Anthem. Overall, the opening of the conference was a celebration of the achievements of the Department of Computer Science, Aligarh Muslim University and a look forward to the future of AI and machine learning research. Ms. Ghazala Zameer was the compere of the inaugural session**.**

*[The **audience** during the inaugural session]*

***[Ms.Gazala Zameer,** compere inaugural session]*

1.3 DAY 1: 11 FEB, ICECI – 2023

PLENARY SESSION 1

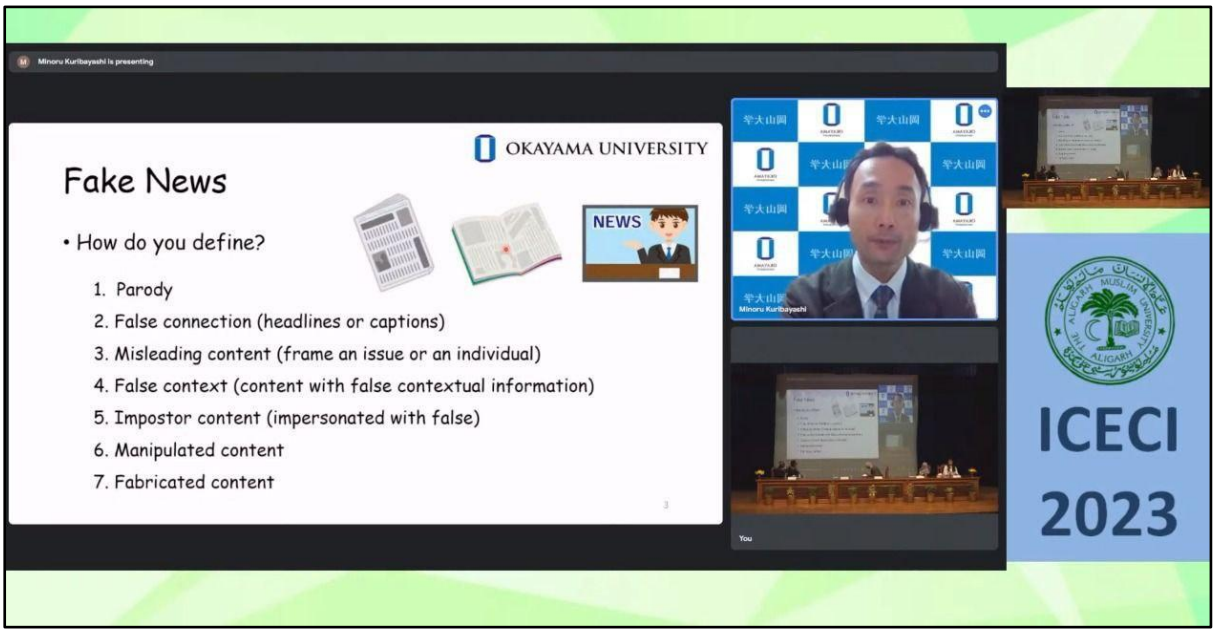
*[The **audience** during the Plenary Session 1]*

The first plenary session of the conference began after the high tea break. The event was designed to bring together distinguished speakers and attendees to share their insights and knowledge on the latest advancements in the field of Computational Intelligence.

*[**Prof. M.U. Bokhari,** during Welcome address in Plenary Session]*

Prof. M.U. Bokhari, General Chair**,** delivered the welcome address. He highlighted the significance of technology in today's rapidly changing world and the importance of developing new technologies to address society's challenges and improve the quality of life.

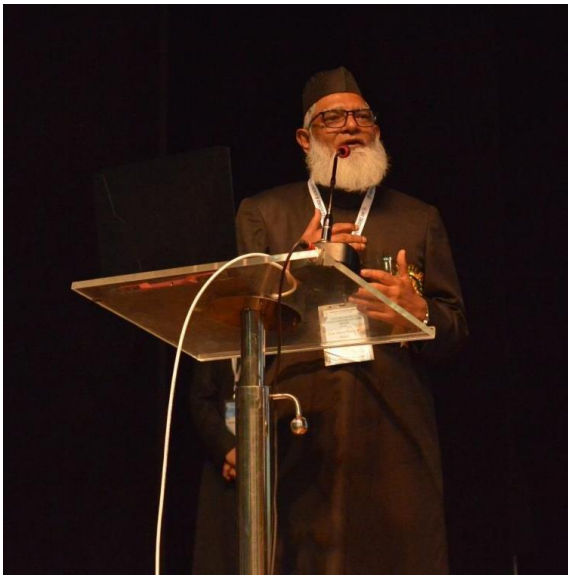
The session featured two keynote speakers: **Prof. Minory Kuribayashi** and **Prof. Abdul Quaiyum Ansari**. The session was presided by **Prof. Mirza Salim Beg.**



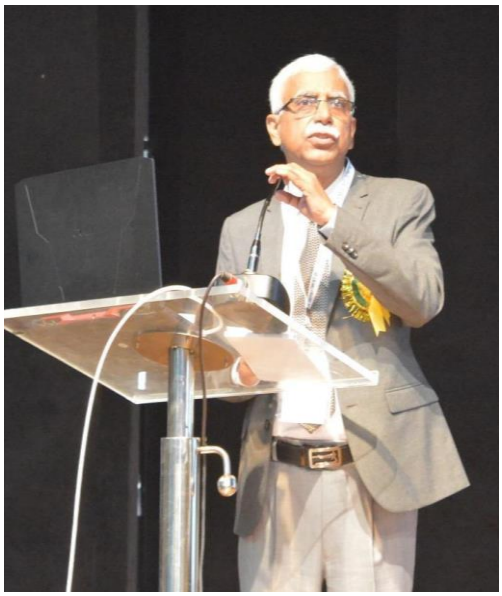
***[Prof. Minoru Kuribayashi,** during Plenary Session-I.]*

Prof. Minoru Kuribayashi, a professor at the Graduate School of Natural Science and Technology, Okayama University, Japan, was the first keynote speaker of the event. He is well-known for his expertise in the field of natural science and technology. He provided an enlightening presentation on multimedia forensics for fake content classification. He emphasized that the increasing prevalence of multimedia content has created new opportunities for propaganda and misinformation, especially with the rise of deepfakes. Techniques such as GANs and Face Swap are used to create fake content, making it more challenging to detect. While AI-powered frameworks are being developed, obstacles such as undetectable fake content and adversarial attacks still exist. New methods like watermarking, forensic tools, and DRM frameworks are being developed to address these challenges. The fight against fake content requires a collective effort from various stakeholders.

Next in line was **Prof. Abdul Quaiyum Ansari**, a professor at Jamia Millia Islamia University, New Delhi. Prof. Ansari is a well-respected and experienced educator and researcher. He conducted a session on reasoning and logic, aimed at providing attendees with a comprehensive overview of the history of logic, the limitations of crisp logic, and significance of fuzzy logic in AI and decision-making. The speaker discussed the history of logic and introduced fuzzy logic as a solution to the limitations of crisp logic. He also emphasized the importance of fuzzy logic in AI and machine learning for more accurate and effective decision-making. The session was a success, providing valuable insights into the topic and sparking interest among attendees.



*[**Prof A.Q. Ansari** during Plenary Session-I]*



*[Presidential remark by **Prof. M.S. Beg**]*

Later, **Prof. Mirza Salim Beg** from the Department of Electronics Engineering, Aligarh Muslim University, who was the president of the session, gave his presidential remarks. Bringing a strong background in electronics engineering, he provided valuable insights and perspectives. He highlighted the importance of students and professors working together in technology advancement. Topics such as cryptography, secure communication, and information theory were discussed, with emphasis on the role of contentauthenticity.org in promoting digital authenticity. The session was highly informative and concluded with the encouragement of collaboration among students and professors to bring positive changes in technology.

[Dr. Swaleha Zubair**, presenting vote of thanks**]

Finally, **Dr. Swaleha Zubair,** the Organizing Chair, gave a vote of thanks at Plenary Session I. She thanked the attendees, guest speakers, and the organizing committee for their contributions.

***[Ms. Marisha Shoeb**, compere Plenary session 1]*

Overall, after the first plenary session, the attendees left with a better understanding of the advancements and innovations in the field of AI, machine learning and multimedia forensics. The session served as an ideal platform for the attendees to expand their knowledge and network with professionals in their field. The compere for this session was Ms. Marisha Shoeb.

TECHNICAL SESSIONS: DAY 01

The technical sessions on Day 1 (11th February 2023) of the conference began concurrently with five tracks as per the schedule.

Technical Session Track - 1: Artificial Intelligence Applications.

The topic of Track-1 of the technical session was **"Artificial Intelligence Applications." Prof. Nesar Ahmad** from the Department of Computer Engineering, Aligarh Muslim University, presided over the session, sharing the chair with **Dr. Nadeem Akhtar,** Associate Professor, Department of Electrical Engineering, Aligarh Muslim University. The session was coordinated by **Prof. M. U. Bokhari,** Department of Computer Science, Aligarh Muslim University (AMU). A total of nine papers were presented in this technical session. The student facilitator for the session was **Ms. Deepika Kaushik.**

Ms. Deepika Kaushik from Aligarh Muslim University was the first speaker in this session, presenting her paper titled **"Parameter Tuning over Twenty Years: A Bibliometric Review."** Her paper provided a bibliometric review, analyzing studies on parameter tuning for

metaheuristic algorithms conducted over 20 years, from 2002 to 2022. She identified 864 related documents in the Scopus database and presented a comprehensive analysis based on various metrics.

The second speaker of this session was **Mr. Mohammad Abdullah Tahir** from Université Bourgogne Franche, France. He presented his paper titled "**Integration of Machine Learning Algorithms Classifiers and Sequential Forward Selection Features in Diabetes Prediction"**. This study aimed to develop a machine learning model for early detection of diabetes using supervised algorithms and feature selection strategies. The results showed an approximately 86% accuracy rate using Logistic Regression, Decision Tree Classifier, and Random Forest Classifier on a diabetes dataset obtained from Kaggle.

Ms. Khushnaseeb Roshan from Aligarh Muslim University was the third speaker in this session, presenting her paper titled **"Performance Analysis of Intrusion Detection System based on Online Machine Learning."** This study compared the performance of five classifiers, Adaptive Random Forest (ARF), Neural Network (NN), K-Nearest Neighbor (KNN), Voting-Ensemble (Voting-Ens), and Stacking-Ensemble (Stacking-Ens), in an online learning environment for the Network Intrusion Detection System (NID). They used the CICID-2017 dataset for analysis, and the results indicated that the ensemble method achieved the highest accuracy and recall of 99.77%, outperforming the standalone methods.

The fourth speaker of the session was **Mr. Khalid Anwar** from Aligarh Muslim University. His paper, title **"An Efficient Approach for Improving Predictive Accuracy of Multi-Criteria Recommender System,"** Presents a study on the issues in Multi-Criteria Recommender Systems (MCRS). The paper proposes a modified similarity measure to improve the accuracy of neighborhood generation and rating prediction. This approach is evaluated using standard evaluation measures on a benchmark dataset.

The fifth speaker of this session was **Mr. Basil Hanafi,** Department of Computer Science, Aligarh Muslim University. He presented his paper titled **"Cruciality of securing user data due to increasing Digital Learner traffic over the Internet.".** This paper is a review that details securing e-learning systems data. The shift towards e-learning during the COVID-19 pandemic has highlighted the importance of ensuring security for these digital platforms to protect against potential external threats.

The sixth paper was presented by **Mr. Sani Hasan**, A.K.T.U., I.T.M College, Aligarh. The title of his paper was **"Predicting Deaths From New and Highly Contagious Diseases Based On Machine Learning Techniques".** The recent pandemic has shown that poverty can negatively impact the ability of individuals to follow official guidelines and control the spread

of disease. Mr. Hasan's paper proposes a hypothetical calculation suggesting that the percentage of a country's population living below the poverty line could be used to predict the number of deaths in a future pandemic.

The seventh paper was presented by **Mr. Mohd. Sakib,** Department of Computer Science, Aligarh Muslim University. The titled of his paper was "**Energy Demand Forecasting of smart city using Hybrid Deep Learning with Time series Analysis".** The paper discusses the importance of a stable energy forecasting model in a smart city environment for sustainable power supply and precise information regarding the power system's health. Time series forecasting (TSF) is a challenging and popular research topic that helps organizations in understanding trends and structural variations over time. Traditional approaches struggle to extract deep features and identify latent patterns, but deep learning techniques with multiple layers and abstractions have been developed to overcome these difficulties. The paper proposes a hybrid deep learning model that combines the LSTM and GRU network with an extra hidden layer consisting of 50 neurons to effectively manage energy efficiency by forecasting energy demand on a non-stationary time series. The proposed model outperforms single-mode approaches and is evaluated based on metrics such as RMSE and MAE.

The eighth speaker of the session was **Mr. Savir Ali** from Aligarh Muslim University, presenting the paper titled **"Computational Evaluation of Machine Learning Classifiers for Diabetes Prediction."** The paper compares the performance of several Machine Learning algorithms, including Support Vector Machine, Decision Tree, Random Forest, Logistic Regression, Native Bayes, and K-Nearest Neighbor, in predicting the early onset of diabetes using the Pima Indian Diabetic dataset. The results of the study show an accuracy of 82.3%.

The ninth paper was presented by **Mr. Ahmad Raza Shibli** from Aligarh Muslim University. The title of his paper was **"Machine Learning-Based Predictive Modeling of Student Counseling Gratification: A Case Study of Aligarh Muslim University."** In this research, a machine learning-based method was developed to automate the course selection recommendation for students during the admission process. A real dataset based on students' perspectives was designed and analyzed, with over 100 students participating in the survey. To address the lack of data volume, the Synthetic Minority Oversampling Technique was employed. The findings of the study showed potential for application from the department to the university level, bringing novelty to the existing system.

The session concluded with comments from **Dr. Nadeem Akhtar's** and the presidential remarks by **Prof. Nesar Ahmad**. In the end, **Prof Bukhari**, the coordinator of the session, presented certificates to the chairs followed by a photography session.

Technical Session Track- 2: Soft Computing & Deep Learning

The Technical Session, Day-1, Track-02 on **"Soft Computing & Deep Learning"** was chaired by **Prof. Saiful Islam** (President), Department of Computer Engineering, AMU and **Dr. Mohammad Shahid,** Assistant Professor of Computer Application in Dept. of Commerce, A.M.U. **Mr. Khalid Anwer**, the facilitator for the session, welcomed the chairs and all the delegates. **Prof. Tamanna Siddiqui,** Department of Computer Science, AMU, was the session's coordinator. A total of nine papers were presented in this session.

Mr. Ankur Kumar from Aligarh Muslim University presented his paper titled **"Assessment of DevOps Lifecycle Phases and their Role in DevOps Implementation using Best-Worst MCDM Method."** He explained DevOps as the integrator of software development and operations through continuous phases. The study utilized a Best-Worst MCDM technique and data from the HELENA dataset to determine the priorities of each software development stage in implementing DevOps.

Mr. Mohammad Qasim from Aligarh Muslim University spoke as the session's second speaker on his paper titled **"Firefly Scheduler for Task Scheduling Problem in Cloud**

Computing Environment." In this paper, the author proposed a task scheduling method in a cloud computing environment using Harris Hawk Optimization, Firefly Algorithm, and Differential Evolution algorithms. These methods were tested and validated through simulation analysis with four different versions of S-type transfer functions. The aim was to minimize time loss and improve performance in task scheduling.

The third speaker, **Mr. Mohd Farooq** from Aligarh Muslim University, presented his paper titled **"Contention-free Dynamic Task Scheduling Approach for Network-on-Chip based Quad-core System."** This paper introduces an improved dynamic mapping technique aimed at reducing the average latency by 15% and meeting deadlines in most test cases for quad-core systems. The approach involves intelligently mapping tasks on processor cores and minimizing communication overhead to achieve contention-free task scheduling.

Ms. Wajda Tarannum, the fourth speaker from Aligarh Muslim University presented her paper titled **"Integration of Blockchain and Cloud Computing: A Review."** In her presentation, she explained that Blockchain technology is becoming increasingly popular due to its distributed nature, transparency, immutability, security, and audibility, making it a valuable tool in various fields, including finance and healthcare, its integration with cloud computing has received limited attention. This review article explores the potential of using blockchain in cloud computing, discusses the benefits of cloud-based blockchain services, and provides an overview of the current trends in this field. The presentation drew conclusions and highlighted areas for further research.

Mr. Faraz Masood from Aligarh Muslim University presented his paper titled "**Smart Contract Testing for Enhanced Security on the Ethereum"** as the session's fifth speaker. This paper examined the importance of testing smart contracts in the Ethereum network. It presented various testing tools and analyzed the results of using three of these tools to test a smart contract. The presentation highlighted the need for multiple testing methods to ensure the security of these contracts.

The sixth speaker of this session was **Dr. Mohd. Anas Wajid,** from Sharda University, Greater Noida, India. He presented his paper titled **"Applications of Neutrosophic-CNN in Multimodal Classification".** This study explores the use of neutrosophic fuzzy sets for managing uncertainty in multimodal data classification. It uses image and text data and applies a pipeline based on NCNN (neutrosophic convolutional neural networks) for learning feature representations and categorizing data. The results show promising performance compared to individual sources on multi-modal classification datasets.

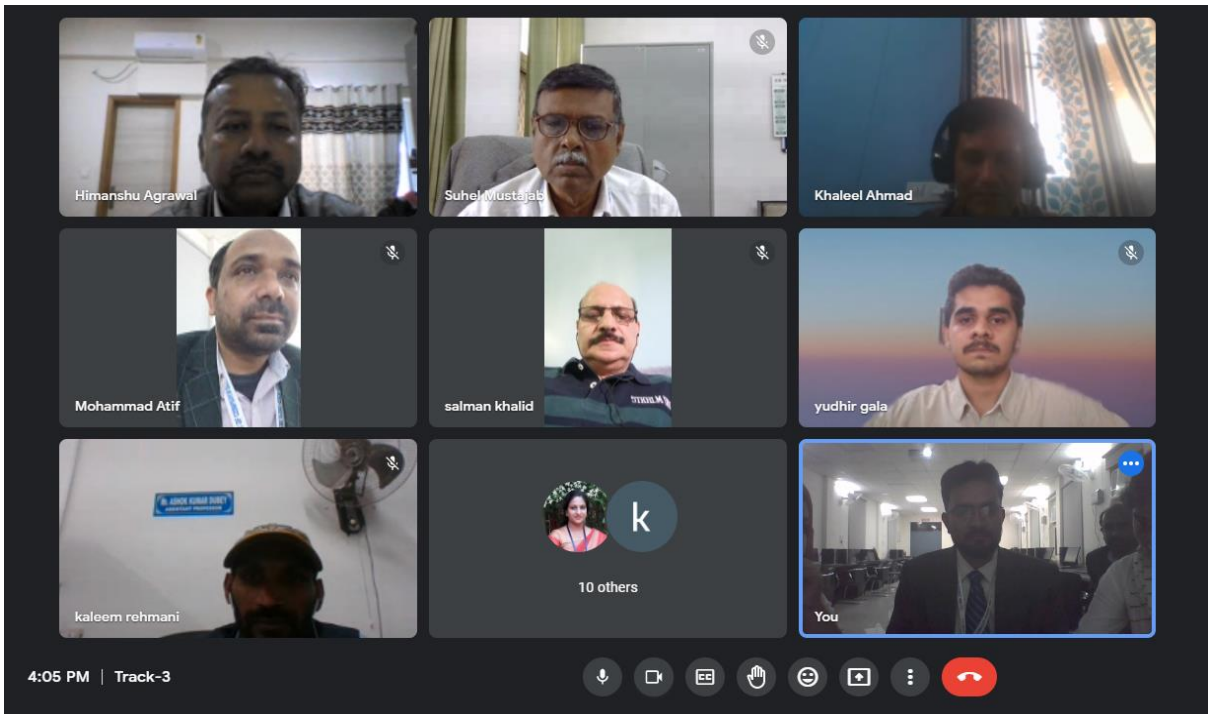
Ms. Fatma Ahsan from Aligarh Muslim University presented the paper titled **"Improved PSO-GA Hybrid algorithm for code coverage Testing"** as the session's seventh speaker. She explained that the success of software heavily depends on testing, which can be time-consuming and resource-intensive. In this paper, an improved hybrid meta-heuristic algorithm for test case generation, combining Particle Swarm Optimization (PSO) and Genetic Algorithm (GA), was implemented for path coverage testing criterion. The results showed improved outcomes compared to state-of-the-art techniques, such as GA and PSO, for combined fitness functions through preliminary experimental results. The study suggests potential for future research to incorporate more meta-heuristics and experiments on more benchmark problems.

Ms. Fakhrun Jamal from Aligarh Muslim University, participated as the eighth speaker in this session and presented her paper titled **"An optimized Algorithm for Resource Utilization in Cloud Computing based on the Hybridization of Meta-heuristic Algorithms**." In this presentation, a hybrid approach of Grey Wolf Optimization and Particle Swarm Optimization was proposed to address the problems with job scheduling and provide the best optimum load balancing to all virtual machines. The aim was to improve performance through parallel task scheduling and selection of the best virtual machine to distribute the load by updating the best particle and velocity.

The ninth speaker of this session was **Mr. Md. Saquib Jawed** from Aligarh Muslim University. He presented his paper titled **"Enhancing the Cryptographic Key using Sample Entropy and Whale Optimization Algorithm".** In his presentation, a novel algorithm, SampEn-WOA, was suggested to develop highly randomized and unpredictable keys for various state-of-the-art cryptographic algorithms, such as AES, SIMON, DES, SPECK, 3DES, and PRESENT. The SampEn-WOA algorithm utilizes sample entropy, v-type transfer function, and Whale Optimization Algorithm. The results obtained from the study were promising, suggesting the effectiveness of SampEn-WOA in enhancing cryptographic key security.

The session ended with the presidential remark by **Professor Saiful Islam**, who highlighted the importance of research and encouraged students and researchers to actively participate in such events. He also expressed gratitude and congratulations to the participants of the event. In conclusion, **Prof. Tamanna Siddiqui** presented certificates to the session chairs, followed by a photography session.

Technical Session Track- 3: Artificial Intelligence and Machine Learning



The Technical Session, Day-1, Track-3 was on **"Artificial Intelligence and Machine Learning**." held virtually. **Prof. Himanshu Aggarwal,** Dept. of Computer Science & Engineering, Punjabi University, Patiala, presided over the session and shared the chair with **Dr. Khaleel Ahmad,** Assistant Professor, Maulana Azad National Urdu University, Hyderabad. The session was coordinated by **Dr. Suhel Mustajab**, Associate Professor, in the Department of Computer Science, AMU. The student facilitator for the session was **Mr. Mahfooz Alam.** A total of five papers were presented in this technical session.

The first paper of the session was presented by **Mr. Rizwan Alam** from Aligarh Muslim University titled **"Stacked Ensemble Learning Approach for Early Diabetes Prediction."** The paper focused on employing a stacked ensemble model, which synthesizes multiple machine learning methods, to identify diabetes in patients. The presenter thoroughly examined the ESDP dataset to evaluate the model's efficacy. The research achieved an accuracy ranging from 90.21% to 98.40%, with the highest value obtained using the stacked ensemble learning approach.

The second paper of the session was presented by **Mr Denis R.** from Mount Carmel College, Lucknow; titled **"Performance Analysis of Machine Learning-Semantic Relational Approach based Job Recommendation System"**. The paper introduced a recommendation framework that matches individuals with employment opportunities based on their LinkedIn and Facebook profiles. The proposed framework utilizes word-2vec to extract semantic

meaning from the data. It then processes the data using a multi-phased feature search method and a Majority Voting Ensemble idea to get the best job recommendations. The paper compared various machine learning models on different datasets of Facebook and LinkedIn to provide optimal job recommendations.

The third paper of the session was presented by **Ms. Nitha V. R.** from the University of Kerala, titled **"Lung Cancer Classification Using Fine-Tuned VGG 16."** The paper describes a transfer learning-based lung cancer detection system developed using the publicly available dataset IQOTH/NCCD. The system employs a fine-tuned VGG16 model that outperforms current approaches in distinguish between benign and malignant tumors. Comparing to other models on the same dataset, the proposed model outperforms others with an accuracy of 99.54%.

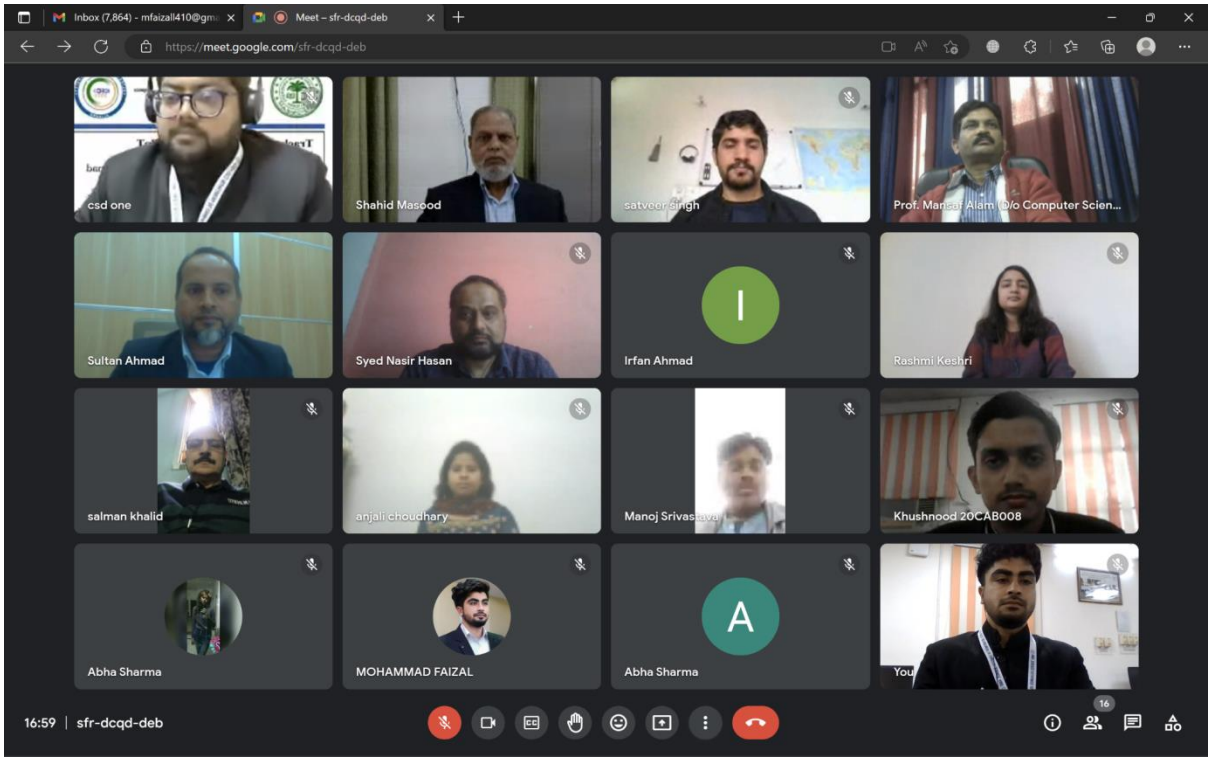
The fourth paper of the session was presented by **Mr. Yudhir Gala** from K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai, titled **"AI-Based Techniques for Network-Based Intrusion Detection System: A Review."** The paper discussed network security and the difficulties intrusion detection systems (IDS) face in detecting new type of intrusions. The presenter provided an overview of IDS and various AI-based methods for Network-based IDS (NID), highlighting their benefits and drawbacks and the metrics used for evaluation. The paper also discusses the research challenges and outlines current and future trends in this field. The study has revealed a current trend of using DL based methods to improve NIDS performance and efficiency in terms of accuracy rate and false alarm rates.

Mr. Mohd. Kalem, from SRM IST, Delhi NCR presented the fifth paper of the session titled **"Wireless body area networks utilizing data transmission techniques based on prediction"**. The paper aimed to employ data prediction (DP) techniques to decrease the quantity of data broadcast in a Wireless Body Area Network (WBAN). The solution the presenter suggests uses neural networks and prediction models to minimize the amount of data exchanged between the sensor and base station while keeping the same level of data quality. The research demonstrated that the proposed solution outperformed existing methods, providing a faster recall path at a lower computational cost. The research offered a solution for an improved WBAN based on an LRNN prediction model-based data transmission reduction technique.

The session concluded with remarks from **Prof. Himanshu Aggarwal** and **Dr. Khaleel Ahmad**, who congratulated the presenters on their insightful contributions and encouraged

others to actively participate in research work. At the end, the session coordinator presented certificates to the session chairs.

Technical Session Track- 4: Cloud Computing & Internet of Things (IoT)



The Technical Session, Day-1, Track-4 was also a virtual session on "**Cloud Computing & Internet of Things (IoT).**" The session was chaired and presided over by **Prof. Mansaf Alam** from the Department of Computer Science, Jamia Millia Islamia, New Delhi. **Dr. Sultan Ahmad**, Senior Lecturer in the Department of Computer Science at the College of Computer Engineering and Sciences, Prince Sattam Bin Abdul Aziz University, Al-Kharj, Saudi Arabia, co-chaired the session. **Mr. Mohammad Luqman** was the facilitator for this session, and Mr. Shahid Masood, Associate Professor in the Department of Computer Science at A.M.U., coordinated the session. A total of five papers were presented in this technical session.

The first paper for the session was presented by **Mr. Satveer Singh** from Jawaharlal Nehru University, New Delhi, titled "**Fog Node Placement using Multi-Objective Genetic Algorithm**". The paper discussed how the Cloud and Fog computing industries dominate the modern IT era with their networking, storage, and computing services. In this study, a mathematical model is created to determine where to locate fog nodes inside a specific geographic area. The algorithm is used to locate the fog devices and work out the most practical method of connecting them to the Cloud. The suggested methodology uses a multi-objective evolutionary algorithm to reduce deployment costs and network latency.

Ms. Rashmi Keshri from Jawaharlal Nehru University, New Delhi presented the second paper for the session, titled "**Communication-Aware, Energy-Efficient VM Placement in Cloud Data Center Using Ant Colony Optimization.**" The purpose of the study was to discuss virtual machine (VM) placement, which involves mapping of VMs to physical computers. To reduce communication costs, energy consumption, and resource waste, the study applied multi-objective ant colony optimization to the VM placement problem.

Ms. Anjali Choudhary from Dr. Hari Singh Gaur Central University, Sagar, Madhya Pradesh, delivered the paper titled "**A Comparative Analysis of Load Balancing Heuristic Approaches on Cloud Computing Platform.**" as the third speaker of the session. The purpose of this study was to clarify how cloud computing, now the most popular paradigm for computing, meets the demands of various industries in the real world. The research systematically examines the constraints of load-balancing algorithms and categorizes them, shedding light on the many challenges they encounter.

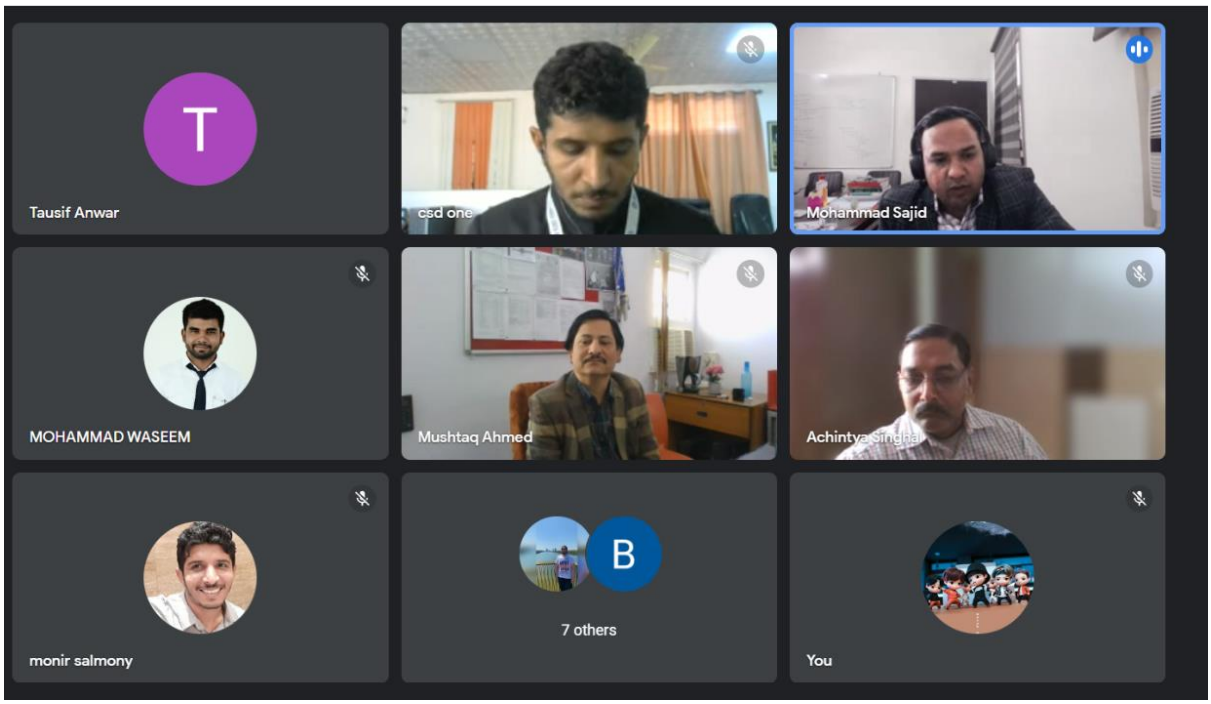
The fourth paper for the session was presented by **Mr. Manoj Kumar Srivastava** from Desh Bhagat University, Fatehgarh Sahib, Punjab, titled "**Efficient Energy Algorithm-based VMs consolidation in Cloud Environment."** Technologies used in cloud computing need a lot of energy. An energy utilization strategy for a time-shared approach throughout the entire computing environment is suggested in research to support cloud technologies in cloud environments. The proposed method was developed in the Cloud Sim simulator. This paper classifies VM placement strategies and suggests new iterated placement methods that consider host load, Swarm Bee-inspired adaptive Threshold to adapt their placement decisions dynamically.

Mr. Sayed Nasir Hasan from Sangam University, Bhilwara, Rajasthan, presented the fifth paper for the session titled "**User Profiling and Interest-Based Machine Learning to Solve the Cold-Start Problem for a Recommendation Engine**". This paper describes a strategy based on user interests that connects user profile information and related user interests. Based on their profiles and interest matching, the company will offer the products to cold-start users and promote them. The strategy is distinctive because it proposes goods based on user interests rather than similarities across items. The Bayesian classifier Chain Classifier had the quickest training and classification times, even though other classifiers were accurate and effective.

The session concluded with a speech by **Prof. Mansaf Alam**, who emphasized the significance of humility and the notion that knowledge surpasses ego. He distinguished between being literate and being educated and underscored the value of respecting others and upholding ethical principles. Prof. Alam urged conference attendees to prioritize writing high-quality

research papers, with compelling titles and clear abstracts, supported by recent references to demonstrate the caliber of their work. He also highlighted the constructive role of criticism in fostering growth and improvement. Prof. Alam concluded by expressing gratitude to the organizers and educators for their contributions and expressed optimism for the future of the conference. The session coordinator then presented certificates to the chairs.

Technical Session Track- 5: Data Mining & Machine Learning



The Technical Session, Day-1, Track-5 focused on **"Data Mining and Machine Learning."** It was conducted in virtual mode and presided and chaired by **Dr. Mushtaq Ahmad**, Associate Professor in the Department of Computer Science and Engineering, NIT Jaipur, and co-chaired by **Dr. Achintya Singhal**, Associate Professor, Department of Computer Science, South Campus, Banaras Hindu University. **Mr. Monir Yahya Ali Salmony** was the facilitator for this session. The coordinator of the session was **Dr. Mohammad Sajid,** Assistant Professor at the Department of Computer Science, Aligarh Muslim University. He introduced the chairs while briefing the audience about data mining and machine learning. A total of six papers were presented in this technical session.

The first paper was presented by **Ms. Balwinder Kaur** from Punjab University titled "**Descriptive Statistical Analysis and Discretization of Academic Data for Machine Learning Techniques."** The paper describes the process of analyzing educational data using descriptive statistical analysis to gain a better understanding of the data set. This study also tries to present the procedure for descriptive statistical analysis of the educational data taken

from the academic environment. Also, predictive classification models were created utilizing discretized datasets, demonstrating the importance of descriptive statistical analysis in discretization and improving classification models' accuracy.

Mr. Md. Gulzar from Maulana Azad National Urdu University, Hyderabad, was the second speaker of the session whose research topic was **"Chronic Disease Management using Semantic Web Technologies."** This paper explores the use of semantic web technologies in the healthcare domain to manage and retrieve large amounts of data related to chronic diseases. In the paper, the technologies, such as ontology, SWRL, and SPARQL, are used to construct a knowledge base from patient data such as health histories, medical guidelines, and medication information. Then, the knowledge base is used to make decisions about patient care, diets, and medication. The paper also examines the potential for remote patient monitoring and decision-making through the use of decision support systems based on the knowledge base.

The third speaker of the session was **Mr. Mohammad Waseem** from Aligarh Muslim University on **"The Issues and Challenges of the KDD Model for Distributed Data Mining Techniques and Architecture."** This paper investigates the Dispersed Data Mining systems, approaches, techniques, and algorithms that can be applied to effectively and efficiently handle distributed data and derive insightful information. Moreover, selected KDD models for Distributed Data Mining were systematically reviewed.

The fourth paper was presented by **Ms. N. Bhavna Reddy** from Bhavan's Vivekananda College of Science, Humanities and Commerce, Hyderabad, titled **"Predictive Analytics on Gender Classification Using Machine Learning"**. The study proposes a statistical machine-learning method for gender prediction based on facial features. In this analysis process, the author applied various machine learning algorithms to classification. The research demonstrated that with its high accuracy, the Gradient Boosting algorithm provided the dataset with the best fit algorithm. The Python machine learning programming language was used to carry out the investigation. Based on the best-fit algorithm, the paper further processes the data for predictions.

The fifth paper was presented by **Ms. Syed Matla ul Qumar** from Jamia Millia Islamia, New Delhi. Her topic of research was **"Neural Machine Translation: A Survey of Methods Used for Low Resource Languages."** The paper proposed a method that will be used to improve the translation accuracy of low-resource languages by utilizing monolingual data, which is typically simple to obtain and available in a significantly higher amount. This method reviews the paper in a broad and well-organized manner. The methods were further classified into two categories based on the modifications required to the NMT model's architecture.

The sixth speaker, **Mr. V. T. Ram Pavan Kumar** from Annamalai University, presented paper on the topic **"Colon Cancer Classification Using Google Net."** The paper presented a study on the classification of colon cancer using deep learning techniques like CNN and GoogLeNet, where a pre-processing step of removing noise from the input image was conducted and the filtered image was segmented using SegNet, and the comparative evaluation showed that GoogleNet was the best classifier for colon cancer classification.

The session concluded with a speech by **Dr. Mushtaq Ahmad**, who shared valuable insights on data analysis, emphasizing its potential to yield valuable outcomes. He underscored the importance of ethical considerations in data analysis, particularly regarding the acquisition and presentation of data from external sources. Dr. Ahmad expressed gratitude to the conference organizers and attendees for their dedicated efforts in organizing the event. He reiterated the significance of responsible and ethical practices in data analysis to ensure the accuracy and meaningfulness of results. Following his remarks, the session coordinator presented certificates to the chair.

1.4 DAY 2: 12 FEB, ICECI – 2023

PLENARY SESSION 2

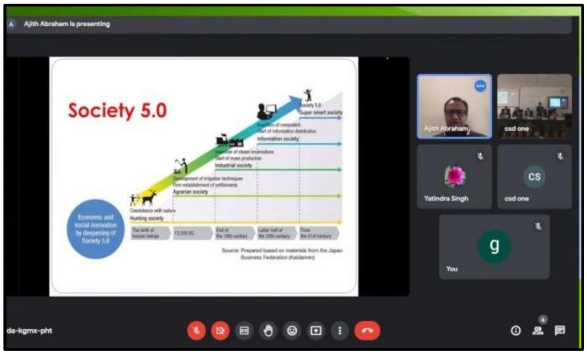
The **Plenary Session-02, Day-2**, held on **February 12th, 2023**, was commenced by **Ms. Ariba Bashar**. The session was graced by the presence of several esteemed guests, including Professor Qazi Mazhar Ali, Professor Ajith Abraham (participating remotely), Professor Yatindra Nath Singh (participating remotely), Professor Muhammad Abulaish, Professor Tamanna Siddiqui in the capacity of General Chair, and Dr. Shafiqul Abidin serving as the Organizing Chair.

*[**Prof Tammana Siddiqui** during the welcome address]*

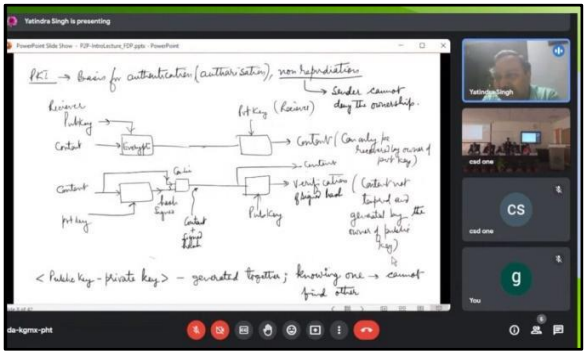
Professor Tamanna Siddiqui delivered the welcome address. She greeted all dignitaries and delegates and spoke highly of the department and university. She emphasized the importance of the conference and encouraged active participation and knowledge exchange among the attendees.

*[Compere of the plenary session 2. From left **Ms. Nabeela Masroor, Ms. Ariba Bashar**.]*

The session's opening speaker was **Professor Yatindra Nath Singh** from the Department of Electrical Engineering, IIT Kanpur, who delivered a keynote address on commercial ventures, embedded systems, and the essentials of authentication and encryption. Professor Singh discussed the disadvantages of centralized systems, the utilization of public and private keys, and the significance of authentication in peer-to-peer systems. Additionally, He also covered topics such as digital signatures, symmetric keys, cloud formation, and certificate verification and signature, providing in-depth explanations of these concepts. His speech provided a comprehensive overview of the importance of secure systems in today's digital landscape. In conclusion, Professor Singh's keynote address was informative and engaging, setting the tone for the rest of the proceedings.



*[**Prof. Y.N. Singh** in his keynote speech]*



*[**Prof. Ajith Abraham** in his keynote speech]*

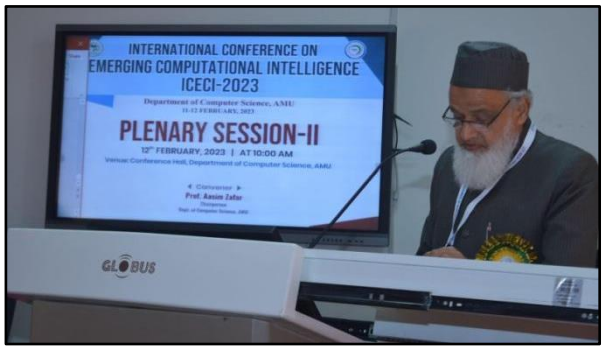
The second speaker of the session was **Professor Ajith Abraham**, the Director of Machine Intelligence Research Labs (MIR Labs), a non-profit scientific network that connects industry and academia, headquartered in Seattle, USA. During his presentation, Professor Abraham discussed data science and artificial intelligence, emphasizing on Industry 4.0 and the four aspects of big data (volume, velocity, variety, and veracity). He also covered the technological advancements in big data and the significance of testing and training phases in biometric pattern recognition and hand gesture recognition. Additionally, Professor Abraham discussed the concepts of functions approximation and approximate reasoning, and their application in multi-objective designed Fuzzy Inference Systems.

Professor Muhammad Abulaish, Chairperson of the Department of Computer Science at South Asian University (SAU), New Delhi, India, delivered a lecture on the subject of "**Social bots - Key Enablers for Emerging Threats in Online Social Networks.**" With over 24 years of experience in academia and research, Professor Abulaish provided a succinct overview of the South Asian University and the LDSA research group. He then delved into the challenges posed by the data deluge in online social networks, highlighting how social bots contribute to these emerging threats.

***[Prof. Abulaish** during his keynote speech.]*

He described the characteristics of online social networks and the associated risks posed by social bots. Topics covered included the injection and analytics of social bots, as well as the detection of social bots using machine learning techniques. Finally, he outlined future research directions in this field.

In a Presidential address, **Professor Qazi Mazhar Ali**, former Dean of the Faculty of Science, AMU, shared his thoughts on big data analysis and commercialized research. The esteemed professor highlighted the significance of identifying research problems and developing algorithms to find solutions.



*[Presidential remark by **Prof. Qazi Mazhar Ali**]*

He further discussed the role of artificial intelligence, fundamental tools such as regression and graph theory, and the significance of multivariable analysis. The professor extended his congratulations to the organizing committee for their efforts and expressed his hope for future events of similar nature. He encouraged young researchers to find practical solutions to problems and to stay informed about the unanswered questions in their respective fields. Professor Ali also highlighted the abundance of resources now available on cyber platforms, making it easier for researchers to access the information they need.

*[Vote of thanks by **Dr. Shafiqul Abidin**]*

In the closing moments of the event, **Dr. Shafiqul Abidin**, Associate Professor in the Department of Computer Science at Aligarh Muslim University, offered his Vote of Thanks. He extended his heartfelt gratitude to the keynote speakers, the president, the delegates, the listeners, and the members of the organizing committee for their participation and contributions. He acknowledged the dedicated efforts of all involved and expressed his sincere appreciation for the event's success. The session was an outstanding success, with the guests actively participating in discussions and imparting their valuable knowledge and perspectives to those in attendance. The presence of distinguished individuals made the session a genuinely enriching experience for all who participated.

TECHNICAL SESSION: DAY 02

The technical sessions on Day 2 (12th February 2023) of the conference began concurrently with five tracks according to the schedule.

Technical Session Track- 6: Machine Learning & Advanced Computing

The technical session titled "**Machine Learning & Advanced Computing**" was designated as Track-6. It was chaired by **Prof. M.M. Sufyan Beg**, Chairperson of the Department of Computer Engineering at Aligarh Muslim University, who was joined by **Dr. Shakir Ali**, Associate Professor in the Department of Mathematics at the same university. **Ms. Sehba Masood**, Assistant Professor in the Department of Computer Science at Aligarh Muslim University, served as the session's coordinator. She introduced the chairs and extended a warm welcome to the participants. **Ms. Deepika Kaushik** acted as the student facilitator for the session. A total of ten papers were presented during Track-6 of the technical session.

The first paper in this session was presented by **Ms. Anam Beg,** Department of Computer Science, Aligarh Muslim University, titled "**Implications of COVID-19 pandemic on**

ovarian cancer mortality". The effects of COVID-19 on patients with ovarian cancer, the monitoring of the CA125 trend in ovarian cancer patients with COVID-19, and how COVID-19 influences the death rate in cancer patients were given priority in this review paper.

The second paper was presented by **Mr. Mohd, Hamza Zaki,** Mangalayatan University, Aligarh titled **"Hand Drawn Graph Recognition".** This paper deals with recognizing hand-drawn images. Hand-drawn graph recognition could be employed to recognize engineering diagram graphics. If engineering diagrams from hand-drawn images could be identified and turned into a format recognizable by the case tool software, this problem might be solved.

The third paper was presented by **Mr. Shiekh Burhan Ul Haque,** Department of computer science, Aligarh Muslim University, titled "**Adversarial Attack: Compromising the security of Deep Learning Based COVID-19 Diagnosis Systems**". This study showed that adversarial attacks can cause adversarial deep learning-based COVID-19 diagnosis systems to produce incorrect predictions. With an untargeted Fast Gradient Sign Gradient (FGSM) adversarial approach, they were able to successfully combat the deep learning-based COVID-19 diagnosis model on X-Ray pictures. The deep diagnostic model had a 95.56 percent average accuracy.

The fourth paper was presented by **Mr. Syed Shamikh Iqbal,** Department of Computer Science, Aligarh Muslim University, titled "**Quantum Computing and Effects of Shor's Algorithm on Classical Cryptographic Techniques**". The process of quantum cryptography was demonstrated in the article, along with comparisons of the traditional cryptographic integer factorization techniques, Trial Division, Quadratic Sieve, and Shor's Algorithm. Additionally, a brief explanation of Shor's algorithm was given about quantum computing capabilities, and the performance of Shor algorithms in attacking traditional cryptosystems was also discussed.

The fifth paper was presented by **Ms. Amal Esmail Qasem,** Department of Computer Science, Aligarh Muslim, titled "**Leveraging Contextual Features to Enhanced Machine Learning Models in Detecting Covid-19 Fake News**". To describe the context of the text, several aspects, such as word count, hashtag count, sentiment, etc., have been extracted and then concatenated in this research, utilizing the Term Frequent Inverse Document Frequency approach to the embedded tweet functionality. These features are then fed into six machine-learning models to determine whether the given text is real. The performance of the Models is then assessed using the Covid-19 false news benchmark dataset. Comparing the findings, it can be seen that using these models with quality features can improve baseline models' overall performance by a factor of [0.5 to 2].

The sixth paper was presented by **Mr. Talha Umar**, Department of Computer Science, Aligarh Muslim University, titled **"Modified Chaotic Quadratic Map with Improved Robust**

Region". This paper investigated and evaluated the stability of the chaotic quadratic map in this research. For communication, robust chaotic maps having a sizable robust zone are preferable, especially in cryptography, to increase the key length.

The seventh paper was presented by **Mr. Mohammad Aijaz,** from Jamia Millia Islamia, titled **"Modelling and analysis of social engineering threats using the Attack tree and the Markov model".** In this study, the principles and methods of persuasion employed in SETs are modeled and evaluated. This article computed the attack occurrence likelihood (AOL) using the attack tree model based on the frequency data of various SETs and the associated modality and persuasive principle applied. Based on the effectiveness data of the modality and persuasion principles utilized in the SETs, the attack success probability (ASL) is calculated using the Markov chain model. To validate the proposed model, examples from several SETs are employed. The encouraging results indicate that this approach would be appropriate for understanding and ranking SETs.

The eighth paper was presented by **Mr. Gaurav Yadav**, Department of Computer Science, Aligarh Muslim University, titled **"Comparative Study on Mental Stress Detection through the Machine Learning Techniques".** This review paper deals with the study of the implementation of AI for the early detection of mental health issues with a focus on the dimension of AI and its subfields, such as machine learning, for the early-stage detection of issues related to mental health with optimized accuracy. This study provided a helpful review of the prior study and concluded that the SVM is the most suitable algorithm for mental health detection.

The ninth paper was presented by **Mr. Ali Reshi Junaid,** Aligarh Muslim University, titled **"Leveraging Transfer Learning for Detecting Misinformation on Social Media".** This study investigates the application of deep learning to identify false content on Reddit, one of the well-known online communities. The suggested method combines deep learning and natural language processing to find posts containing false information and flag them for further examination. We test our model using a benchmark dataset of Reddit posts, and the results demonstrate that it can accurately detect disinformation.

The tenth paper was presented by **Mr. Monir Yahya Ali Salmony,** Department of computer science, Aligarh Muslim University, titled **"Leveraging Attention Layer in Improving Deep Learning Models Performance for Sentiment Analysis".** This work intends to use the attention mechanism to enhance the performance of the models in sentence-level sentiment analysis. Vanilla RNN, LSTM, and GRU models are used to compare the outcomes to the baseline. According to the experimental findings, adding attention to these models can

significantly improve overall performance in the indicated evaluation measures, improving decision-making effectiveness.

The session concluded with remarks from **Dr. Shakir Ali**, followed by the presidential remarks from **Prof. M.M. Sufyan Beg**. The coordinator of the session then presented the certificates to the chairs, followed by a photo session.

Technical Session Track- 7: Machine Learning and Security Applications

The theme of technical session Track-7 was "**Machine Learning and Security Applications**" The session was chaired by **Dr. Salma Shaheen (Preside)**, Principal of Women's Polytechnic, AMU, and **Dr. Tameem Ahmad**, Assistant Professor, Department of Computer Engineering AMU Aligarh. **Dr. Swaleha Zubair**, Department of Computer Science, AMU, welcomed the chairs and all the delegates, followed by a comprehensive overview of the concept of Machine Learning and Security Applications. She emphasized the benefits, scope, current global trends, and future prospects of the field. **Mr. Khalid Anwer** served as the facilitator for this session.

Eight papers were presented during the session, each delving into various aspects of Machine Learning and Security Applications.

The session's first speaker was **Mr. Mahfooz Alam** from Aligarh Muslim University, who addressed the subject of "**Security Driven Dynamic Level Scheduling under Precedence Constrained Tasks in IaaS Cloud**." The research proposed a security-driven dynamic level scheduling algorithm (SDLS) for the IaaS cloud, which aims to improve task allocation in a heterogeneous cloud system by taking security requirements into account. The proposed algorithm resulted in enhanced risk probability and makespan compared to existing algorithms.

The second speaker of this session was **Mr. Mohd. Shaliyar** from Jamia Millia Islamia. He spoke on the topic of "**Comparative analysis of DWT, SLT, and SWT for source authentication in online social media**". The proposed methodology in the article performs a comparative evaluation of three different watermarking techniques (DWT, SLT, and SWT) to determine the first user of shared content on Online social media (OSM) by using a 10-digit phone number, a Social Security Number (SSN), AADHAAR number, and GPS coordinates as watermarks, and the results show that SLT outperformed DWT and SWT in terms of robustness and performance after being subjected to various signal processing assaults.

Mr. Aquib Iqbal from Aligarh Muslim University presented paper titled "**Zea Mays Leaf Disease Classification Using Swin-Transformer"** as the session's third speaker. The paper describes the use of deep learning techniques, specifically, the Swin Transformer, which was effective in classifying maize leaf diseases such as blight, common rust, and gray leaf spot with an overall accuracy of 95.9%.

Mr. Imran Khan from Aligarh Muslim University presented paper titled "**Comparison and Application of Deep Learning-Based Graph Embedding Methods**" as the fourth speaker in this session. The article reviews the use of deep learning-based network analysis techniques and their challenges, including dimensionality reduction, processing large graphs, expressiveness, and graph splitting, and concludes by discussing possible applications and future directions.

The fifth speaker of this session was **Mr. Haitham Mohammed Abdul Wahab Ahmed** from Aligarh Muslim University. He staged his paper titled "**Design of Novel Encryption and Decryption to Secure Data in the Cloud: Using RSA & AES Algorithm**". The study aimed to investigate and evaluate a new encryption and decryption protocol using Rivest-Shamir-Adleman and Advanced Encryption Standard algorithms to secure information transmission in the cloud, implementing a hybrid method with three distinct keys to enhance security and reduce data transfer time while providing complexity for attackers.

Mr. Mohd Zain Khan from Aligarh Muslim University presented paper titled "**Comparative Study on Detection of IoT Attacks Using Machine Learning Techniques**" as the session's sixth speaker. This study analyzes different machine learning algorithms for detecting security threats in IoT networks and devices, which have risen due to the rapid spread of IoT into various aspects of life, and compares the results of various machine learning methods used by researchers to detect IoT attacks.

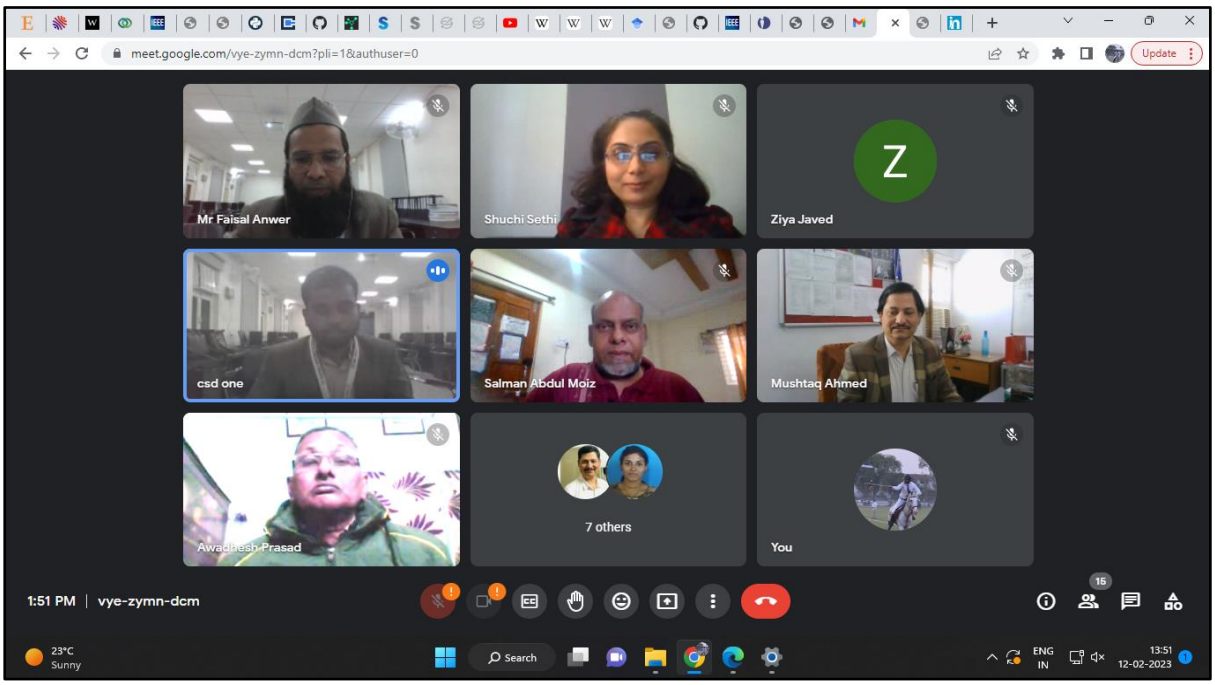
The seventh speaker of this session was **Mr. Shahnwaz Afzal** from Aligarh Muslim University. He presented his paper titled "**Performance of Software & Hardware oriented Lightweight Stream Cipher in constraint Environment-A Review**". This study compares the performance of stream ciphers on both software and hardware bases, as lightweight cryptography offers protection against brute force and exhaustive key attacks for secure internet communication.

Mr. Salman Ali from Aligarh Muslim University presented his paper titled "**Hybrid Model of AES and ECC for Data Security**" as the session's eighth speaker. In this work, a hybrid method combining Elliptic Curve Cryptography (ECC) and Advanced Encryption Standard (AES) with a genetic algorithm is proposed as a solution to overcome the limitations of symmetric and asymmetric key algorithms in providing efficient data security.

The session concluded with remarks from **Dr. Salma Shaheen (Preside)**, who emphasized the significance of research and encouraged student participation in such events. She extended gratitude and congratulations to all participants. **Dr. Swaleha Zubair** then presented certificates to the session chairs, followed by a photography session.

In conclusion, the technical session was a resounding success. It offered a comprehensive overview of Machine Learning and Security Applications, with presentations that were both informative and enlightening. The session witnessed active participation, and discussions were productive and engaging.

Technical Session Track- 8: Computing Applications



The technical session Track-8 was conducted virtually on "**Computing Applications**". **Prof. Salman Abdul Moid**, a Professor at the University of Hyderabad, presided over the session along with **Dr. Shuchi Sethi**, Assistant Professor and Deputy Head of the Department of Computer Science at NIET, Greater Noida. **Dr. Faisal Anwer**, an Assistant Professor in the Department of Computer Science at AMU, coordinated this session, while **Mr. Mahfooz Alam** served as the student facilitator. A total of six papers were presented during this session.

The first paper for the session was presented by **Ms. Harpeet Kaur** from Delhi Technical Campus (GGSIPU), titled "**Prognosis of Diabetes Mellitus Based on Machine Learning Algorithms**". In this paper, a model was developed that can predict diabetes in patients with a high degree of accuracy. As a result, three classification-based ML algorithms, Decision tree, Support Vector Machine (SVM), and Nave Bayes, are applied in our work for early identification of Diabetes Mellitus (DM). Following a comparison examination, it was discovered that Nave Bayes had the greatest accuracy among other algorithms. Receiver Operating Characteristic (ROC) curves are traced in an ordered manner to verify results.

The second paper for the session was presented by **Ms. Kritika Purohit** from Delhi Technical Campus (GGSIPU) titled "**Necessity and Role of Blockchain technology in the Domain of Cyber Security and Data Science**". This paper emphasized on the importance of blockchain technology and various applications in today's world. In blockchain-based technology, a lightweight password security authentication is needed which is part of the smart factory RFIS

system. Blockchain can bring trust in decentralized data storage and also can bring changes in business automation.

From Sri Sairam Engineering College, **Mr. Ramyaa Madhavan, Kirthiga M.** and **Ms. Prakriti B** presented the third paper of the session titled "**Improving Safety in Hazardous Underground Conditions Using LoRaWAN and WUSN**." This research presented a strategy to construct a smart suit with sensors built in it to securely convey data to managers concerning dangerous circumstances and the physical state of mine workers, boosting overall safety. The microcontroller, coupled with the Lora Transmitter module, have many sensors for monitoring pressure, smoke, gases, and temperature. The ground station is made up of circuitry that receives data from the coal mine or mine operators. At the event of a deviation from typical values, the operations in the ground station quickly notify the person working with LoRaWAN. The total safety of mine operators is increased by using this WUSN approach.

Mr. Ziya Javed from Jamia Hamdard University, New Delhi, presented the fourth presentation for the session titled "**Exploring Research Supervisor Recommendation: Student-centric or Supervisor-centric.**" This paper examined ten studies and classified them based on the preference expressed when recommending, i.e., student-centric, where preference is given to students, supervisor-centric, where preference is given to the supervisor, or hybrid approaches, where we evaluate data from both the supervisor and the student. Supervisor recommendation systems have been classified into three types: content-based filtering, collaborative filtering, and hybrid filtering. Furthermore, this research looks at the numerous algorithms utilized in each form of recommendation system.

Mr. Awadhesh Prasad from the PG department of Physics from the Veer Kunwar Singh University in Ara, India, presented the fifth paper for the session, titled "**Review on Localized Demand-Driven Routing Protocol**. "This paper explained and examined a novel distributed routing algorithm that is especially built to accommodate highly dynamic networks in order to reduce cost overhead and save electricity.

The last speaker of this session was **Mr. Mushtaq Ahmed** from MNIT, Jaipur. He presented his paper titled **"An Expert system for analyzing the behavior of students in the higher education".** The study presented the Student Mindfulness Survey as a new measure of college students' mindfulness, which was validated through structural and concurrent validity analyses on a sample of 208 students and showed positive results, highlighting the importance of future research in educational data mining.

The session concluded with a presidential remark from **Prof. Salman Abdul Moid**, who expressed gratitude to all the participants for their valuable contributions to the diverse topics

presented during the session. He emphasized the importance of attending conferences like these to gain insights and expand one's knowledge in the field. Finally, the coordinator presented certificates to both the chairs as a token of appreciation for their efforts.

Technical Session Track- 9: Network Security

The Track-9: "**Network Security**" and was a virtual technical session. It was chaired by **Prof. Sultan Ahmad (Preside),** from Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia, and **Dr. Asif Irshad Khan,** King Abdul Aziz University, Jeddah, KSA. The coordinator for this session was **Dr. Asad Malik,** Assistant Professor, Department of Computer Science, AMU. He gave a brief overview of the concept of Network Security and mentioned the advantages, scope, current global trends, and current perspectives. The student facilitator for the session was **Mr. Mohammad Luqman.** A total of eight papers were presented during this session.

The first paper of the session was presented by **Mr. Mohd Mustaqeem** from Aligarh Muslim University, titled "**Performance Evaluation of Software Defect Prediction with NASA Dataset using Machine learning techniques**". The paper focuses on the application of machine-learning techniques for software defect prediction and seeks to enhance software quality by assessing the effectiveness of various machine-learning approaches. To avoid

overfitting, the results were balanced using the Synthetic Minority Oversampling Technique (SMOTE), and they will serve as a road map for better software fault prediction performance.

The second presenter of this session **Mr. Devendra Kumar Misra** from ABES Engineering Collage, presented thepaper titled "**Achieving the Security in Cyber World through Blockchain: A Taxonomy**". The paper explores the cryptographic principles behind blockchain technology and its underlying fundamentals, including data, network, consensus, contract, and application levels, to offer secure decentralized solutions for various industries such as finance, healthcare, legal, the internet of things, and information security.

The third presenter of this session **Dr. Haider Allamy** from Maysan Education Directorate, Iraq, presented the paper titled "**Proposing a method for community detection with multi-objective particle swarm optimization algorithm**". This paper presents a new method for identifying communities in social networks using a multi-objective particle swarm optimization algorithm, which has been shown to be optimal through evaluation results. The method takes into consideration the complexity of finding communities on social media, including the diversity of data types, the presence of communities, and the uncertainty of their number and internal densities.

The fourth speaker of this session **Mr. Kaushal Kumar** from Department of Statistics and Computer Applications, T.M. Bhagalpur University, Bihar, presented the paper titled "**Testing Effort Based Software Reliability Growth Models: A Comprehensive Study**". The paper discusses the importance of software reliability in modern society and presents a review of testing effort dependent software reliability growth models, including the incorporation of an exponentiated Weibull testing effort function into a delayed S-shaped model, validated with real data and compared to previous models, ultimately concluding with the contributions and potential for further research

The fifth speaker of this session **Mr. Ahmad Nafis** from Jamia Hamdard, New Delhi, presented the paper titled "**Differential Privacy in Recommender System: Challenges and Opportunities**". This paper reviews the use of differential privacy to secure user data in recommender systems, particularly through Collaborative Filtering, Gaussian mechanism, and Clustering strategy, while acknowledging the limitations of the technology.

The sixth speaker of this session **Mr. Jhhunu Khan** from the Department of Statistics and Computer Applications, T.M. Bhagalpur University, Bihar, presented the paper titled "**Security and Privacy Technique in Big Data: A Review**". This paper presents a comprehensive overview of the research on privacy and security in Big Data, highlighting the

advantages, difficulties, and potential strategies for protecting the privacy and security of Big Data, and aims to provide useful information for new researchers in the field.

The seventh speaker of this session **Mr. Ahmed Kawsar Laskar** from the Department of Computer Science and Engineering, School of Engineering Sciences and Technology, Jamia Hamdard, New Delhi, presented the paper titled "**Shilling Attacks on Recommender System: A Critical Analysis**".This paper examines the vulnerability of Collaborative Filtering (CF) recommender systems to shilling attacks through the insertion of fake and biased profiles, and provides a summary of findings and limitations, along with potential areas for future research in this field.

The seventh speaker of this session, **Ms. Tehseen Fatma** from Al-Falah University, Haryana, presented the paper titled "**Software Defect Estimation Using Data Mining Techniques: Experimental Study of Algorithms on "PROMISE" Repository**". The purpose of our experimental study is to examine the utilization of various data mining techniques including Support Vector Machine, C4.5, Bagging, Naive Bayes, K-Nearest Neighbors, Neural Networks, Random Forest, Decision Trees, and Radial Bias for the estimation of software defects in the early stages of the software development life cycle. The objective of this study is to achieve cost-effectiveness and appropriate resource planning through the analysis of dataset repositories and evaluation metrics for software defects estimation.

In conclusion, the technical session Track-09 underscored the critical importance of network security and showcased diverse research approaches to address this pressing issue. Papers presented in this session delved into topics such as machine learning, blockchain technology, software reliability, differential privacy, Big Data privacy and security, social networks, and recommender systems, demonstrating the multifaceted nature of network security research. The insights provided by these papers offer valuable contributions to the field and pave the way for future exploration and advancements. Overall, the session highlighted the paramount significance of network security in contemporary society and underscored the need for continued research and innovation in this domain.

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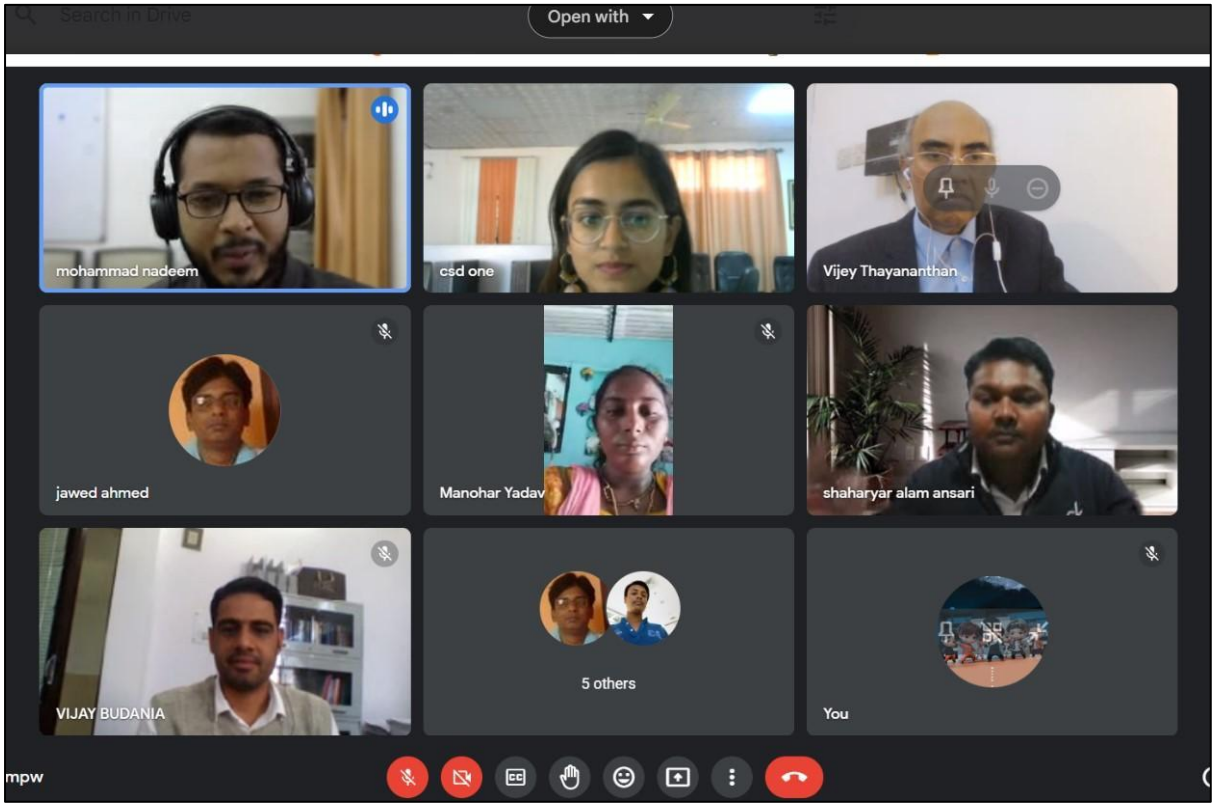
Technical Session Track- 10: Deep Learning



The technical session Track-10, focused on "**Deep Learning**" held in virtual mode. It was chaired by **Dr. Jawed Ahmad,** Assistant Professor, Jamia Hamdard University, New Delhi, and presided over by **Prof. Vijey Thayananthan,** Professor, King Abdul Aziz University, KSA. The coordinator for this session was **Dr. Mohammad Nadeem**, Assistant Professor, Department of Computer Science, AMU. The student facilitator for the session was **Mr. Monir Yahya Ali Salmony.** Throughout the session, five papers were presented, each contributing to the exploration and advancement of deep learning technologies.

The first speaker of the session **Mr. Shaharyar Alam Ansari** from Aligarh Muslim University, Aligarh, presented the paper titled **"A Comprehensive Study on Video Captioning Techniques, Benchmark Datasets, and QoS Metrics."** The paper provided an overview of current video captioning usage and advancements for people with visual impairments. According to the paper, object identification and natural language processing technology have advanced. They are currently employed in video captioning, enabling the development of captions that describe the images in a video clip. The presenter analyzed various video captioning approaches, benchmark datasets, and explored potential future prospects for video captioning. The paper finishes with recommendations for future research and advancement in video captioning.

The second speaker of the session **Mr. Anjani Kumar Singha** from Aligarh Muslim University, Aligarh, presented the paper titled **"Combination of Optimization Methods in a Multistage Approach for a Deep Neural Network Model."** The paper focused on the importance of gradient descent optimization in deep learning and its potential for improvement through the combination of various optimization methods. The proposed architecture combines different learning rate methods and adaptive methods to achieve improved performance in training deep learning models. The research was motivated by the principles of SGDR, warm-up, and CLR, and the results of training tests with large deep learning networks validate the efficiency of the proposed combination technique. The aim of the research is to provide a theoretical foundation for the application of gradient descent optimization in deep learning and demonstrate its effectiveness in improving network performance.

The third speaker of the session was **Mr. Vijay Budania** from the Malaviya National Institute of Technology, Jaipur. He presented the paper titled **"Deep Learning with encoders for Intrusion Detection Systems."** The paper proposed a deep learning-based Intrusion Detection System (IDS) to detect zero-day attacks in communication networks. The IDS used a Convolution Neural Network, bi-directional Long Short-Term Memory (LSTM), and a stack of encoders to effectively handle spatial and temporal data. The proposed method creates a model of normal network traffic and classifies attacks using characteristics discovered in the dataset. The model had a low False Positive Rate and a high Detection Rate compared to other models.

The fourth speaker of the session was **Ms. Nisha** from Chandigarh University, who presented the paper titled **"Deep Neural Network-based Nuchal Translucency Marker Detection Using Directional Iteration Forward Propagation."** The paper proposed an automated method for measuring Nuchal Translucency (NT) during early prenatal ultrasound screening using deep neural networks. Here, a network is trained to identify the region of interest for NT measurement. In order to calculate weighted terms for thickness estimation, the presenter also employs an autonomous computerized method to determine the ideal NT layer thickness. This method extracts local intensity, edge strength, and continuous data. According to the findings, this method may produce more accurate and reliable results in NT measurement.

The fifth speaker of the session **Ms. Naruboina Srilatha** from Computer Science and Engineering, JNTUA, Ananthapur, India presented the paper titled **"Mean AR-Local Binary Pattern for Facial Expressions Classification Based on KNN Classifier."** The paper focused on facial expression recognition (FER), a crucial area of image processing research. Using the Extended Cohn-Kanade (CK+) and Japanese Female Facial Expression (JAFFE) datasets, the system described in the paper can identify all eight basic facial emotions. LBP Patterns,

particularly Asymmetric Region LBP (AR-LBP) and Mean Asymmetric Region LBP (Mean AR-LBP), as well as the GLCM feature extractor approach were employed in the study as methodologies. In order to build a feature vector, the GLCM computes a number of characteristics, including contrast, correlation, homogeneity, entropy, mean, variance, and dissimilarity. The study's findings were then contrasted with the conventional LBP, which classifies facial emotions using the K-Nearest Neighbor (KNN) method.

The session concluded with a speech by **Prof. Vijey Thayananthan**, who shared his insights on recent advancements in the field of deep learning. He expressed gratitude to the conference organizers and participants for their dedication and hard work in making the event successful.

INDUSTRY TALK

The Industry Talk commenced with dignitaries taking the stage, followed by an opening address from **Dr. Mohammad Nadeem**, Assistant Professor at Aligarh Muslim University. He extended a warm welcome to all attendees, both on and off the dais. **Ms. Laeeba Javed** served as the compere for the session.

*[Welcome speech by **Dr. Nadeem**]*

[Distinguished guest on the dais in the Industrial Talk]

The session featured presentations from three highly respected speakers, beginning with **Dr. Adel Saleh Ali Al-Raimi,** Gaist Solutions Ltd, Skipton, U.K., Dr. Al-Raimi, a highly proficient computer science professional, shared his expertise and understanding on MLOps remotely. He stressed on the importance of data and discussed the challenges associated with data cleaning, offering insights into ways to overcome these challenges. Additionally, he explained how ensemble models can be utilized to address data-related issues and elaborated on the concept of model drifting, providing valuable perspectives on the latest industry trends and advancements.

*[Compere of the session **Ms. Laeeba Javed**]*

Next, **Dr. Mohammad Jibreel,** a Senior Applied Scientist at Microsoft, Cairo, Egypt, delivered his talk remotely. The speaker covered a comprehensive overview of machine learning, including the deployment of successful DL models, the stages of the ML pipeline, challenges that may arise when creating a ML model, utilizing unlabeled data, and estimating the quality of generated synthetic data. He explained each of these topics in detail, including best practices, common challenges and how to overcome them, and metrics for measuring the effectiveness of the models and data. The speaker provided a comprehensive understanding of the machine learning process, from data collection to deployment.

*[**Mr. Akram** during his speech in the industry talk]*

Finally, **Mr. Akram Ahmad** from ZMQ Software Systems, Delhi, provided insightful advice and practical strategies for achieving success in the sector. He described the use of technology by his NGO to improve the lives of underprivileged people. He also discussed FreedomTV, software that captures actions in order to track the individuals who take medication thereby removing sickness from its source. He described the IoT device's method for gathering data from AI. He also discussed how data can be used to inform future planning by using the example of a fighter plane returning from a battle to illustrate the narrative process of data.

[*Presidential remark by **Dr. Parvez]***

[*Vote of thanks by **Dr. Faisal Anwer]***

The event was wrapped up with a Presidential address of **Dr. Parvez Mahmood Khan,** Director, PMNF Computer Centre, AMU and a vote of thanks from **Dr. Faisal Anwer,** Assistant Professor, Aligarh Muslim University.

Dr. Anwer expressed gratitude to the guests, dignitaries on the dais, and the speakers for their valuable contributions, making the event highly informative and engaging. Attendees gained a deeper understanding of the industry and its recent developments, thanks to their insights and expertise.

VALEDICTORY SESSION

[Distinguished guest on the dais in the Valedictory Session]

The Valedictory Session commenced with the dignitaries being invited on stage, followed by a recitation from the Holy Qur'an by **Mr. Syed Mohammad Hamza Husain**.

The convener, **Prof. Aasim Zafar**, Chairperson of the Department of Computer Science at Aligarh Muslim University, then presented the conference report. He illuminated the key achievements and events of the conference, highlighting the journey the department undertook to reach this day. He detailed the number of tracks, their themes, and the total number of papers presented, which were 36 in offline mode and 35 online. Additionally, he announced that in each track, one paper had been selected for the best paper award.

*[Conference report presented by **Prof. Aasim Zafar**]*

This was followed by an address from **Prof. Pervez Mahmood Khan**, Director of the PMNF Computer Centre at AMU. He emphasized the importance of practically implementing the ideas inspired by the track sessions.

The Guest of Honour, **Prof. Afifullah Khan**, a professor at Aligarh Muslim University, spoke next. He discussed the rapid advancements in information and communication technology. He shared his experiences using punch cards and early programming languages, expressing his amazement at how quickly the computing landscape has evolved. Prof. Khan underscored the significance of using computational intelligence in interdisciplinary research.

Following his speech, the best paper awards were announced track by track. There were ten tracks in total, with four conducted offline and six online. The winners of the offline tracks were felicitated on stage with **Best Paper Certificates**, while the certificates for the online tracks were mailed to the winners.

*[**Prof Pervez Mahmood Khan** during his speech]*

*[**Prof. Afiffulah Khan** during his speech]*

Best Paper Award from Day 1 (Track 1- 5)

Track	Title of the paper	Presenter	Affiliation	Authors	Presentation
1	Learning based productive modeling of student counseling Gratification: A case study of Aligarh Muslim University	**Mr. Ahmad Raza Shibli**	Aligarh Muslim University	Mr. Ahmad Raza Shibli; Mr. Khushnood Bilal; Mr. Mohammed Sarim; Ms. Nabeela Masroor; Ms. Noor Fatima	Physical mode
2	Enhancing the cryptographic key using sample entropy and Whale optimization Algorithm	**Mr. Md Saquib Jawed**	Aligarh Muslim University	Mr. Md Saquib Jawed; Dr. Mohammad Sajid	Physical mode
3	Lung Cancer classification using fine-tuned VGG 16	**Mr. Nitha V R**	University of Kerala	Mr. Nitha V R	Virtual mode
4	User profiling and interest-based machine learning to solve the cold start problem for a recommendation engine	**Mr. Sayed Nasir Hasan**	Sangam University, Rajasthan	Mr. Sayed Nasir Hasan	Virtual mode
5	Descriptive statistical analysis and discretization of academic or academic data for machine learning Techniques	**Mr. Balwinder Kaur**	Punjab University	Mr. Mohammad Abdullah Tahir; Mr. Zamam Farhat; Mr. Mohd Umair Rizwan Khan; Mr. Jaafar Gaber; Mr. Musheer Anwar; Mr. Prosper Eguono Ovuoraye	Virtual mode

*[Distribution of **Best Paper Award** to the participants]*

Best Paper Award from Day 2 (Track 6- 10)

Track	Title of the paper	Presenter	Affiliation	Authors	Presentation
6	Leveraging transfer learning for detecting misinformation on social media	**Mr. Junaid Ali Reshi**	Aligarh Muslim University	Mr. Junaid Ali Reshi; Mr. Rashid Ali	Physical mode
7	Hybrid Model of AES and ECC for data security	**Mr. Salman Ali**	Aligarh Muslim University	Mr. Salman Ali; Dr. Faisal Anwer	Physical mode
8	An expert system for analyzing the behavior of students in higher education	**Dr. Mustaq Ahmed**	MNIT, Jaipur	Mr. Pravesh Kumar Bansal; Dr. Mushtaq Ahmed	Virtual mode
9	Performance evaluation of software defect prediction with NASA dataset using Machine Learning Techniques	**Mr. Mohd Mustaqeem**	Aligarh Muslim University	Mr. Mohd Mustaqeem; Dr. Tamanna Siddiqui	Virtual mode
10	Deep learning with encoders for intrusion detection systems	**Mr. Vijay Budania**	Malaviya National Institute of Technology, Jaipur	Mr. Vijay Budania; Dr. Mushtaq Ahmed	Virtual mode

The Chief Guest, **Prof. Abdul Alim**, Dean of Students' Welfare at AMU, offered his thoughts and insights on the importance of the conference. He discussed the new education policy in India, highlighting the significance of regional languages. He acknowledged the challenges posed by the new educational policy for both teachers and learners, but expressed his confidence that ICT and innovative learning technologies will undoubtedly ease the transition.

Finally, **Dr. Mohammad Sajid** delivered the vote of thanks. The session concluded with the performance of the Aligarh Muslim University Tarana, followed by the National Anthem.

The Valedictory Session was a fitting conclusion to a successful conference, leaving the dignitaries and attendees feeling proud and inspired.

*[**Prof. Abdul Aleem**, D.S.W., during his speech]*

*[**Dr. Mohammad Sajid** delivering vote of thanks]*

*[The **Tarana** Team]*

From left to Right:

Girls: *Ms. Ilma Khan, Mr. Abeeha Hasan, Ms. Laiba Javed*
Boys: *Mr. Danish Iliyas Ahamad, Mr. Ziaul Mustafa, Mr. Ariz Aftab, Mr. Aman Tariq*

1.5 Conference Organization Chairs and Committees

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Aligarh

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Dr. Mohammad Sajid
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Department of Computer Science
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3. Mr. Talha Umar

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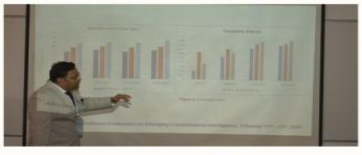
1.6 The People behind the Scenes


Comparative Study on Mental Stress Detection
through the Machine Learning Techniques
GLOBUS


Prof. Abdul Alim
Chief Guest


TORY SESSION

GLIMPSES




ICECI-2023
Department of Computer Science


VALEDICTORY SESSION
INAUGURAL SESSION

The People that made it possible

*[The architects of the event. From left **Prof. Aasim Zafar** and **Dr. Arman Rasool Faridi**]*

[Group photo of the volunteers]

[Group photo of the undergraduate volunteers]

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[Group photo of the stage and auditorium management team]

2
Book of Abstracts

1st INTERNATIONAL CONFERENCE ON EMERGING COMPUTATIONAL INTELLIGENCE
ICECI'23
FEBUARY 11-12 2023

Department of Computer Science, Aligarh Muslim University, Aligarh (INDIA)

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Paper Id: 3

FOG NODE PLACEMENT USING MULTI-OBJECTIVE GENETIC ALGORITHM

Satveer Singh & Deo Prakash Vidyarthi
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The emergence of the Internet of Things (IoT) has paved the way for numerous activities leading to smart life, such as health care, surveillance, and smart cities. Since many IoT applications are real-time, they need prompt processing and actuation. To enable this, a network of Fog devices has been developed to provide services close to the data generation points, i.e., the network's edge. Designing a feasible Fog network for managing the explosion of data from the edge to the Cloud requires intelligent monitoring. This work develops a model to address the issue of Fog node placement in a geographical area. The proposed model determines the location of the Fog devices and how to connect them to the Cloud in the best feasible way. Using a multi-objective genetic algorithm (MOGA), the proposed model minimizes the Deployment Cost (DC) and network latency (NL). The simulation setting is designed in Spyder (Anaconda3) using Python programming.

Keywords— Fog Computing, Fog Node Replacement, Genetic Algorithm (GA), Internet of Things.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01530-1

Paper Id: 6

COMMUNICATION-AWARE, ENERGY-EFFICIENT VM PLACEMENT IN CLOUD DATA CENTER USING ANT COLONY OPTIMIZATION

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The many advantages of the cloud computing trend are being recognised by an increasing number of tech-savvy companies and industry leaders utilising this technology to run their businesses, provide better customer service, and significantly boost their overall profit margins. In a cloud computing environment, users submit their jobs to run on virtual machines instead of a cloud host. Mapping virtual machines to physical machines is known as virtual machine placement (VMP). There may be communication among the VMs, which may lead to network congestion. Hence, VMP has significant importance with respect to resource utilization, energy consumption and total communication cost in data centres. In this work, we have applied multi-objective ant colony optimization for the VMP problem to minimize communication cost, energy usage and resource wastage. The proposed work is simulated, and analysis is done on how these factors affect each other and vary with the increasing load. Numerous experiments are performed with varying resource correlation coefficients in the requested VMs for performance analysis of this work. As observed, the proposed ant colony optimization-based metaheuristic algorithm outperforms multi-objective genetic algorithm, other ant colony optimization based, well-known heuristic-based first fit decreasing algorithms, and random-based approaches in terms of overall power consumption, resource wastage and the total network data transfer rate.

Keywords— Virtual Machine, Ant Colony Optimization, Multi-Objective Optimization, Communication Aware Placement.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01531-0

Paper Id: 30

SECURITY DRIVEN DYNAMIC LEVEL SCHEDULING UNDER PRECEDENCE CONSTRAINED TASKS IN IAAS CLOUD

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High performance in large-scale heterogeneous distributed infrastructure, like cloud computing depends on effective scheduling algorithms. List-based scheduling is one of the most effective heuristic technique for allocating task graphs of fully connected heterogeneous cloud systems. However, few list-based scheduling algorithms used today takes into account the security needs of the applications or the security services provided by the cloud providers. The mapping of high-priority tasks onto the virtual machine satisfying the security requirements is challenging in the cloud environment. In this work, a security-driven dynamic level scheduling (SDLS) algorithm is proposed for the IaaS cloud using a dynamic level, considering the security overheads into account during the task prioritization and the virtual machine selection phases. SDLS offers more reliable virtual machines to the higher security demand tasks to reduce the risk probability. The suggested SDLS outperforms the existing algorithm in terms of makespan and risk probability, as shown in the performance study.

Keywords: IaaS cloud, Dynamic level scheduling, Precedence constrained, Security overhead, Risk probability, Makespan.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01523-0

Paper Id: 36

PARAMETER TUNING IN METAHEURISTICS: A BIBLIOMETRIC AND GAP ANALYSIS

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Parameters are an integral part of every metaheuristic algorithm as these control different aspects of algorithms. Thus, parameter tuning (PT) approaches are one of the prime sub-domains of metaheuristics. The proposed study presents two analyses of PT approaches (i) Bibliometric analysis (BA), for a quantitative overview of the literature giving a multi-dimensional view of studies carried down, and (ii) gap analysis (GA), for identifying voids in the research field. This analysis has been conducted for the time period 2002–2022 over the Scopus database. This study enables a macroscopic view of the field of PT and enables researchers to determine the gaps existing in PT methods, paving the way for future research. To the best of our knowledge, this is the first study presenting a BA and GA over PT methods.

Keywords— Bibliometric analysis, Gap analysis, Metaheuristics, Parameter tuning, Parameter setting, Literature review, Scopus.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01694-w

Paper Id: 69

ASSESSMENT OF DEVOPS LIFECYCLE PHASES AND THEIR ROLE IN DEVOPS IMPLEMENTATION USING BEST-WORST MCDM METHOD

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After DeBois popularized DevOps, there is now a focus on integrating software development and operations. However, DevOps lacks a widely accepted definition despite various interpretations in the literature. Practitioners possess a basic understanding, but academic conceptualization is necessary. This research paper presents a framework based on the continuity principle in DevOps Phases to elucidate the fundamental concepts underlying DevOps. The framework defines DevOps as a synthesis of phases that encompass the entire software development lifecycle, including continuous planning, development, testing, integration, delivery, and monitoring. The study aims to assess the importance of each phase in implementing DevOps practices within the software development lifecycle. To accomplish this, the best–worst method is employed to calculate priority weights for each stage. The analysis utilizes input values derived from the DevOps-related section of the HELENA Dataset, which is sourced from software development practitioners, particularly those engaged in hybrid development models.

Keywords—DevOps, MCDM, Continuous integration, Best–worst method
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01566-3

Paper Id: 76

PERFORMANCE EVALUATION OF SOFTWARE DEFECT PREDICTION WITH NASA DATASET USING MACHINE LEARNING TECHNIQUES

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The software industry's growth and increasing complexity have made software maintenance more challenging, with Software Defects (SD) being a significant contributor to quality degradation leading to resource wastage in terms of effort, time, and finances. If the SD is not considered in the early stages of software development, it occurs in any stage of the Software Development Life Cycle (SDLC). The proposed study focuses on improving software quality through Software Defect Prediction (SDP) using machine learning (ML) and data balancing techniques. To mitigate the problem of imbalanced datasets, which often lead to model overfitting, the authors employ the Synthetic Minority Oversampling Technique (SMOTE) combined with ML approaches. The assessment encompasses various ML techniques, including Random Forest, SVM, KNN, and LDA, on the balanced CM1 dataset of the NASA promise repository and evaluated performance using accuracy, precision, recall, F1-score, and AUC-ROC. Random Forest emerges as a standout performer, with an accuracy of 98.09% and an F1-score of 97.25%. SVM and KNN also demonstrate high accuracy rates of 97.71% and 97.56%, respectively, while LDA shows balanced performance with an accuracy of 96.04% and an F1-score of 95.93%. Notably, our study achieves significant performance improvements compared with the prior state-of-the-art. The author provides a roadmap to achieve improved performance and predictive capabilities in SDP, highlighting the novel contribution of the proposed study. These findings hold great potential for the software industry, offering solutions to enhance software quality and streamline development.

Keywords—Software defects prediction, Machine learning
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01528-9

Paper Id: 85

MACHINE LEARNING-BASED PREDICTIVE MODELING OF STUDENT COUNSELING GRATIFICATION: A CASE STUDY OF ALIGARH MUSLIM UNIVERSITY

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Subject counseling may assist students in evaluating their courses and choosing the appropriate career path. This article intends to investigate, create, and apply efficient methods for assessing student course counseling, guidelines, and decision-making. We develop a way to automate the course selection recommendation using machine learning. One can realize what course will suit them based on historical data. We primarily focused on the detailed description and analysis of the dataset collected from the students that have already faced any online admission counseling session. A real dataset based on the diverse perspectives of pupils was designed. Over 100 students participated in the survey; their data were recorded, analyzed, and presented efficiently for the readers to understand. Due to limited data volume, the Synthetic Minority Oversampling Technique (SMOTE) has been used. Our work holds novelty to the existing system and usage. It can be further applied from the department to the university level.

Keywords— Counseling System, Data Mining, Machine Learning, Data Analysis.
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Paper Id: 93

NEW AND HIGHLY CONTAGIOUS DISEASES DEATHS PREDICTION USING MACHINE LEARNING TECHNIQUES

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The recent pandemic has shown us how a new pathogen can infect previously infected individuals again and the current data systems do not account for that in the SIR Model. During the pandemic, one of the more significant concerns in developing nations was the survival and livelihoods of the people below the poverty line. As these people lacked the necessary means to endure the long and hard-hitting impact of the pandemic on the economy, it led to an inability to follow the official guidelines due to the eminent need for survival. However, this also had another repercussion: the increase in the spread of the disease caused spikes in the number of cases over time. This has led us to believe that by using the percentage of a country's population living under the poverty line, we may be able to hypothetically calculate the number of deaths in a future pandemic under similar economic and social conditions.

Keywords— IFR (infection fatality rate), COVID-19—Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), SIR (susceptible-infectious removed)
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Paper Id: 103

WHITE-BOX INFERENCE ATTACK: COMPROMISING THE SECURITY OF DEEP LEARNING-BASED COVID-19 DIAGNOSIS SYSTEMS

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The COVID-19 pandemic has necessitated the exploration of innovative diagnostic approaches, including the utilization of machine learning (ML) and deep learning (DL) technologies. However, recent findings shed light on the susceptibility of deep learning-based models to adversarial attacks, leading to erroneous predictions. This study investigates the vulnerability of a deep COVID-19 diagnosis model to the Fast Gradient Sign Method (FGSM) adversarial attack. Leveraging transfer learning of EfficientNet-B2 on a publicly available dataset, a deep learning-based COVID-19 diagnosis model is developed, achieving an impressive average accuracy of 94.56% on clean test data. However, when subjected to an untargeted FGSM attack with varying epsilon values, the model's accuracy is severely compromised, plummeting to 21.72% at epsilon 0.008. Notably, the attack successfully misclassifies adversarial COVID-19 images as normal with 100% confidence. This study underscores the critical need for further research and development to address these vulnerabilities and ensure the reliability and accuracy of deep learning models in the diagnosis of COVID-19 patients.

Keywords— COVID-19, perturbation, vulnerabilities, Deep learning, adversarial attack.
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Paper Id: 120

CONTENTION-FREE DYNAMIC TASK SCHEDULING APPROACH FOR NETWORK-ON-CHIP BASED QUAD-CORE SYSTEMS

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The use of multi-core based on Network-on-Chip (NoC) systems has increased in recent years due to its effectiveness in executing real-time applications using the latest technologies. Efficient core utilization demands smart mapping of tasks on processing cores. The communication between different tasks should be done through the best available route to minimize network congestion. However, selecting the best suitable path becomes more complex in the case of dynamic scheduling of tasks. This paper presents an improved dynamic mapping technique for mapping the tasks on cores and minimise communication cost by using the various available links simultaneously for quad-core systems. This technique tries to map the communicating tasks in the vicinity to reduce the communication overhead. The proposed algorithm reduces the average latency by approximately 15%. In addition, the developed technique has met the deadline in the majority of test cases.

Keywords— Dynamic scheduling, Network-on-Chip, Link contention
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Paper Id: 127

AN EFFICIENT APPROACH FOR IMPROVING THE PREDICTIVE ACCURACY OF MULTI-CRITERIA RECOMMENDER SYSTEM

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Recommender Systems are useful information filtering tools that have reduced information overload over the web. Collaborative filtering (CF) is one of the extensively used recommendation techniques. Traditional CF captures user-item ratings in a two-dimensional rating matrix which does not sufficiently convey user preferences. Ratings based on several criteria are incorporated into CF to develop multi-criteria recommender systems (MCRS). MCRS are more efficient and cater to the users' needs with more satisfaction. However, there are certain issues like multidimensionality, sparsity, and cold start associated with MCRS. This paper aims to study the MCRS and investigate efficient solutions for existing issues. In this direction, we proposed a modified similarity measure that improves the accuracy of neighborhood generation and rating prediction. In the proposed approach, the users are clustered based on multi-criteria ratings, which reduces the data sparsity and multidimensionality issues in MCRS. The supremacy of the proposed approach is verified by conducting experiments on a benchmark data set and evaluating the performance using some standard evaluation measures.

Keywords— Recommender System, Collaborative filtering, Similarity Measure, Neighborhood, Multi-criteria
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Paper Id: 131

A DEEP LEARNING APPROACH FOR IMAGE AND TEXT CLASSIFICATION USING NEUTROSOPHY

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The proliferation of data on the web and on personal computers is a direct result of the proliferation of new technologies and gadgets. Most of these pieces of information are collected through a number of different methods (text, image, video, etc.). This type of information is also vital for e-commerce websites. The products on these websites feature both images and descriptions in text form, making them multimodal in nature. Earlier classification and information retrieval algorithms focused largely on a single modality. This study leverages multimodal data for categorization utilizing neutrosophic fuzzy sets for uncertainty management for information retrieval tasks. This work employs image and text data and, inspired by prior ways of embedding text over an image, seeks to classify the images using neutrosophic classification algorithms. Neurosophic convolutional neural networks (NCNNs) are used to learn feature representations of the generated images for classification tasks. We demonstrate how a pipeline based on NCNN may be applied to learn representations of the unique fusion method. Traditional convolutional neural networks are subject to unexpected noisy conditions in the test phase, and as a result, their performance for the categorization of noisy data degrades. Comparing our technique against individual sources on multi-modal classification dataset provides good results.

Keywords— Multimodal data, Information retrieval, Early fusion, Late fusion, Fuzzy logic, Neutrosophic logic, Convolutional neutral network.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01529-8

Paper Id: 136

COMBINATION OF OPTIMIZATION METHODS IN A MULTISTAGE APPROACH FOR A DEEP NEURAL NETWORK MODEL

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This paper on gradient descent (GD) lies at the heart and soul of neural networks. The development of GD optimization algorithms significantly sped up the advancement of deep learning. Gradient Descent methods focus on deep learning research; some research projects have attempted to mix multiple training approaches to improve network performance; moreover, these methods seem primarily practical and need more theoretical guidance. This paper develops an architecture to demonstrate the combination of various GD optimization methodologies by analyzing other learning rates and numerous adaptive methods. This research aims to show how to apply GD to different optimization methods in Multistage into the GD optimization approach for exploring a deep learning model using a GD optimization method mixing technique. This research was motivated by the principles of SGDR (stochastic gradient descent with warm restarts), warm-up, and CLR (cyclical learning rates). The results of the training tests with the huge deep learning network validate the efficiency of the technique. This experiment is done by google colab python.

Keywords— Stochastic gradient descent with warm restarts (SGDR),Cyclical learning rates, Adam, RMSprop, Nesterov accelerated gradient (NAG), Recurrent neural networks (RNN), Convolutional neural networks (CNN), Long-short term memory (LSTM).
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01568-1

Paper Id: 139

AN OPTIMIZED ALGORITHM FOR RESOURCE UTILIZATION IN CLOUD COMPUTING BASED ON THE HYBRIDIZATION OF META-HEURISTIC ALGORITHMS

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Cloud services are rapidly growing and in high demand. Load Balancing (L.B.) is crucial for optimizing the workload among Virtual Machines (V.M.s) to utilize resources effectively. This study proposes a hybrid approach called Grey Wolf and Particle Swarm Optimization (GW-PSO) to address task scheduling issues and provide optimal L.B. to all V.M.s. The primary objective is identifying the optimized V.M.s using the proposed hybrid methodology. Additionally, parallel task scheduling minimizes response time and provides quick results for each task. The study utilizes Grey Wolf (G.W.) for parallel task scheduling and Particle Swarm Optimization (PSO) to obtain the optimal solution based on G.W., thereby identifying the optimized V.M.s. This approach ensures flexibility among V.M.s, preventing them from overloading or underloading. All V.M.s are equally assigned tasks. The proposed G.W. calculates the Fitness Value (F.V.) and saves it, which is then passed to PSO. The best particle is updated with its position and velocity, helping identify the optimized V.M.s and assigning loads based on the obtained optimal solution. Performance analysis considers essential parameters such as average Load, processor utilization, turnaround time, response time, runtime, and memory utilization. The analytical results demonstrate the effectiveness of the proposed method compared to the existing system in terms of these parameters.

Keywords— Cloud computing, Load balancing, Task scheduling, G.W.O., PSO
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Paper Id: 142

ENHANCING THE CRYPTOGRAPHIC KEY USING SAMPLE ENTROPY AND WHALE OPTIMIZATION ALGORITHM

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Internet-of-Things (IoT) is one of the most rapidly developing technologies of the twenty-first century. With the invention of 5G technology and the support of the fog-cloud paradigm, IoT has boosted its growth exponentially. Billions of IoT devices exchange data every second, putting data security and privacy at risk and leading to the development of various cryptographic algorithms yearly. A cryptographic key is essential to any cryptographic algorithm, which should be highly randomized and unpredictable. This paper suggests a novel algorithm SampEn-WOA to generate cryptographic keys by utilizing sample entropy, V-Type transfer function, and whale optimization algorithm (WOA). The cryptographic keys of various lengths are generated for the state-of-the-art algorithms, namely advanced encryption standard (AES), SIMON, data encryption standard (DES), SPECK, 3DES, and PRESENT Ciphers. A comparison study is also performed to evaluate the strength of cryptographic keys of various lengths based on sample entropy and approximate entropy. The results are promising and suggest using SampEn-WOA for various state-of-the-art cryptographic algorithms.

Keywords— Cloud computing, Approximate entropy, Sample entropy, Cryptography, Bio-inspired algorithms, Cloud security, Internet-of-Things
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Paper Id: 143

LEVERAGING ATTENTION LAYER IN IMPROVING DEEP LEARNING MODELS PERFORMANCE FOR SENTIMENT ANALYSIS

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Sentiment analysis (SA) is a rapidly expanding research field, making it difficult to keep up with all of its activities. It aims to examine people's feelings about events and individuals as expressed in text reviews on social media platforms. Recurrent neural networks (RNN) have been the most successful in the past few years at dealing with sequence data for many natural language processing (NLP) tasks. These RNNs suffer from the problem of vanishing gradients and are inefficient at memorizing long or distant sequences. The recent attention strategy successfully addressed these issues in many NLP tasks. This paper aims to leverage the attention mechanism in improving the performance of the models in sentiment analysis on the sentence level. Vanilla RNN, long short-term memory, and gated recurrent unit models are used as a baseline to compare to the subsequent results. Then, an attention layer was added to the architecture blocks, where the encoder state reads and summarizes the sequential data. This layer provides weights to the summarized portion so that the decoder state can translate it more accurately and the model can make more accurate predictions. Under the same parameter settings, the integrated attention approach is evaluated and compared to the baseline models. The experimental results show

that combining attention with these models can increase overall performance by a good margin in the suggested evaluation metrics compared to other works; it will help to enhance the efficiency of the decision-making.

Keywords— Sentiment analysis, Deep learning, RNN, LSTM, GRU Attention
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Paper Id: 144

LEVERAGING CONTEXTUAL FEATURES TO ENHANCED MACHINE LEARNING MODELS IN DETECTING COVID-19 FAKE NEWS

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The proliferation of fake news on online social networks, particularly Twitter, has become a major issue in recent years. False and potentially harmful information can spread quickly and cause panic or confusion among the public. To mitigate this, accurate fake news detection is crucial. This work introduces a novel approach by leveraging domain knowledge to extract high-quality features from text data. These features, including word count, hashtag count, and sentiment, complement tweet embeddings derived from the Term Frequency-Inverse Document Frequency technique. The resulting combined representation enhances accuracy. Four machine learning models, i.e., Logistic Regression, Support Vector Machine (SVM), Decision Tree, and Gradient Boosting Decision Tree, are employed to classify text as real or fake, using the combined enriched features. The models are evaluated on a COVID-19 fake news benchmark dataset, measuring their performance across four key metrics: accuracy, precision, recall, and F1-score. The results reveal a 0.5–2% performance boost compared to baseline models. Notably, SVM achieved the highest accuracy at 93.74%. This highlights the efficacy of augmenting models with quality features for improved fake news detection.

Keywords— Fake news, COVID-19, Classification. Machine learning, Contextual feature, Support vector machine
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Paper Id: 145

MODIFIED CHAOTIC QUADRATIC MAP WITH IMPROVED ROBUST REGION

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Chaotic systems are now employed in a variety of applications, including nonlinear control, Pseudo Random Number Generator (PRNG), encryption, and others. However, the majority of basic chaotic maps have a number of constraints, including limited chaotic areas, a low Lyapunov Exponent (LE), and a poor sensitivity to initial states. In this paper, we investigate and analyse the stability of a chaotic quadratic map. As Chaotic quadratic map has resistant chaos for the control parameter within $p = 2$. When a control parameter's value is increased by more than two, the trajectory does not exhibit chaotic behaviour. In order to overcome the disadvantages of chaotic behaviour in small parameter space, we suggest a Modified Chaotic Quadratic Map (MCQM) using the sine function and perturbation operations. These approaches keep chaotic orbits globally stable and robust. In the end, the chaotic dynamics of the proposed modified chaotic quadratic map are carefully studied. This shows that the

presented chaotic map has a larger chaotic area within parameter value $[0, +\infty]$ and Lyapunov Exponent is 13.8517. Therefore, we may conclude that the given Modified Chaotic Quadratic Map (MCQM) has superior chaotic qualities and more sensitivity than the standard quadratic map and other maps currently available.

Keywords— Chaos theory, Quadratic map, Logistic map, Sine function, Bifurcation, Lyapunov exponent (LE)
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Paper Id: 150

A HYBRID ALGORITHM-BASED OPTIMIZATION PROTOCOL TO ENSURE DATA SECURITY IN THE CLOUD

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Cloud computing security involves the procedures, technologies, and policies that protect data, applications, and resources in cloud computing environments. As communities increasingly rely on cloud services for computing requirements, protecting their data's security and privacy becomes critical to retain confidence and safeguard against possible attacks. Consequently, many researchers are interested in the security and privacy of computerised data. The present study aims to devise a protocol for data safety during its storage and dissemination. We developed a hybrid algorithm for data protection during the process. The highlights of the as-proposed approach include (1) Secured information input in the cloud; (2) Protected response to the information within such a manner that the data integrity is maintained. (3) Correct use and distribution of the public, private, and secret keys used in the encryption/decryption procedures. These keys consist of a public key, which may be used to encrypt data, a private key, which can be used for decrypting data, and a secret key, which can be used for authenticating users. The proposed solution can potentially speed up data transmission between the user and the cloud storage while preventing the unsolicited user from breaching the system.

Keywords— Cloud, AES algorithm, RSA algorithm, Public key, Secret key, Private key, Authentication, Decryption
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01546-7

Paper Id: 184

MODELLING AND ANALYSIS OF SOCIAL ENGINEERING THREATS USING THE ATTACK TREE AND THE MARKOV MODEL

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Social Engineering Threats (SETs) exploit human vulnerabilities in information system security. Due to its ability to bypass technical security, these threats have become a common concern today. However, Social engineering is still in its infancy in rigorously modelling and evaluating its outcomes. Therefore, this research attempts to model and assess the persuasion principle and modality used in SETs. Based on the frequency data of various SETs and the associated modality and persuasion principle used, this paper computed the attack occurrence probability (AOP) using the attack tree model. Attack success probability (ASP) is computed using the Markov chain model based on effectiveness data of modality and persuasion principles used in the SETs. Examples from a variety of SETs are used to validate the suggested model. The results are promising, suggesting that this model may be

suitable for gaining insight into and ranking SETs. This study has the potential to aid practitioners and academics in the systematic analysis of human vulnerabilities in successful SETs, allowing for more educated decisions to be made in the face of such threats. Furthermore, the successful implementation of the ideas and methodologies discussed in this paper can help design a policy framework for handling SETs.

Keywords— Social engineering threats, Attack tree, Markov model, Attack occurrence likelihood, Attack success likelihood, Risk ranking, Attack modelling
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Paper Id: 202

LEVERAGING TRANSFER LEARNING FOR DETECTING MISINFORMATION ON SOCIAL MEDIA

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Misinformation is a pervasive problem on social media platforms, with the potential to cause harm to individuals and society as a whole. Many computational techniques have been employed to tackle the misinformation in the online ecosystem. Curbing misinformation on online social networks is an important sub-field of this research. In this paper, we explore the use of deep learning to detect misinformation on Reddit, which is one of the popular online forums. The proposed approach combines natural language processing and deep learning techniques to identify posts that contain misinformation and flag them for further review. We evaluate our model on a benchmark dataset of Reddit posts and show that it is able to identify misinformation with a high degree of precision. We use transfer learning by incorporating transformer-generated embeddings in our system. The Transformer based model is fine-tuned on Stanford natural language Inference dataset. We subsequently use a simple deep neural network to classify the posts as true or fake. Our model outperforms the models reported in the literature on the unimodal text data, on the benchmark dataset Fakeddit.

Keywords— Misinformation, Natural language processing, Social media, Deep learning, Transformers
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-023-01541-y

Paper Id: 108

ENHANCED SHOR'S ALGORITHM WITH QUANTUM CIRCUIT OPTIMIZATION

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Most researchers in the field of cryptography are very aware of attack possibilities from quantum computers. Large integer factorization remains a difficult challenge, however, using Shor's method, the brute force attack potential of assailants on various asymmetric key cryptosystems, such as RSA and ECDSA, are significantly enhanced. The effectiveness of Shor's Algorithm allows us to factor big numbers in polynomial time. This research paper presents an enhanced version of Shor's algorithm for factoring large numbers using quantum computing. The algorithm incorporates quantum circuit optimization techniques to reduce the resource requirements, making it more efficient and practical. The essence of our work lies in not only breaking down the seemingly insurmountable barriers posed by large integers but also doing so with resource efficiency in mind. By harnessing the principles of quantum circuit optimization, we have achieved a remarkable reduction in the

computational resources required. This optimization doesn't just make our algorithm theoretically superior; it transforms it into a practical tool for cryptographic analysis. We analyze the quantum circuit optimization steps and demonstrate the efficiency of the enhanced algorithm through simulations and comparisons with the standard version of Shor's algorithm.

Keywords — Shor Algorithm, Quantum Computing, Circuit Optimization.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-024-01741-0

Paper Id: 72

ENSEMBLE ADAPTIVE ONLINE MACHINE LEARNING IN DATA STREAM: A CASE STUDY IN CYBER INTRUSION DETECTION SYSTEM

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Adaptive online machine learning using data streams is an emerging research area in which algorithms learn dynamically from live data and update regularly for future predictions. On the contrary, traditional machine learning and deep learning approaches follow the batch learning paradigm, which requires the entire dataset to be available in memory for model training and testing purposes. The model is deployed only once with few updates. This approach is not feasible where data arrive in real-time and streaming manner (e.g., modern network traffic data stream, IoT and sensor data stream, etc.). This necessitates the need for the deployment of real-time and adaptive online machine learning systems. In this research study, we have proposed a case study of ensemble adaptive online machine learning in the cyber intrusion detection system (EnsAdp_CIDS) to detect and classify cyber intrusion in network traffic data. The proposed EnsAdp_CIDS algorithm learns instance by instance and fine-tunes its parameters on the fly. We have conducted extensive experimentation on the three benchmark cybersecurity datasets, namely, CICIDS-2017, CIC-IoT-2023 and CIC-MalMem-2022, to evaluate their performance in terms of accuracy, precision, recall and f1-score. The obtained results are compared with recent state-of-the-art machine learning and deep learning algorithms to show the novelty and efficiency of the proposed research work. The obtained accuracy over three cyber security datasets is 99.77%, 98.93% and 99.85%, respectively. The potential applicability of the proposed work is not limited to the cybersecurity domain; in fact, it can be further extended to other domains, such as video analytics and surveillance systems.

Keywords— Cyber Intrusion Detection; Adaptive Online Machine Learning; Network Data Stream; Ensemble Learning.
Web access link for full paper: https://link.springer.com/article/10.1007/s41870-024-01727-y

Paper Id: 112

AN EFFICIENT IOT TASK SCHEDULING ALGORITHM IN CLOUD ENVIRONMENT USING MODIFIED FIREFLY ALGORITHM

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Internet and communication technologies now rely heavily on cloud computing, making it an indispensable component and allowing users to access infrastructure, platforms, and applications on a flexible, scalable, on-demand via a pay-per-use model. As an essential component of cloud computing, the scheduling algorithm controls many virtualized resources and plays a crucial role in providing efficient cloud services. Assigning Internet-of-Things (IoT) tasks to virtual machines (VMs) is one of the most significant issues and falls in the

category of NP-Hard problems. This paper proposes a scheduler based on the Firefly Algorithm (FFA) to solve the IoT task scheduling problem in cloud computing efficiently. The modified Firefly Algorithm-based scheduler employs the transfer function (TF) and the Quantization technique to schedule IoT tasks on VMs in a cloud environment to minimize the makespan of IoT tasks. The proposed algorithm has been compared with the well-known Harris Hawks Optimization (HHO) and Differential Evolution (DE) algorithms. The simulation study demonstrates that the proposed algorithm outperforms HHO and DE algorithms regarding convergence speed and result quality.

Keywords— Cloud Computing, Scheduling, Internet-of-Things, Makespan, Firefly Algorithm, Transfer Function, Quantization Method.

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Paper Id: 194

SECURE IOT FRAMEWORK FOR AUTHENTICATION AND CONFIDENTIALITY USING HYBRID CRYPTOGRAPHIC SCHEMES

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IoTs are increasingly gaining popularity and prevalence due to their extensive applications across various domains. They gather data from the real environment and transmit it through the networks. Security is essential to prevent data alteration, misuse of data, unauthorized access, etc. Cryptography techniques are an efficient way to provide a security mechanism for stored data and data during transmission. The proposed secure model commences by authenticating the user and IoT and activating associated IoT devices that are subsequently, sent data to the cloud server. To ensure the secure transmission of IoT data, the technique utilizes Elliptic Curve Cryptography (ECC) in combination with Genetic Algorithm (GA) to generate keys. The data is encrypted using the generated key and the Advanced Encryption Standard (AES). Assessment and comparison are performed based on parameters such as key size, execution time, throughput, and avalanche effect. Experimental results show that the proposed model ensures the authentication and confidentiality of the data against unauthorized access and data expose. Moreover, the proposed approach is robust and performs better on selected parameters than state-of-the-art cryptographic algorithms such as Data Encryption Standard (DES) and Rivest–Shamir–Adleman (RSA).

Keywords — Elliptic Curve Cryptography (ECC), Genetic Algorithm (GA), Advanced Encryption Standard (AES), SHA-512, authentication, Data Security.

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Paper Id: 31

DEEP NEURAL NETWORK (DNN)-BASED NUCHAL TRANSLUCENCY MARKER DETECTION USING DIRECTIONAL ITERATION FORWARD PROPAGATION

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During early pregnancy, ultrasound screening is used to determine foetal survivability and diagnose chromosomal abnormalities in the fetus, including measuring nuchal translucency (NT) thicknesses. The Intra- and inter variability and inconsistency are limitations of the existing NT measurement technique of outcomes. As a result, in this paper, we provide automated detection and measuring approach for NT of deep neural networks (DNN).

The network was trained to find the NT-containing region of interest (ROI). The training network's accuracy was at least 94.44 percent, indicating that it may be used to recognize NT consistently. To determine the optimal thickness of the window function zone, an autonomous computerized technique was used to identify the boundary of the NT layer. Local intensity, edge strength, and continuous measurements were extracted, and weighted terms for thicknesses calculation were created. Findings revealed that this strategy could produce more objective and consistent outcomes.

Keywords— Deep neural network (DNN), nuchal translucency (NT), fetal, pattern recognition, ultrasound

Paper Id: 51

ZEA MAYS LEAF DISEASE CLASSIFICATION USING SWIN-TRANSFORMER

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Agricultural losses have an effect on the global economy, and plant diseases are a primary cause of such losses. To address these challenges, artificial intelligence techniques such as deep learning can help to leverage the consequences. Corn is one of the most significant agricultural products. A disease outbreak might cause a significant drop in corn production, resulting in millions of dollars in losses. The risk of crop failure due to a disease pandemic can be mitigated with the help of deep learning methods. Traditionally, plant illnesses are examined using just one's own eyes, with the emphasis typically being on color changes, the presence of spots or rotten regions in the leaves, or both. Because of their tiny nature, the symptoms of plant diseases might be difficult for farmers to accurately detect in certain cases. In addition, many people who operate farms are not specialists in the identification and classification of diseases; thus, vision-based deep learning methods may be able to aid farmers in delivering more accurate diagnoses, identification, and classification. Convolutional neural networks have emerged as the top choice for image processing over the last few years as advancements have been made in related domains. Swin Transformer, which was recently introduced, has shown significant improvement in classification applications. We used the Swin Transformer to categorize maize leaf diseases including as blight, common rust, and grey leaf spot. Compared to the state-of-the-art approaches currently available, our model has the highest accuracy at 95.9%.

Keywords— Agriculture, Leaf Diseases, Computer Vision, Swin Transformer, Smart Farming.

Paper Id: 129

SMART CONTRACT TESTING FOR ENHANCED SECURITY ON THE ETHEREUM BLOCKCHAIN

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Distributed ledger technology is a decentralized database that records and verifies transactions among multiple parties, rather than being stored on a central server or controlled by a single entity. One type of Distributed ledger technology is a blockchain, which is a secure, transparent, and decentralized record of transactions that is cryptographically secured and updated on all network nodes when a new block is added to the chain. Ethereum is a decentralized, open-source blockchain platform that allows anyone to design and deploy smart contracts, which are automated, transparent agreements that can simplify information exchange and financial transactions. Smart contract testing is crucial because these contracts manage high-value financial assets and valuable items like non-fungible tokens, and flaws in the contracts can cause significant, irrecoverable losses for users. However, thorough testing before deployment can reduce security risks and mitigate these potential losses. This paper presents different testing tools that can be used to test smart contracts and discusses the results of using three of these tools to test a smart contract on the Ethereum network. The results show that it is necessary to test smart contracts in multiple ways to ensure their security.

Keywords— Blockchain, Ethereum, Testing tools, Smart Contract, Slither

Paper Id: 164

STACKED ENSEMBLE LEARNING APPROACH FOR EARLY DIABETES PREDICTION

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Diabetes is the most widespread disease nowadays. Ignoring it may lead to other diseases and disorders. To determine if a patient has diabetes, a stacked ensemble model, which is a prediction model based on ensemble different Machine Learning (ML) algorithms, have been proposed. A deep analysis is performed on the Early-Stage Diabetes Risk Prediction dataset to evaluate the model's performance. The proposed stacked ensemble model outperformed with an accuracy of 98.4% when compared to other current popular models like Naive Bayes (NB), k- Nearest Neighbor (KNN), Support Vector Machine (SVM), and Decision Tree (DT). The prime objective of this study is to identify possible diabetic patients at an early stage. This model can be further evaluated with other datasets and can be improved by incorporating different feature selection techniques.

Keywords— Diabetes prediction, Machine learning, Ensemble learning, Stacking.

Paper Id: 117

ENERGY DEMAND FORECASTING OF SMART CITY USING HYBRID DEEP LEARNING WITH TIME SERIES ANALYSIS

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In a smart city environment, a stable energy forecasting model contributes to a sustainable power supply and offers precise information regarding the health of the power system. On the other hand, time series forecasting (TSF), due to its popularity in real-world applications, has been a prominent and challenging research topic for decades. It helps organizations to understand the root causes of trends and structural variation over time. Since the availability of time series data is increasing, a vast number of time series forecasting methods have been proposed by researchers. Extracting deep features and identifying deep latent patterns are challenging tasks for traditional approaches. To overcome these difficulties, deep learning techniques consist of several layers, and multiple abstractions have been deployed. To be more specific, precisely estimating the amount of energy that will be consumed in a certain building, nation, or other location is a vital challenge for effectively managing energy efficiency. The main aim of this research is to examine and develop an effective deep learning model in order to perform energy demand forecasting on a non-stationary time series. To achieve this goal, we have proposed a hybrid architecture that combines the LSTM and GRU network with an extra hidden layer consisting of 50 neurons. We evaluate this model on RMSE and MAE. Our hybrid model performs much better than a single mode.

Keywords— Energy demand forecasting, deep learning, time series, LSTM, GRU

Paper Id: 185

COMPUTATIONAL EVALUATION OF MACHINE LEARNING CLASSIFIERS FOR DIABETES PREDICTION

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Diabetes mellitus, which is more often referred to as just diabetes, is a kind of metabolic condition that is characterized by chronically high levels of blood sugar. If it is feasible to make accurate early predictions, the severity of diabetes, as well as the chance of having the condition, might be considerably decreased. Machine learning has been gaining ground in the field of medicine, notably in the area of disease prediction. In this paper, we compare the Machine Learning classifier algorithms to find out which classifier algorithms perform best in predicting the early onset of diabetes. Our technique is based on the prediction accuracy of a limited number of highly successful machine learning (ML) algorithms. These algorithms are evaluated using parameters such as accuracy, precision, recall, and F1-measure to determine how accurate their predictions are. For the purpose of this study, the Pima Indian Diabetic (PIDD) dataset was used. This dataset is generally used to predict the onset of diabetic symptoms of especially people belonging to India. We found out that Support Vector Machine (SVM), Decision Tree (DT), Random Forest (RF), Logistic Regression (LR), Native Bayes (NB), and K-Nearest Neighbor generate results that have an accuracy of 82.3%, 79.4%, 79.4%, 79.3%, 77.1%, and 81.2%, respectively. According to the findings, SVM performs better than other algorithms when it comes to accurately predict diabetes.

Keywords — Machine learning, SVM, KNN, Decision Tree, Random Forest, Naïve Bayes, Diabetes prediction

Paper Id: 80

CRUCIALITY OF SECURING USER DATA DUE TO INCREASING DIGITAL LEARNER TRAFFIC OVER INTERNET

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In recent years, the whole globe has been afflicted with a devastating viral virus known as COVID 19 that has interrupted the operations of every organization, either directly or indirectly. Education was one of the most affected spheres, and it is still unable to function as smoothly as it did prior to the COVID Period. This disaster, on the other hand, ushered in a new era of education through e-learning. As the need for e-learning ideas and platforms for teaching students and knowledge transitions in professional corporate environments grows, so does the need to supply suitable facilities. If any external dangerous entity attacks these numerous platforms, it might have devastating consequences for the users or learners. Threat to the Vulnerable Systems over the widespread web of devices is also got increased in numbers since the increasing number of users attracts more digital threats to the digital assets. The concept of implementing and enhancing security over digital e-learning platforms is a crucial point to be discussed as education will never going to be the same in the upcoming post-Covid Years.

Keywords— E-learning, Cryptography, Post-COVID and Blended Learning.

Paper Id: 121

COMPARISON AND APPLICATION OF DEEP LEARNING-BASED GRAPH EMBEDDING METHODS

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Network analysis has been used to detect fake citations, fake news, and fraud in social networks and to study networks of words that appear together, networks of protein interactions, and community networks. It has also been used to facilitate the collaboration of researchers by examining how people interact and communicate with each other. Due to technological improvements, deep learning-based methods have become popular in the scientific community for analyzing networks. Network embedding methods can represent nodes and edges in a low-dimensional latent space. This study systematically analyze deep learning methods for graph embedding, including their challenges. We also discuss potential applications and future directions for these methods.

Keywords— Graph, Graph Neural Network, Graph Embedding Techniques, Graph Auto Encoder

Paper Id: 149

IMPROVED PSO-GA HYBRID ALGORITHM FOR CODE COVERAGE TESTING

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Testing is essential for the software's success, but despite this, it is a time- and resource-consuming activity. Therefore, researchers and practitioners continuously try to improve software testing automation to maximize test coverage and make it fast and reliable. Meta-heuristics are high-level frameworks which many researchers have used to generate test data for software testing. Maximizing test coverage would also indirectly help to find vulnerabilities in the code. In this paper, we have implemented an improved hybrid metaheuristic algorithm to generate test case for code coverage testing, utilizing particle swarm optimization (PSO) and genetic algorithm (GA) for path coverage testing criterion. The used fitness function is the combination of branch distance (BD), approximation level (AL) and path distance (PD). Hence, the proposed approach is a hybrid Particle Swarm Optimization and Genetic Algorithm (PSO-GA). We compared the meta-heuristics (GA and PSO) and Hybrid PSO-GA algorithm with different fitness functions. Moreover, the preliminary experimental result shows that the hybrid algorithm improves outcomes as compared to GA and PSO for the combined fitness functions. Additionally, Future research directions would include experiments on more benchmark problems. Furthermore, more meta-heuristics can be incorporated into the hybrid approach.

Keywords— Genetic Algorithm, Particle Swarm Optimization, Hybrid Algorithm, Memetic Algorithm, Software Testing, Code Coverage, Path Coverage, Control Flow graph.

Paper Id: 14

PROGNOSIS OF DIABETES MELLITUS BASED ON MACHINE LEARNING ALGORITHMS

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One of the life-threatening and deep root diseases leading to raise the level of sugar in the blood is Diabetes Mellitus (DM) and if it is kept anonymous and untouched then many difficulties have to be faced as a result. Generally, when it is identified a patient visits a diagnostic center and takes a consultation with the doctor. Now, this critical problem can be solved using Machine Learning (ML) approaches as it is booming. A model has been designed in this study that can prognosticate the prediction of DM in patients with a certain level of accuracy. Hence 3 ML algorithms based on classification namely Decision tree, Support Vector Machine (SVM), and Naïve Bayes are used in our study for early detection of DM. Database which is sourced from UCI ML repository namely Pima Indians Diabetes Database (PIDD) is used for performing experiments. Measurement of the performance of all 3 algorithms is based on various criteria like Accuracy, Recall, Precision, and F- Measure. Measurement of Accuracy is done on both correct and incorrect classified instances. After comparative analysis, it has been found that Naïve Bayes is having the highest accuracy among other algorithms. For verification of results Receiver Operating Characteristic (ROC) curves are traced in an organized manner.

Keywords— Healthcare, Diabetes Mellitus, PIMA, Machine Learning, Patients, Decision Tree, Support Vector Machine, Naïve Bayes
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Paper Id: 16

IMPLICATIONS OF COVID-19 PANDEMIC ON OVARIAN CANCER MORTALITY

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Ovarian cancers are the most prevalent cancers with the highest mortality among women. Most women with advanced stages require multimodal therapy, including surgery, radiotherapy, and chemotherapy. The advent of the coronavirus disease in the 2019 has affected the entire system of healthcare delivery in majority of patients suffering from cancer. During these tough times, patients suffering from ovarian cancer face mental trauma, which involves delays in diagnosis and prognosis, surgeries, chemotherapy, and radiotherapy. Instead of in-person visits, tele consultations were performed with a fear of being infected with the pandemic. This review, have prioritized the repercussions of COVID-19 on patients with ovarian cancer, Monitoring of CA125 trend in patients of ovarian cancer with COVID-19 and how COVID-19 affects the rate of mortality in cancer patients.

Keywords— COVID-19, Pandemic, Mortality, SARS-CoV-2, Delayed cancer care.
Web access link for full paper: https://ieeexplore.ieee.org/abstract/document/10112424

Paper Id: 19

PERFORMANCE ANALYSIS OF MACHINE LEARNING-SEMANTIC RELATIONAL APPROACH BASED JOB RECOMMENDATION SYSTEM

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The rapid growth of software computing and web technology has broadened users' horizons, allowing them to investigate web methods for obtaining goods or services. It has opened up tremendous opportunities for corporates to explore users' search patterns or behaviours to make personalized business decisions and recommendations. The research paper aims to illustrate the machine learning methods based recommendation framework that extracts competencies from the website and matches individuals with jobs whose descriptions closely match their profiles. On LinkedIn and Facebook sets of data, this experiment is carried out. Word-2vec idea was used to retrieve semantic meaning, then processed using a multi-phased or multiplexed feature search algorithm that included Wilcoxon Significant Test, Significant Predictor Test and Cross-Correlation Test. To ensure jobs with the highest (recommendable/prediction) scores, the framework included Majority Voting Ensemble (MVE) concept. It uses several machine learning methods and the findings demonstrate that the ensemble classifier achieves the expected result compared to other mechanisms.

Keywords— Recommendation, Machine Learning techniques, Job portal website, social network, Optimization technique
Web access link for full paper: https://ieeexplore.ieee.org/document/10112348

Paper Id: 21

NECESSITY AND ROLE OF BLOCKCHAIN TECHNOLOGY IN THE DOMAIN OF CYBER SECURITY AND DATA SCIENCE

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The technology of blockchain is widely spread and used in different sectors, which include security too. Blockchain has many applications including bitcoin and handling cryptocurrency. Blockchain has recently been analyzed for exploring the applications of data science. The decentralized nature of blockchain can facilitate the tasks of data scientists more securely. Blockchain technology holds immense promises for a variety of the industry, including financial services, healthcare, academia, and more. Blockchain is a distributed digital ledger which is responsible for forming trust in an untrusted system which makes it potential for cybersecurity also. For transactions security, blockchain technology has been very effective. Sharing sensitive information among financial institutes is very difficult and there is high financial risk control cost, for this problem blockchain is the solution for securing the data. Blockchain has the ability to bring trust in decentralized data storage and also has the capacity to bring changes in business automation. This research discusses how the features of blockchain architecture can serve the purpose of data scientists and cyber security.

Keywords—Blockchain, Consensus, Data Science, Cryptography, Security, Cyber Security
Web access link for full paper: https://ieeexplore.ieee.org/abstract/document/10112544

Paper Id: 22

DESCRIPTIVE STATISTICAL ANALYSIS AND DISCRETIZATION OF ACADEMIC DATA FOR MACHINE LEARNING TECHNIQUES

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Every educational institute gathers voluminous data, which includes student enrolment data, student attendance, classroom participation, assessment results, course information, etc. Basic data analysis tools and techniques are not adequate to process and analyze a large volume of academic data. Machine learning or Data mining techniques have been applied by researchers which require pre-processing of the dataset. The discretization technique is commonly applied during data pre-processing to transform continuous feature values into discrete ones. The academic datasets are mostly continuous and hence require discretization. The paper attempts to apply descriptive statistical analysis to academic data to gain a better insight and understanding of the dataset. The observations obtained from descriptive analysis such as range, skewness, median, and mode are further applied in the discretization of the dataset. In the discretization process, both supervised and unsupervised methods have been used to convert continuous numeric values into discrete or nominal values. It has been found from the experiments that the CSForest algorithm has generated the best model for academic performance prediction. The proposed work has achieved a percentage accuracy of 97.10 % and outperformed the previous study.

Keywords—Descriptive statistical analysis, Discretization process, Equal-width, Equal-frequency, Classification, Prediction
Web access link for full paper: https://ieeexplore.ieee.org/abstract/document/10112346

Paper Id: 34

IMPROVING SAFETY IN HAZARDOUS UNDERGROUND CONDITIONS USING LORAWAN AND WUSN

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Worldwide, the mining industry is known for its hazardous working environmental conditions. Though there are many advances in technology for extracting elements in the production levels, the concern for safety has much higher demand in the mining industry. They are prone to many health hazards and sudden phenomenal change in the environments like release of harmful gasses and spontaneous combustion. This might result in making the environment unsafe to work as the area is prone to gas explosions and ceiling collapsing. This has led to several life deaths and has also worsened the health conditions of the mine operators working underground as unfavorable environmental conditions may lead the mine operators to an un-optimized path. Our solution is to improve the safety of the miners by designing a smart suit that has sensors embedded in it to securely transmit data to managers about harmful conditions and the worker's physical conditions, improving safety overall. Several sensors to monitor the pressure, smoke, gasses, and temperature are incorporated in the microcontroller along with the Lora Transmitter module. The ground station consists of circuitry to receive the data from the coal mine or the mine operators. In case of deviations from normal values, the operations in the ground station immediately communicate it to the person who is at work using LoRaWAN. Using this WUSN technique the overall safety of the mine operators is improved.

Keywords— LoRaWAN, Hazardous conditions, WUSN, Mining workers
Web access link for full paper: https://ieeexplore.ieee.org/document/10112354

Paper Id: 35

COMPARATIVE ANALYSIS OF DWT, SLT, AND SWT FOR SOURCE AUTHENTICATION IN ONLINE SOCIAL MEDIA

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Users of Online Social Media (OSM) may have a deep virtual connection in the online realm, enabling them to perform a variety of tasks such as message forwarding, sharing, decision-making, analysis, news, and voting to name a few. Moreover, due to the internet's ubiquity, the gathered information may be instantly shared through OSM platforms such as WhatsApp, Facebook, Twitter, and Instagram without knowing the credibility of a source. Such a habit of sharing web content without first verifying the source validity might have major political, social, and economic ramifications. As a result, it is vital to determine the source of misinformation, disinformation, or other undesired behaviors over OSM. A comparative evaluation is performed utilizing three distinct watermarking techniques: DWT (Discrete Wavelet Transform), SLT (Slantlet transform), and SWT (Discrete stationary wavelet transform) for the identification of the first user of shared content in OSM. In the proposed methodology, a 10-digit phone number, a Social Security Number (SSN) or AADHAAR number, and GPS coordinates have been used as a watermark. All of the aforementioned watermarking techniques have been subjected to various signal processing assaults to compare their robustness and performance. The experimental results demonstrate that SLT outperformed DWT and SWT.

Keywords—Watermarking; source authentication; DWT; SLT; SWT; identification; online social media
Web access link for full paper: https://ieeexplore.ieee.org/abstract/document/10111841

Paper Id: 41

EFFICIENT CONSOLIDATION OF VMS SYSTEMS IN THE CLOUD TO REDUCE ENERGY USE

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The energy needs of cloud computing systems are very high. Cloud suppliers, in order to keep their services available, need to reduce the amount of power their platforms need without sacrificing quality of service. As a result, studies have recommended a cloud-specific architecture that optimizes energy use throughout the whole computer infrastructure. The suggested method was developed in the CloudSim simulator, and the results of the associated simulations suggest that power consumption may be substantial and varies depending on parameters like the quantum variable, data size, and the number of VMs operating on a host. It is possible to establish a variety of resource allocation and planning methods for amassing virtual machines (VMs) on fewer hosts while still maintaining critical metrics, making cloud technology the first step towards sustainable energy. In this study, we first outline the taxonomy of VM placement approaches before proposing new iterative placement strategies that dynamically adjust their placement judgments based on host load Swarm Bee inspired improved Threshold.

Keywords— Resources of cloud; VM Placements; Power utilization; Nature based; Swarm Bee improved Threshold.
Web access link for full paper: https://ieeexplore.ieee.org/document/10112423

Paper Id: 47

HAND DRAWN GRAPH RECOGNITION

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Diagrams are the most important part of any project. These diagrams help in better analyzing, understanding and optimizing the problem solution. UML diagram is one of the most important models to understand software modules and generally they are exported in various image formats. Images of these diagrams will lead to loss of their structural information. This structural file is used as a modeling tool for recognition, visualization and processing of the diagram. If we want to understand or check any vulnerability, ambiguity and error in the diagram, that has to be done manually and requires high skill and more time. This problem can be alleviated if we have such software that recognizes the engineering diagram from images and converts them in a format which is recognizable by their case tool software. Hand drawn graph recognition works for recognizing these images of engineering diagrams.

Keywords—Engineering diagrams, Image processing, modeling tools, recognizable
Web access link for full paper: https://ieeexplore.ieee.org/document/10112369

Paper Id: 48

LUNG CANCER CLASSIFICATION USING FINE-TUNED VGG16

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Lung Cancer is an abnormality where the body's cells proliferate erratically. The disease can spread to other body parts and can be deadly in case of late diagnosis. Machine learning techniques can be used to diagnose lung cancer effectively. To detect lung cancer at an early stage, we developed a software-aided lung malignancy detection system utilizing transfer learning. Transfer learning enables us to eliminate training the model from scratch and also reduces the number of parameters as well as computation time. Here, the pre-trained Visual Geometry Group (VGG16) model is fine-tuned in two ways; Initially, all five convolution blocks are frozen and the classifier is replaced with two dense layers and an output layer. In the Second method, only the first four convolution blocks are frozen leaving behind the fifth convolution block as un-frozen. The first model with all frozen convolution blocks attained an accuracy of 98.18%, whereas the second model produced a better accuracy of 99.54%. To evaluate the proposed model, a comparison is performed with existing state-of-the-art methodologies. The experimental results clearly show that the proposed methodology performs better than other methods already in use. This work helps to determine if a tumor is benign or malignant, and is helpful for both medical professionals and patients.

Keywords— Lung Cancer Malignancy Detection, Transfer Learning, Fine-Tuning, Deep Learning
Web access link for full paper: https://ieeexplore.ieee.org/document/10112376

Paper Id: 49

EXPLORING RESEARCH SUPERVISOR RECOMMENDATION: STUDENT CENTRIC OR SUPERVISOR CENTRIC

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Securing an appropriate supervisor is essential for a student's research trajectory in the education field. Supervisors can provide students with dynamic and ongoing information. A supervisor recommendation system is a methodology for assisting students in selecting the most suited supervisor. This paper aims to provide an overview of research supervisor recommender systems by reviewing published papers and examining the difficulties and prospective research paths concerning this subject. After conducting a thorough search and utilizing our available knowledge, we believe this is the first review article on the Research Supervisor Recommendation System. This investigation explores the basic principles of recommendation systems and the various methods utilized to design supervisor recommendation systems. To avoid information overload, a supervisor recommendation system derives user preferences or interests from connected data sets. In this paper, we analyzed nine studies and classified them based on the preference given while recommending, i.e., student-centric where preference is given to students, supervisor-centric where preference is given to the supervisor or hybrid approaches where we evaluate data from both the supervisor and student. Three types of supervisor recommendation algorithms have been identified: content-based filtering, collaborative filtering, and hybrid filtering. In addition, this study examines the various algorithms used in each type of recommendation system.

Keywords— Collaborative filtering (CF), Recommender systems, content-based filtering (CBF), research supervisor recommendation, explainable recommendation
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Paper Id: 56

INTEGRATION OF MACHINE LEARNING ALGORITHMS CLASSIFIERS AND SEQUENTIAL FORWARD SELECTION FEATURES IN DIABETES PREDICTION

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Diabetes mellitus, commonly known as diabetes, is a medical condition in which blood sugar levels rise for an extended period. Diabetes is a chronic condition that affects thousands of people. It has resulted in the deaths of millions of people across the world. The only goal of this research is to create a machine-learning model for the early detection of diabetes utilizing supervised machine-learning algorithms and various feature selection strategies for the optimal number of features. On the diabetes dataset obtained from the online platform Kaggle, we employed three distinct machine learning classification algorithms, including Logistic Regression, Decision Tree classifier, and Random Forest classifier. All machine learning models scored roughly 86% accuracy, but the Random Forest model achieved 86.51 % accuracy on a test set with only a subset of four features. The first features are High Blood Pressure, High Cholesterol, Body Mass Index, and General Health, with an accuracy of 86.57% on the train set. The Sequential forward Selection algorithm was applied for the feature.

Keywords—Diabetes Prediction; Logistic Regression; Decision Tree; Random Forest
Web access link for full paper: https://ieeexplore.ieee.org/document/10112428

Paper Id: 61

MEAN AR-LOCAL BINARY PATTERN FOR FACIAL EXPRESSIONS CLASSIFICATION BASED ON KNN CLASSIFIER

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According to its significance, facial expression recognition (FER) has reached an incredibly prominent position in the field of image processing, beginning in the 1990s and continuing to the present day. Face recognition, feature extraction, and face categorization are the three common steps in FER. In contrast to the various FER systems described for recognizing just part of face expressions, the system presented in this study can identify all eight fundamental facial emotions (neutral, pleased, angry, contempt, surprise, sad, fear, and disgust). We employ the Japanese Female Facial Expression (JAFFE) and the Extended Cohn-Kanade (CK+) datasets to verify our results. The presented methods LBP Patterns in this work namely, Asymmetric Region LBP(AR-LBP), Mean Asymmetric Region LBP (Mean AR-LBP), We used GLCM feature extractor technique for feature selection. For the given input image, The GLCM calculates different features factors named Contrast, Correlation, and Homogeneity, Entropy, Mean, variance, and dissimilarity which were results to a feature vector. The findings of the given approach, which employed K-Nearest Neighbor (KNN) to categories facial emotions, are then contrasted with those of the standard LBP Pattern. The recognition rate utilizing the provided technique is 96% for the CK + data set and 97% for the JAFFE data set, as shown by the testing results.

Keywords— Local Binary Pattern, Mean AR-LBP, Region, Mean, K-NN
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Paper Id: 79

AI BASED TECHNIQUES FOR NETWORK-BASED INTRUSION DETECTION SYSTEM: A REVIEW

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The internet has unlocked a whole new universe. It has no bounds and provides individuals with tremendous economic prospects all throughout the world. People can live better lives as a result of it. The internet has become one of the most important channels for communication. It has caused a massive range of information to be available online. This in turn has led to a lot of new threats coming into play, making it hard for network security to find breaches. An intrusion detection system (IDS) is a technology that scans network activity for unusual behavior and sends out alerts when it is found. It still has trouble detecting new intrusions, increasing the detection's precision and lowering false alert rates, despite the enormous efforts of the researchers. This research paper begins with a quick overview of IDS and its forms. We then go over several AI-based methods for Network-based IDS (NIDS), contrasting their advantages and disadvantages, while also determining evaluation metrics for each. Further discussing the various datasets used. We conclude our research by listing the research challenges along with the current and future trends.

Keywords—Network Intrusion Detection, Anomaly Detection, Deep Learning, Machine Learning
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Paper Id: 86

ACHIEVING THE SECURITY IN CYBER WORLD THROUGH BLOCKCHAIN: A TAXONOMY

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The foundation of the blockchain is the concept of cryptography. We offer trustful and safe decentralized solutions. Numerous recent publications examine blockchain's applications in fields like consensus building, business finance, healthcare, information security, legal and the internet of things. Other analysis investigates the cryptographical principles behind blockchain. In the blockchain industry, technology of digital encryption is essential. Blockchain technology's development is both aided and hampered by the progress of cryptography technology. Although several recent studies examine block chain's applications in various industries, includes finance, health care, legal relations, Internet of Things, informational security, and consensus-building systems, just a handful have been published, only a few studies examine the blockchain's cryptographic principles. The infrastructure of blockchain is described in this paper, which includes data, network, consensus, contract, and application levels. The Author will also study its underlying fundamentals of cryptography and cryptographic concepts.

Keywords— Merkle tree, Cryptography, Cryptocurrency, Blockchain architecture, Blockchain generations, Structure of Blockchain
Web access link for full paper: https://ieeexplore.ieee.org/document/10112559

Paper Id: 89

TESTING EFFORT-BASED SOFTWARE RELIABILITY GROWTH MODELS: A COMPREHENSIVE STUDY

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In recent era, the use of software systems is growing rapidly. Hence, reliability and customer satisfaction are the most important objectives for software development organizations. Software reliability growth models are essential for checking software reliability. In this paper, we first present an investigative review of testing-effort dependent software-reliability growth models. We discuss the different software reliability growth models with testing-effort behaviors. We then integrate the exponentiated-Weibull testing effort function into a delayed S-shaped software reliability growth model. To validate the proposed model, we present the analysis and estimate of the parameters with authentic data and compare the experimental outcome with the findings of previous models

from the articles. Finally, we wrap up the paper by presenting the contributions and by indicating the probable research scope.

Keywords— Software reliability growth model (SRGM); testing-effort function; mean value function (MVF); imperfect debugging; delayed S-shaped model
Web access link for full paper: https://ieeexplore.ieee.org/document/10112465

Paper Id: 90

DIFFERENTIAL PRIVACY IN RECOMMENDER SYSTEM: CHALLENGES AND OPPORTUNITIES

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Recommender system assist people in locating a selected object based totally on their preference from a wide range of products in online purchasing. The suggestions that can be carried out primarily depend on the user's hobbies, interpersonal habits, and interpersonal influence. To advise the product to user in more customized manner some social factors are involved. Social groups include users who have similar hobbies as consumer. E-trade web-sites are offering item suggestions to the customers to increase the sale of items, Recommendation is a statistic filtering technique. User's data that is used to provide recommendations needs to be secure. In this paper we have reviewed that differential privacy has been applied on Collaborative Filtering (CF), Gaussian mechanism, Clustering strategy to secure the data and also told the limitations of Differential privacy.

Keywords— Recommender System, Collaborative Filtering, Differential Privacy, Neighborhood based CF
Web access link for full paper: https://ieeexplore.ieee.org/document/10112456

Paper Id: 94

AN EXPERT SYSTEM FOR ANALYZING THE BEHAVIOR OF STUDENT'S IN THE HIGHER EDUCATION

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The institution and the students can respond immediately to improve performance by implementing an interim mechanism to analyze and anticipate student performance early. Growing demand in the education industry has opened the way for numerous research projects that strongly emphasize students' academic achievement and behavior analysis. Machine learning methods are used in data mining for education to extract functional patterns and insights from educational datasets. Research supporting assessments of students' mindfulness in classrooms has drawn far less empirical attention. The Student Mindfulness Survey, a new 50-item, multidimensional, self-report measure of students' mindfulness strongly tied to theory and specifically aimed at college settings, is presented in this study as a case for its use. After being piloted with a target sample of 208 students, the Data underwent several structural and concurrent validity analyses. The outcomes demonstrated how data recipients

reacted regarding acceptance, approach, and perseverance. The importance of future research and its value is highlighted in my study. This study used educational data mining to examine how contemporary pupils learn. Our case study gathered student information about the above attributes from a higher education institution.

Keywords— Behaviors analysis, data mining, EDM, academic analysis
Web access link for full paper: https://ieeexplore.ieee.org/document/10112367

Paper Id: 96

SECURITY AND PRIVACY TECHNIQUE IN BIG DATA: A REVIEW

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A new issue has arisen since the volume of data is constantly increasing and cannot be solved by conventional analytic methods. Therefore, a new paradigm known as Big Data was developed in order to deal with this problem. We discuss in this paper review the literature contains over eight years of the techniques proposed by the researcher for security and privacy in Big-Data. The purpose of this research paper is to compile a review of the research that will be useful to new researchers in this field. We also discuss the benefits and difficulties in terms of confidentiality and security. Further we discuss some potential strategies and tactics for protecting the privacy and security of Big Data.

Keywords— Big Data, Data security, Data privacy, Linkability, Composability
Web access link for full paper: https://ieeexplore.ieee.org/abstract/document/10112366

Paper Id: 97

SOFTWARE DEFECT ESTIMATION USING DATA MINING TECHNIQUES: EXPERIMENTAL STUDY OF ALGORITHMS ON "PROMISE" REPOSITORY

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Nowadays, people are becoming self-employed software developers due to the growing demand for mobile apps and other forms of computerized software. However, Software Engineering is a broad field since it necessitates open lines of communication among all parties involved in the system's development and the timely and cost-effective delivery of the system itself. Acquiring excellent performance by reducing the size of the system is an integral part of meeting consumer expectations. But, the most expensive part of developing software is defects estimation. Metrics collected from software may provide some insight into the presence of defects. In the final stages of software testing, defect estimates may be produced. Furthermore, estimating defects in the early stages of the software development life cycle (SDLC) is among the critical fields of study only with the goal of cost-effectiveness and appropriate resource planning. In order to improve the efficiency of defect estimation, various data mining techniques have been applied, including Support Vector Machines, C4.5, Bagging, Naive Bayes, K-

Nearest Neighbors, Neural Networks, Random Forest, Decision Trees, and Radial Bias. These techniques are applied to datasets from NASA dataset repositories and evaluated using various metrics for software defects estimation (SDE). The results of our study indicated that the Support Vector Machine algorithm had the highest performance among the data mining techniques evaluated. The algorithm achieved a precision of 43.74%, recall of 50.00%, accuracy of 87.48%, and an F-1 measure of 81.64%. It is essential to consider various evaluation metrics, including recall, F-measure, precision, and accuracy, when performing software defects estimation.

Keywords— Software Defect Estimation (SDE); Data mining; Bagging; Naïve Bayes; Neural Network; C4.5; Support vector machine
Web access link for full paper: https://ieeexplore.ieee.org/document/10112316

Paper Id: 106

WIRELESS BODY AREA NETWORKS UTILIZING DATA TRANSMISSION TECHNIQUES BASED ON PREDICTION

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Data prediction (DP) is a method that is extremely useful for minimizing the amount of data that is transmitted between a sensor and a base station in a Wireless Body Area Network (WBAN). This method works by using anticipated sensor values rather than actual sensor values while maintaining the same level of data quality (BS). Efforts are being made to mitigate the quantity of data that is in transmission among the base station and sensor nodes. However, the degree to which the prognosis can be predicted within a given margin of error is a significant obstacle. The majority of the time, the base station will make use of a prediction model to change a modification in the transmission parameters that will result in a reduction in the amount of data that is sent to the sink. Despite having a lower computing cost and a faster recall path, this model has a better performance than its predecessors. The proposed research gives a method in a WBAN s for energy conservation utilizing data transmission based on prediction techniques using neural networks

Keywords— Wireless Body Area Network; Neural Networks; Prediction; Data transmission; Energy conservation
Web access link for full paper: https://ieeexplore.ieee.org/document/10112263

Paper Id: 110

NEW METHOD FOR COMMUNITY DETECTION USING MULTI-OBJECTIVE PARTICLE SWARM OPTIMIZATION ALGORITHM

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In the last decade, social media has exploded in popularity, with some platforms now having tens of millions of users. Many sorts of data, such as audio, video, and text, may be found in these networks and must be investigated individually. Because of the wide variety of uses for these networks and the impact of past events and societal norms, their designers confront a number of obstacles. The existence of communities inside social networks is one of their most distinguishing characteristics. Tools for "community extraction" make it easier to investigate all components of a network and classify activities that are typical of certain groups. Although it may seem like a simple task, recognizing communities on social media is computationally difficult owing to the unknown number of groups and the varied internal density of communities. The features of a network and the goal of studying it might guide the selection or development of a particular approach for finding communities within that network. There is a distinct grouping of current community detection techniques based on their individual characteristics. Selecting the right algorithm requires knowledge of the proper categorization and features of each category. In this research, we offer an approach to social media community discovery that makes use of a multi-objective particle swarm optimization algorithm. Evaluation findings confirm the superiority of this approach.

Keywords— Social networks, communities, community detection, meta-heuristic algorithms, multi objective particle swarm optimization algorithm, NMI criteria.
Web access link for full paper: https://ieeexplore.ieee.org/document/10112247

Paper Id: 114

A COMPREHENSIVE STUDY ON VIDEO CAPTIONING TECHNIQUES, BENCHMARK DATASETS AND QOS METRICS

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Video captioning is widely utilized nowadays in a variety of applications for people with special needs, and more specifically, people who are visually impaired. Technology improvements in object detection and natural processing have immediately infused the aforementioned common jobs. When an input image is provided to the system, one such example of this fusion produces image captions, which provide a brief description of what is shown in the image. With some adjustments to the current techniques, this image-related fusion was then shifted to be applied to videos. With the recent success of activity recognition on video, there is growing interest in the challenge of video captioning, which involves creating a sentence-or, more generally, a paragraph-to explain a video clip while capturing its visual semantics. In this article, we evaluate numerous video captioning techniques that have been proposed in the literature along with benchmark datasets for video captioning and commonly accepted evaluation metrics. We highlight a number of potential future directions for the issue of video captioning at the conclusion.

Keywords—Deep learning, video captioning, video description, video to text, video captioning datasets, Language in vision, video captioning evaluation metrics
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Paper Id: 119

DEEP LEARNING WITH ENCODERS FOR INTRUSION DETECTION SYSTEMS (IDS)

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An Intrusion Detection System (IDS) is often used to keep safe and efficiently utilise communication network. And generally this is achieved by monitoring the network regularly for possible intrusions. Nowadays in networks, zero-day attacks are common type of intrusions. So it became necessary to use IDS, which is capable of detecting zero-day attacks. Machine Learning (ML) algorithms are suitable in designing such IDS. Deep Learning (DL), being part of ML, have promising approaches that can be used in designing IDS, which is capable of detecting intrusions of new and old types. This paper proposes DL based IDS which create model of normal network traffic. This model classifies attacks based on the various features present in the dataset. The proposed model uses a Convolution Neural Network, bi-directional Long Short Term Memory (LSTM), and a stack of encoders to handle spatial and temporal features more effectively. The model achieves a low False Positive Rate and high Detection Rate compared to existing models.

Keywords— Intrusion Detection System, Bi-LSTM, Deep Learning, encoders
Web access link for full paper: https://ieeexplore.ieee.org/document/10111839

Paper Id: 123

ISSUES AND CHALLENGES OF KDD MODEL FOR DISTRIBUTED DATA MINING TECHNIQUES AND ARCHITECTURE

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We are currently seeing a data explosion and witnessing a meteoric rise in database sizes; therefore, with the widespread availability of such large volumes of data, there has arisen an urgent need to transform it into actionable insights and knowledge. So, data mining is a very important tool. The knowledge that is produced is put to use in a wide variety of contexts, containing but not limited to the following: science, technology, engineering, commerce, study, social, health, education, entertainment, etc. Market analysis, client retention, and production control are just some of the many uses for the knowledge gained from data. In this study, we explore the systems, methodologies, techniques, and algorithms for Distributed Data Mining that may be used to effectively and efficiently deal with distributed data and extract useful insights. Moreover, some selected KDD models for Distributed Data Mining have been systematically reviewed.

Keywords— KDD System, Database, Data Mining, Distributed Data Mining, Classification, Decision Tree
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Paper Id: 125

SHILLING ATTACKS ON RECOMMENDER SYSTEM: A CRITICAL ANALYSIS

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Because of information overload, Recommender systems help users cope with searching for products and services. To this end Collaborative Filtering (CF) recommender systems have been introduced. However collaborative recommender systems are vulnerable to attacks by their very nature. Attackers can insert fake and biased profiles to undermine the system. This paper provides analysis of shilling attacks on recommender systems. Profile injection attacks are vulnerable to a lot of algorithms. Almost every major e-commerce site is using a recommender system these days, and this brings a lot of challenges. In this paper, we have taken out the findings and limitations after a lot of review and have taken out many major research fields, in which future work can be done.

Keywords— Shilling Attack, Profile Injection Attack, Recommender Systems, Collaborative Filter, Attack Type
Web access link for full paper: https://ieeexplore.ieee.org/document/10112342

Paper Id: 126

INTEGRATION OF BLOCKCHAIN AND CLOUD COMPUTING: A REVIEW

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Blockchain technology is becoming more popular as it is utilized in various fields, including finance, healthcare, etc., due to its distributed nature, transparency, immutability, security, and auditability. These characteristics make blockchain technology advantageous because it can completely change how data is stored and operations are performed. Cloud computing is a system that stores, manages, and processes data over the internet and on distant computers. It is a form of computing that enables consumers to access data and applications from anywhere in the world with just an internet connection. Cloud computing is a popular centralized system, which is used by companies and individuals to keep and access data online. However, this system is vulnerable to cyber-attacks, data breaches, and other security threats because data are controlled by a single organization and stored centrally. Therefore, research is needed to know the security issues of cloud computing that may be resolved using Blockchain and how Blockchain can be utilized to boost security and integrity. In this review paper, authors have examined how blockchain technology can be leveraged in cloud computing, discussed the advantages of using cloud-based blockchain services, and explored the current trends in this field, paying close attention to its development, advantages, and applications. Several blockchain applications in the supply chain, finance, healthcare, etc, have been explored. Then it comes to some valuable conclusions with few unanswered questions that require more inquiry. This review article offers a broad foundation for researchers interested in cloud data security and data management using blockchain technology.

Keywords— Blockchain, Cloud Computing, Bitcoin, Distributed Ledger Technology, Cryptocurrency
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Paper Id: 141

CHRONIC DISEASE MANAGEMENT USING SEMANTIC WEB TECHNOLOGIES

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Healthcare domain generates huge amount of data every day. To store and retrieve data meaningfully semantic web technologies can be used. Semantic web technologies contain tools for creating ontologies, Semantic web rule language (SWRL) for inferring new knowledge and SPARQL query language for retrieving the semantic data. In the health care domain chronic diseases needs continues attention. Chronic diseases need continues monitoring, diagnosis and treatments. Semantic web technologies use various data like patient's health history, medical guidelines, disease symptoms, medication prescribed and other patient related information to construct a knowledge base by using ontologies. By using inference rules new information is produced like, what type of care should be given, which type of diet should be taken and what medications has to be prescribed. Patients can be remotely monitored as well as patients can take decisions at home. By using knowledge base decision support systems can be constructed. In this paper we will study various application areas of semantic web technologies in the field of chronic diseases.

Keywords— Chronic diseases, Semantic web, Ontology, RDF, SWRL
Web access link for full paper: https://ieeexplore.ieee.org/document/10112436?denied=

Paper Id: 162

PREDICTIVE ANALYTICS ON GENDER CLASSIFICATION USING MACHINE LEARNING

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The present study suggests a statistical Machine learning method to predict gender based on facial features using different facial features of a person. The dataset contains eight variables, of which seven are independent, and one dependent variable and the values are in categorical format, i.e., 0's and 1's. It contains two values, i.e., either male or female. Facial features such as nose length, nose width, forehead height, forehead width, are the most important for the determination of gender. For human recognition, we analyse many features in AI, such as iris, thumbprint, faces, voice, etc., for unique identification [1]. However, over all these features, facial representation is an important metric for Gender classification. Every individual has unique face metrics, but the similarity between males and females is determined through the measures of features. Analytical factors like race, gender, and age can be extracted from facial features. Thus, a successful gender classification approach can be a base and boost the performance of many machine learning applications like human recognition, biometric verification, and intelligent human-computer interfaces. Recognising gender through facial features can become unvarying due to the high variance in the illustration and poses of the faces [2]. In this analysis process, we have implemented various machine learning algorithms concerning classification, such as Logistic classification, Neural Networks,

SVM, KNN, Decision tree, Random Forest, and Boosting algorithms. We have compared the accuracy results of all the algorithms applied and finally found the in-Boosting Gradient boosting algorithm fits the dataset best with high accuracy. We have used the python programming tool for Machine learning. Based on the best-fit algorithm, we have further processed data for predictions.

Keywords—Machine Learning, Gender Classification, Categorical data, Exploratory analysis, Python
Web access link for full paper: https://ieeexplore.ieee.org/document/10112496

Paper Id: 168

NEURAL MACHINE TRANSLATION: A SURVEY OF METHODS USED FOR LOW RESOURCE LANGUAGES

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Machine translation (MT) is a maj or natural language processing subfield that is designed to automatically translate human spoken languages. Neural machine translation (NMT) has gained significant achievement in recent times and is becoming the emerging dominant approach in actual MT systems. The availability of significant quantities of parallel data is critical for the performance of Neural Machine Translation (NMT) models. A key challenge in machine translation for many language pairs is a dearth of parallel corpora. An important research concern in the field of machine translation is enhancing NMT accuracy for languages with limited resources. Extensive research is being done to enhance Neural Machine Translation accuracy by leveraging a limited parallel dataset. In this paper, we try to provide a broad and well-structured review of the methods used to enhance the translation accuracy of low-resource languages by exploiting monolingual data, which is typically easy to get and is available in a considerably higher amount, and further classification in two broad categories according to the adjustments they required to the NMT model's architecture is done. We believe that our survey will be useful to new students starting in this field.

Keywords— BLEU Score, Low Resource Language, Monolingual Data, Neural Machine Translation, Parallel Data
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Paper Id: 171

COMPARATIVE STUDY ON DETECTION OF IOT ATTACKS USING MACHINE LEARNING TECHNIQUES

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The term “Internet of Things” describes many trillions connected devices that share a single global data storage system. The Internet of Things has substantially altered our way of life due to the rise of techniques. However, IoT's quick spread to almost every aspect of life has given rise to several new cybersecurity threats. Therefore, academics and industry have recently shown a keen interest in identifying potential attacks in IoT networks because the Internet of things is facing the problem of security threats. A significant technological advancement

in machine learning has created several fresh scientific possibilities to handle current and upcoming IoT issues. Machine learning, however, is a potent tool for finding risks and rumoured activity in networks and intelligent devices. This paper describes different types of attacks incurred in IoT devices and compares different machine-learning algorithms for detecting these attacks. The outcomes of various machine learning methods employed by various researchers to detect IoT attacks have been analysed in this study.

Keywords— Internet of Things (IoT), IoT attack, Machine Learning
Web access link for full paper: https://ieeexplore.ieee.org/document/10112296

Paper Id: 175

USER PROFILING AND INTEREST-BASED MACHINE LEARNING TO SOLVE THE COLD-START PROBLEM FOR A RECOMMENDATION ENGINE

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The cold-start problem is a major issue in recommender systems that becomes a challenge for e-commerce companies when processing large amounts of data. Several strategies have been proposed to overcome the cold-start problem using different approaches, but the user interest approach is a unique and standalone approach. In this study, we present an interest-based approach that establishes a relationship between user profile data and corresponding user interests. Our work will recommend the items to the cold-start users based on their pro-files and interest matching, and also promote the cold-start users. Our approach is unique in that we consider user interests rather than similarities between items and recommend items which are based on user interests. The experiments and related tests show that proposed method is efficient and successful as far as of classification time, training time, and precision. Although other classifiers were efficient in terms of accuracy, the Bayesian classifier and Chain Classifier had the shortest classification time as well as training time.

Keywords — Cold-Start Problem, Collaborative Filtering, Artificial Intelligence, Recommender System, Machine Learning, Bayesian Classifier, User-Interest Approach.
Web access link for full paper: https://ieeexplore.ieee.org/document/10112299?denied=

Paper Id: 181

COLON CANCER CLASSIFICATION USING GOOGLE NET

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Colon cancer is a general form of avoidable cancer, which is also widely spread across the globe. It is also a leading cancer and considered as big killer among all kinds of cancers. In recent times, significant advances are developed in treatment field of this frequently causing disease. There are several traditional techniques which are not flexible, robust and time consuming as they are devised for manual assessment of colon cancer. In this work, pre-processing is conducted utilizing median filter for removing noises from an input colon cancer image. The filtered image is then segmented using SegNet, which is utilized to segment the affected portions. Finally,

classification of colon cancer is conducted employing various deep learning approaches like CNN and GoogLeNet. The comparative assessment showed GoogLeNet as the best classifier for colon cancer classification.

Keywords— Convolutional neural network (CNN), GoogLeNet
Web access link for full paper: https://ieeexplore.ieee.org/document/10112460

Paper Id: 190

COMPARATIVE STUDY ON MENTAL STRESS DETECTION THROUGH THE MACHINE LEARNING TECHNIQUES

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With the rapid development of human civilization, the capability of the human brain is also increasing with the fast pace of development which is eventually leading to mental health issues varying from young stage students to working professionals. Mental health is the least concerning issue in the life of today's generation when compared to physical health. One of the main concerns about which very few are aware is that mental problems can lead directly to several other physical problems and several terminal diseases. Such cases can affect a person's normal life adversely in various ways from affecting day-to-day routine, the standard of living, and relationship trauma. Early-stage detection is significantly important for the cause but gets delayed due to irresponsible handling or ignorance of the situation, where artificial intelligence can play a vital role. In today's era, everything can be predicted using complex mathematical calculations which can be promptly paced up when integrated with computer science and programming concepts. Numerous pieces of research are being done in the dimension of AI and machine learning approach for early-stage detection of issues related to mental health with optimized accuracy. This study presented an effective review of the previous study and concluded the summary of the implementation of AI for the early detection of mental health issues focusing on the dimension of AI and its subfields such as machine learning for early-stage detection of issues related to mental health with optimized accuracy. A nation like India is a great way to become a developed nation and implementing AI -based technology will accelerate the developing phase for overall sustainable development.

Keywords — Mental health, Mental stress detection, Machine Learning (ML), AI, Natural language processing (NLP).
Web access link for full paper: https://ieeexplore.ieee.org/document/10112419?denied=

Paper Id: 191

PERFORMANCE OF SOFTWARE & HARDWARE ORIENTED LIGHTWEIGHT STREAM CIPHER IN CONSTRAINT ENVIRONMENT: A REVIEW

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The internet has advanced significantly in the modern era, with millions of IOT devices connected to one another and exchanging enormous amounts of data. But several types of attacks, including brute-force attacks and exhaustive key attacks, can always target these data. Lightweight cryptography offers a defense against these

types of attacks and safe internet communication. However, not every cipher performs well in every parameter. Some stream ciphers perform well on hardware bases, while others perform well on software bases. We will talk about the performance of the stream cipher on both software and hardware bases in this study.

Keywords — Lightweight Cryptography (LWC), Stream Cipher, NLFSR, LFSR, Initialization Vector, Radio Frequency Identification (RFID).
Web access link for full paper: https://ieeexplore.ieee.org/document/10112260?denied=

Paper Id: 195

REVIEW ON LOCALIZED DEMAND DRIVEN ROUTING (LDDR) PROTOCOL

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Ad-hoc networks offer an approach for communicating for mobile devices having no need for direct communication for the nodes that are placed internal to the range and midway nodes are utilized to direct messages to the terminal locations more than with a single hop. Ad-hoc networks have been widely used in a variety of applications, including military communications, emergency response, and sensor networks. However, they are also associated with several traditional problems and challenges, including limited range, interference, security, routing and high-cost overhead which prohibit scalability. To overcome these challenges, researchers are actively working on developing new technologies and protocols for ad-hoc networks. For example, some researchers are exploring the use of cognitive radio technology to mitigate interference, while others are working on developing more efficient routing protocols that can handle larger networks. In this paper, we discuss and review a new distributed routing algorithm specifically designed to support highly dynamic networks to minimize the cost overhead and therefore save power.

Keywords— Wireless Communication, Routing, Protocol, Ad-hoc network
Web access link for full paper: https://ieeexplore.ieee.org/document/10112563

3

About the Department of Computer Science

Department of Computer Science
Aligarh Muslim University
Aligarh

3.1 Teaching Staff

Prof. Aasim Zafar

Designation	:	Chairperson and Professor
Specialization	:	Virtual Learning Environment (VLE), Mobile Ad-Hoc Networks (MANETs), Image Processing, Video Analytics, Information Retrieval, Soft Computing
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Dr. Asad Malik

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Dr. Md. Ashraf Siddiqui

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Mr. Tipu Sultan

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Dr. Parvej Aalam

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Mr. Zubair Ahmad Hashmi

Designation	:	Instructor
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Mr. Md. Sajid Anwer

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Department of Computer Science
Aligarh Muslim University
Aligarh

3.2 Non-Teaching Staff

Mr. Mohd. Irfan
Designation : TPA Computer

Dr. Jamal Nasir
Designation : Semi. Professional

Mr. Parvez Ahmad Siddiqui
Designation : UDC Admin

Ms. Saba Zafar
Designation : T.A. Fixed

Mr. Faisal Subhan
Designation : D/W Clerical

Mr. Sandeep Kumar Luka Vishwasi
Designation : D/W Tech. Assistant

Mr. Tarik Ali
Designation : D/W Clerical

Mr. Jishan Ahmad
Designation : D/W Unskilled

Mr. Mohd. Manzoor
Designation : D/W Unskilled

Mr. Mohd. Arif
Designation : D/W Skilled

Mr. Parvez Ur Rehman
Designation : D/W Unskilled

Mr. Mohd. Danish
Designation : D/W Unskilled

Mr. Mohd. Afzal
Designation : D/W Unskilled

Mr. Mohd. Imran Khan
Designation : Lab. Attendant

Mr. Vinod Kumar
Designation : D/W Cleaning Staff

3.3 Research Highlights and Thrust Areas

1. Cryptography & Network Security
2. Artificial Intelligence
3. Software Reliability
4. Software Requirement Engineering
5. Computer Graphics, Pattern Recognition and Image Processing
6. Software Engineering
7. Parallel Processing
8. Distributed Computing and Load Balancing
9. Web Technologies
10. Management Information System
11. Ad-Hoc Wireless Area Network
12. Data Computing
13. Soft Computing
14. E-learning
15. Applications of AI & Neural Network in Biomedical Research
16. Bioinformatics
17. Quantum Computing
18. Quantum Cryptography
19. Neural Networks
20. Cloud Computing and Security

3.4 List of Presently Enrolled Research Scholars

S. No.	Name	Enrolment & Faculty No.	Name of Supervisor
01	Mr. Mohammad Luqman	GD-1088 2017-PHD-CS-01	Dr. Arman Rasool Faridi
02	Ms. Ghazala Sultan	GC-8286 2017-PHD-CS-12	Dr. Swaleha Zubair
03	Mr. Haitham Mohammed Abdulwahab	GK-7587 2017-PHD-CS-20	Dr. Swaleha Zubair
04	Mr. Imran Khan	GG-9281 2018-PHD-CS-01	Prof. Mohammad Ubaidullah Bokhari
05	Mr. Talha Umar	GE-1426 2018-PHD-CS-02	Dr. Mohammad Nadeem
06	Mr. Mohd Farooq	GE-5392 2018-PHD-CS-04	Prof. Aasim Zafar
07	Mr. Ankur Kumar	GE-0080 2018-PHD-CS-05	Dr. Mohammad Nadeem
08	Mr. Basil Hanafi	GH-2773 2018-PHD-CS-06	Prof. Mohammad Ubaidullah Bokhari
09	Mr. Md Saquib Jawed	GE-0095 2018-PHD-CS-07	Dr. Mohammad Sajid
10	Ms. Khushnaseeb Roshan	GD-6476 2018-PHD-CS-08	Prof. Aasim Zafar
11	Ms. Fakhrun Jamal	GL-2758 2018-PHD-CS-09	Prof. Tamanna Siddiqui
12	Ms. Fatma Ahsan	GH-2780 2018-PHD-CS-10	Dr. Faisal Anwer
13	Mr. Sheikh Burhan Ul Haque	GL-2759 2018-PHD-CS-11	Prof. Aasim Zafar
14	Mr. Mohd Hanief Wani	GL-2760 2018-PHD-CS-12	Dr. Arman Rasool Faridi
15	Mr. Munir Yahya Ali Sohmony	GL-3751 2018-PHD-CS-14	Dr. Arman Rasool Faridi
16	Mr. Shahnawaz Afzal	GG2838 2019-PHD-CS-01	Prof. Mohammad Ubaidullah Bokhari
17	Mr. Syed Shamikh Iqbal	GE-3429 2019-PHD-CS-02	Prof. Aasim Zafar
18	Mr. Shah Saud Alam Abdali	GB-6144 2019-PHD-CS-03	Dr. Mohammad Sajid
19	Ms. Deepika Kaushik	GE-7382 2019-PHD-CS-04	Dr. Mohammad Nadeem
20	Mr. Mahfooz Alam	GL-9933 2019-PHD-CS-05	Dr. Suhel Mustajab
21	Mr. Salman Ali	GD-2805 2019-PHD-CS-06	Dr. Faisal Anwer
22	Mr. Mohammad Waseem	GG-2541 2019-PHD-CS-08	Dr. Shafiqul Abidin

23	Mr. Mohd. Mustaqeem	GD-8422 2019-PHD-CS-09	Prof. Tamanna Siddiqui
24	Mr. Mohd. Sakib	GG-9286 2019-PHD-CS-10	Prof. Tamanna Siddiqui
25	Ms. Zeba Anjum	GG-7630 2019-PHD-CS-11	Prof. Tamanna Siddiqui
26	Mr. Mohammad Qasim	GL-9940 2019-PHD-CS-12	Dr. Mohammad Sajid
27	Ms. Amal Esmail Qasem	GM6263 2019-PHD-CS-13	Dr. Mohammad Sajid
28	Mr. Savir Ali	GD-9572 2020-PHD-CS-01	Prof. Tamanna Siddiqui
29	Mr. Md. Zeyauddin	GM6359 2020-PHD-CS-02	Prof. Tamanna Siddiqui
30	Mr. Mohd. Zain Khan	GB-1949 2020-PHD-CS-03	Prof. Mohammad Ubaidullah Bokhari
31	Ms. Takreem Fatima Khan	GD-9117 2020-PHD-CS-04	Dr. Swaleha Zubair
32	Mr. Gaurav Yadav	GE-5232 2020-PHD-CS-05	Prof. Mohammad Ubaidullah Bokhari
33	Ms. Wajda Tarannum	GE-8420 2020-PHD-CS-06	Dr. Shafiqul Abidin
34	Mr. Kausar Ali	GI4072 2022-CSRSA-101	Prof. Aasim Zafar
35	Mr. Haider Ali	GI3135 2021-CSRSA-101	Dr. Shafiqul Abidin
36	Mr. Md. Ozaif	GE1335 2021-CSRSA-102	Prof. Suhel Mustajab

3.5 List of Publications by Research Guides

S. No.	Name	Journal Publication	Conference Publication	Book	Book Chapter
01	Prof. Aasim Zafar	82	26	-	08
02	Prof. M Ubaidullah Bokhari	70	93	04	00
03	Prof. Tamanna Siddiqui	42	17	08	09
04	Dr. Suhel Mustajab	12	16	-	02
05	Dr. Arman Rasool Faridi	55	50	-	06
06	Dr. Swaleha Zubair	83	31	-	01
07	Dr. Shafiqul Abidin	38	08	03	14
08	Dr. Faisal Anwer	14	05	-	04
09	Dr. Mohammad Sajid	28	19	01	09
10	Dr. Mohammad Nadeem	28	09	-	02

3.6 International/ National Collaborations & MoUs

International Collaborations

- Workday Inc., Pleasanton, CA 94588, USA
- Lebanese American University, Beirut 1102, Lebanon.
- University of Technology Sydney, Sydney, Australia
- Northern Border University, Saudi Arabia

National Collaborations

- IIT (ISM), Dhanbad
- Koneru Lakshmaiah University, Andhra Pradesh
- Chandigarh University, Mohali
- Dr. Harisingh Gour Central University, Sagar (M.P.)
- Bennett University, Greater Noida
- HCL Technology, Bangalore, India
- MeitY, Govt. of India.
- Symbiosis International (Deemed) University, Pune
- Jaypee Institute of Information technology, Noida
- National Institute of Securities Market (NISM)

MoUs

- Google Asia Pacific Pvt. Ltd.

3.7 Social Responsibility and Awareness Program

- Science Day
- Vigilance Day
- Anti-Ragging Week
- Republic Day
- Independence Day
- Voter's Day

3.8 Seminar/Conference/Workshop Events Organized

1. 4 Weeks Hands-on Training Programme on Web Based Technologies organized by the Department of Computer Science, AMU from 6th Dec-2021 to 8th Jan-2022.
2. Webtalk on "Technology Trends & Industry Expectation" organized by the Department of Computer Science, AMU, Aligarh on 2nd April 2022.
3. 7-Days workshop on "Cyber Security Essentials" organized by the Department of Computer Science, AMU during 17-23 May 2022.

4. Workshop on Employability Enhancement organized by the Computer Science Society (CSS), Department of Computer Science, AMU in collaboration with TPO General, on 5th July, 2022
5. Online Induction Programme for newly admitted Ph.D. Students (Session 2020-2021)" organized by the Department of Computer Science, AMU on 30th June 2022.
6. Vigilance Awareness Week for Sensitization Programme Topic: Corruption Free India organized by CSS, Department of Computer Science on 05.11.2022
7. Induction Programme for newly admitted PG Students (Session 2022-2023) of the Department of Computer Science, AMU, Aligarh from 21-24 Nov, 2022
8. Alumni Meet for MCA Batch-2022 "Riwayat-2022" organized by the Department of Computer Science on 03.12.2022
9. Online Workshop on Embedded, IoT, Design, Simulation and Rapid Prototyping organized by the Department of Computer Science, AMU on 07.12.2022
10. Induction Programme for newly admitted UG Students (Session 2022-2023) of the Department of Computer Science, AMU, Aligarh from 12-14 Dec, 2022
11. Workshop on ERP Mission, NMEICT from January 17-18, 2012 Organized by Dr. Mohammad Ubaidullah Bokhari, Principal Investigator, ERP Mission by Department of Computer Science, AMU, Aligarh-202002.
12. One Day Seminar on Cyber Crime for Policemen, Police Department, Aligarh on September 26, 2012 organized by Dr. Mohammad Ubaidullah Bokhari
13. 3-days online workshop on "Programming & Documentation with R" organized by the Department of Computer Science, AMU during 5-7 June, 2021.
14. Online Inaugural Ceremony of two-week online Communication Skills Development Program on 04th October, 2020
15. A Virtual Hackathon AMUHACKS 1.0 by ADC Club, Department of Computer Science, AMU, Aligarh organized successfully on 13th September, 2020
16. A Free Web Talk on How to Crack UGC NET/JRF to prepare effectively for the examination of UGC NET/JRF organized successfully on 7 September, 2020
17. Free 4-Week Online short-term course on Programming Practices and Standards in Industry organized successfully on 5 July, 2020 to 29 July, 2020
18. Free Webinar Titled You too can become an IAS Officer for Civil Services Preparation organized successfully on July 21st, 2020

19. Webinar organized by the Department on 'Amazon Web Services (AWS)' in association with APPWARS Technologies on 14th June, 2020
20. Webinar on "Competitive Coding and Placement Preparation" in collaboration with PreBytes on July 4, 2020
21. Webinar on Technology Trends, Corporate Culture and Career organized by the Department if Computer Science, AMU held on 03-07-2021
22. One-day workshop on Machine Learning using Python in association with DUCAT was held on 11-09-2019
23. 3-days online workshop on "Art of Successful Project Management" by the Department of Computer Science during 9-11 July, 2021.
24. Web talk on "Career paths in IT industry: Present and future", organized by the Computer Science Society (CSS), Department of Computer Science, AMU.

3.9 List of Ph.D. Awardees

S. No.	Name of Research Scholar	Name of Supervisor	Research Topic
1	Dr. Mohammad Ubaidullah Bokhari		Software Reliability Growth Model
2	Dr. Aasim Zafar	Prof. Nesar Ahmad	Knowledge Representation and User Modeling in Adaptive E-Learning
3	Dr. Faheem Syeed Masoodi	Prof. Mohammad Ubaidullah Bokhari	Comparative Analysis and Design of Stream Cipher
4	Dr. Shadab Alam	Prof. Mohammad Ubaidullah Bokhari	Cryptanalysis and Design of Synchronous Stream Cipher
5	Dr. Javed Ali	Prof. Rafiqul Zaman Khan	Studies on task partitioning strategies in distributed System
6	Dr. Hatem Salem Abu Hammatta	Prof. Mohammad Ubaidullah Bokhari	Adaptive intrusion Deletion system for Wireless Mobile Ad Hoc Network
7	Dr. Noor Adnan Ibraheem	Prof. Rafiqul Zaman Khan	Gesture Recognition for Hand-Image Postures
8	Dr. Shams Tabrez Siddiqui	Prof. Mohammad Ubaidullah Bokhari	Comparative Study and Design of Software Requirement Tools for Secure Software Development
9	Dr. Firoj Ali	Prof. Rafiqul Zaman Khan	The Study of Load Balancing Strategies for the Distributed Computing System
10	Dr. Sadaf Ahmad	Prof. Mohammad Ubaidullah Bokhari	Designing Multi Agent Intelligent System for Inter-active E- Learning
11	Dr. Zaki Ahmad Khan	Prof. Jamshed Siddiqui	Performance Evaluation of Multiprocessor Server Architectures for Informatics Applications
12	Dr. Yahya Kord Tamandani	Prof. Mohammad Ubaidullah Bokhari	Performance Analysis and Design of Ronting Algorithms for WSN, w.r.t. power consumption and overall network performance
13	Dr. Nazir Ahmad	Prof. Jamshed Siddiqui	Issue and Challenge of IT/IS Adoption in Indian SMEs: Performance through Agility
14	Dr. Haider Khalaf Jabbar	Prof. Rafiqul Zaman Khan	Development of Expert System-Using Artificial Intelligent Neural Network
15	Dr. Suby Khanam	Prof. Jamshed Siddiqui	Implementation of TQM using IT/IS in Indian Organizations
16	Dr. Arman Rasool Faridi	Dr. Aasim Zafar	Personalized Information Retrieval using e-Portfolio

17	Dr. Atena Shiranzaei Ghalehno	Prof. Rafiqul Zaman Khan	Studies on IPv6 Security
18	Dr. Shahab Saquib Sohail	Prof. Jamshed Siddiqui	Feature Analysis and Recommendation for Online Shopping using Web Mining Techniques
19	Dr. Faraz Hasan	Prof. Mohammad Ubaidullah Bokhari	Adaptive Multimodal Information Retrieval Using Unsupervised Learning
20	Dr. Mohammad Alkadri	Dr. Tamanna Siddiqui	Using Progressive Analytics on Big Data in the Cloud
21	Dr. Qahtan Makki Shallal	Prof. Mohammad Ubaidullah Bokhari	Security Issues and Solutions at Different Layers of Cloud Computing
22	Dr. Riaz Ahmad	Dr. Tamanna Siddiqui	Designing an Effective Testing Framework for Cloud Application
23	Dr. Hassan Faisal Hamood	Prof. Mohammad Ubaidullah Bokhari	Planning and Developing E-Learning System for Yemen Environment
24	Dr. Ausaf Ahmad	Dr. Tamanna Siddiqui	Mining Software Repositories for Software Metrics
25	Dr. Mayank Srivastava	Prof. Jamshed Siddiqui	Forensic Analysis and Information Security Techniques for Multimedia Information
26	Dr. Md. Oqail Ahmad	Prof. Rafiqul Zaman Khan	The Study on Load Balancing in Cloud Computing System
27	Dr. Md. Ashraf Siddiqui	Prof. Mohammad Ubaidullah Bokhari	Software Reliability Modeling Analysis and Assessment with Imperfect Debugging
28	Dr. Mohd. Kashif Adhami	Prof. Mohammad Ubaidullah Bokhari	Effectiveness of Web-based News Search Systems
29	Dr. Parvej Aalam	Dr. Tamanna Siddiqui	Designing Effective Framework for Short Text Clustering
30	Dr. Shabbir Hassan	Prof. Mohammad Ubaidullah Bokhari	Analysis and Design of Lightweight Stream Cipher
31	Dr. Arshad Iqbal	Prof. Aasim Zafar	A Study on the Use of Soft Computing Techniques in Machine Reading of Ancient Quranic Manuscript
32	Dr. Suhel Mustajab		Applications of Neural Network in Nonlinear Dynamical System
33	Dr. Rizwan Alam	Prof. Mohammad Ubaidullah Bokhari	Design of adaptive feedback based multidimensional e-learning framework
34	Dr. Saif Saffah Badr Alazzawi	Prof. Tamanna Siddiqui	An Effective Security Framework for Internet of Things

35	Dr. Shadab Alam Siddiqui	Prof. Tamanna Siddiqui	Design of Testing Framework for Container Based Applications
36	Dr. Afreen Khan	Dr. Swaleha Zubair	Analysis of Big Data in Alzheimer's disease using Machine Learning Techniques
37	Dr. Ali Haider Thabet Shamsan	Dr. Arman Rasool Faridi	Integrating Software Defined Network (SDN) and Network Virtualization (NV) with Internet of Things (IoT)
38	Dr. Abdullah Yahya Abdullah Amer	Prof. Tamanna Siddiqui	Activities Detection in Social Network, Using Text Mining Technique
39	Dr. Mohammad Haris	Dr. Swaleha Zubair	The Study on Load Balancing Issues to optimize Quality of Services (QoS) parameters in Cloud Computing
40	Dr. Mohd. Anas Wajid	Prof. Aasim Zafar	A Study on the use of Soft Computing Techniques in Multimodal Information Access and Retrieval

3.10 List of MCA Toppers

S. No.	Name of the Students	Year of Passing
1	Priti Bala	1986
2	Ashwni Sapra	1987
3	Narinder Singh Arneja	1988
4	Md. Shahid Jamil	1989
5	Joity Mathur	1990
6	Jamshed Siddiqui	1991
7	Azimuddin Khan	1992
8	Syed Mohammad Ahmad Ali	1993
9	Aasim Zafar	1994
10	Rabiul Awal Hossain	1995
11	Arman Rasool Faridi	1996
12	Sadre Alam	1997
13	Nilofer Perwaiz	1998
14	Tehseen Ahmad	1990
15	Rajeev Khurana	2000
16	Rahul Gupta	2001
17	S.M. Firoz Ashraf	2002
18	Prakriti Srivastava	2003
19	Pragya Gupta	2004
20	Imran Khan	2005
21	Baby Sultana	2006
22	Md. Shadab	2007
23	Megha Varshney	2008
24	Vinti Agarwal	2009
25	Ankita Paliwal	2010
26	Halima Naim	2011
27	Swati Agarwal	2012
28	Arshi Mustafa	2013
29	Shalini Agarwal	2014
30	Faraz Masood	2015
31	Neha Agarwal	2016
32	Amrish Sinha	2017
33	Vivek Gaur	2018
34	Dimple Varshney	2019
35	Alia Khursheed	2020
36	a) Romesh Varshney b) Maryam	2021
37	Sufi Rain	2022

3.11 Curriculum

Curriculum: PG Programme (Two Years)

DEPARTMENT OF COMPUTER SCIENCE
ALIGARH MUSLIM UNIVERSITY
ALIGARH, U.P. – 202002
Master of Computer Applications (MCA) (CBCS)
Curriculum Structure

	COURSE NO.	PAPER TITLE	Type of Course	Periods Per Week (L+T)/(P +T)	Credits	Sessional Marks/ Continuous Evaluation	Final Marks	Total Marks
MCA1st Year-I-Semester								
Bridge Courses (Non-Credit Course)	CSD1011	Fundamentals of IS & IT	B	1+1	#	30	70	100
	CSD1012	Numerical and Statistical Computing	B	3+1	#	30	70	100
Ist SEMESTER	CSD1001	Data Structure using C++	C	3+1	4	30	70	100
	CSD1002	Digital Logic and Computer Architecture	C	3+1	4	30	70	100
	CSD1003	Database Management System	C	3+1	4	30	70	100
	CSD1004	Analysis and Design of Information Systems	C	3+1	4	30	70	100
	CSD1005	Soft Skills Development and Technical Communication	C	3+1	4	30	70	100
	CSD10P1	Laboratory Course –I	C	4+2	4	40	60	100
		Total			**24**			**600**
MCA 1st Year-II-Semester								
IInd SEMESTER	CSD2001	Object Oriented Programming using Java	C	3+1	4	30	70	100
	CSD2003	Data Communication & Computer Networks	C	3+1	4	30	70	100
	EL-1	***Elective-1***	E	3+1	4	30	70	100
	EL-2	***Elective-2***	E	3+1	4	30	70	100
	OE	Open Elective**	OE	3+1	4	30	70	100
	CSD20P1	Laboratory Course –II	C	4+2	4	40	60	100
		Total			**24**			**600**
MCA 2nd Year-III-Semester								
	CSD3001	Operating System and Shell Programming	C	3+1	4	30	70	100
	CSD3002	Software Engineering	C	3+1	4	30	70	100
	CSD3003	Theory of Computation	C	3+1	4	30	70	100

IIIrd SEMESTER	CSD3004	Technical Paper Writing-I	A		4	40	60	100
	EL-3	***Elective-3***	E	3+1	4	30	70	100
	EL-4	***Elective-4***	E	3+1	4	30	70	100
	CSD30P1	Laboratory Course–III	C	4+2	4	40	60	100
		Total			**28**			**700**
MCA 2nd Year-IV-Semester								
IVth SEMESTER	CSM4491	Fundamentals of IT (Open Elective)+	OE	3+1	-	30	70	100
	CSD4001	Dissertation/Project	C		12	40	60	100
	CSD4002	Technical Paper Writing-II	A		08	40	60	100
		Total			**20**			**200**

∗**L** - Lecture; ∗**T** - Tutorial; ∗**P** - Practical/Lab;

#Non-credit and qualifying course

∗∗Students of the department of Computer Science are required to opt any **Open Elective** course offered by other departments of faculty of Science, in **Second Semester** preferably Mathematics, Statistics & OR, GIS, etc.

+ CSM4491 (Open Elective): Fundamentals of IT (For **fourth semester** students of Faculty of Science **other than Computer Science**).

+Open-elective for the students of other Departments of the Faculty of Science

Course Categories and Credits allotted

S. No.	Type of Courses	Code	Credits Allotted
1	Core	C	64
2	Elective (Discipline Centric)	E	16
3	Ability Enhancement (Discipline Centric)	A	12
4	Ability Enhancement (Open elective)	OE	4
5	Bridge Course	B	Non-Credit
Total Credits			**96**

List of Electives:

Students are required to select one course from each set of electives (EL-1 to EL-4) offered by the department from time-to-time.

List of Elective Courses							
EL-1 (Credit-4)		**EL-2 (Credit-4)**		**EL-3 (Credit-4)**		**EL-4 (Credit-4)**	
Course No.	**Paper Title**	**Course No.**	**Paper Title**	**Course No.**	**Paper Title**	**Course No.**	**Paper Title**
CSD2051	Data Mining Techniques and Applications	CSD2061	Parallel Computing	CSD3051	Mobile based Programming	CSD3061	Cyber Security
CSD2052	Microprocessor: Architecture and Applications	CSD2062	E-Commerce	CSD3052	Network Programming	CSD3062	Introduction to Bioinformatics
CSD2053	Computer Graphics	CSD2063	Advanced DBMS and Data Warehouse Design	CSD3053	Compiler Construction	CSD3063	Optimization Techniques
CSD2054	Discrete Mathematics	CSD2064	Simulation and Modelling	CSD3054	Web based Programming	CSD3064	Artificial Intelligence & Soft Computing

Once the 'Credit Transfer Scheme' is adopted by the university and related regulations are framed & becomes operational, students may be allowed to opt for "SWAYAM MOOCs" courses in place of 'Elective Courses' as per the university regulations.

Curriculum of M.Sc. in Cyber Security and Digital Forensics

DEPARTMENT OF COMPUTER SCIENCE
ALIGARH MUSLIM UNIVERSITY
ALIGARH, U.P. – 202002
M. Sc. in Cyber Security and Digital Forensics
Curriculum Structure

COURSE NO.	PAPER TITLE	Type of Course	Periods Per Week (L+T)/(P+T)	Credits	Sessional Marks/ Continuous Evaluation	Final Marks	Total Marks
First Semester							
CSC1001	Introduction to Cyber Security & Cryptography	C	3+1	4	30	70	100
CSC1002	Problem Solving using C	C	3+1	4	30	70	100
CSC1003	Data Structures using Java	C	3+1	4	30	70	100
CSC1004	Database Management System	C	3+1	4	30	70	100
CSC1005	Computer Organization and Architecture	C	3+1	4	30	70	100
CSC10P1	Laboratory Course –I	C	4+2	4	40	60	100
	Total			**24**			**700**
Second Semester							
CSC2001	Data Communication & Computer Networks	C	3+1	4	30	70	100
CSC2002	Operating System & Shell Programming	C	3+1	4	30	70	100
OE	Open Elective**	OE	3+1	4	30	70	100
EL-1	Elective-I	E	3+1	4	30	70	100
EL-2	Elective-II	E	3+1	4	30	70	100
CSC20P1	Laboratory Course –I	C	4+2	4	40	60	100
	Total			**24**			**700**
Third Semester							
CSC3001	Cyber Crimes and Laws	C	3+1	4	30	70	100
CSC3002	Digital Forensics	C	3+1	4	30	70	100
CSC3004	Network and Cloud Security	C	3+1	4	30	70	100
EL-3	Elective-III	E	3+1	4	30	70	100
EL-4	Elective-IV	E	3+1	4	30	70	100
CSC30P1	Laboratory Course–I	C	4+2	4	40	60	100
	Total			**24**			**700**

Fourth Semester							
CSM4491	Fundamentals of IT (Open Elective)***	OE	3+1	-	30	70	100
CSC4001	Dissertation	C		12	40	60	100
CSC4002	Research Paper Publication	A		12	40	60	100
	Total			**24**			**200**

***L - Lecture; *T - Tutorial; *P - Practical/Lab; *D - Dissertation/Project;**

*****Students of the department of Computer Science are required to opt any Open Elective course offered by other departments of faculty of Science, in Second Semester preferably Mathematics, Statistics & OR, GIS, etc.***

******CSM 4491 (Open Elective): Fundamentals of IT (For fourth semester students of Faculty of Science other than Computer Science.***

Course Categories and Credits allotted

The courses mentioned in above curriculum are of following categories.

S. No.	Course Categories	Code	Credits Allotted
1	Core	C	64
2	Elective (Discipline Centric)	E	16
3	Ability Enhancement (Discipline Centric)	A	12
4	Ability Enhancement (Open elective)	OE	4
Total Credits			96

List of Electives

Students are required to select one course from each set of electives (EL-1 to EL-4) offered by the department from time-to-time.

Electives	Course No.	Paper Title	Course No.	Paper Title
EL-1 (Credit-2)	CSC2051	Web Applications Security	CSC2052	**Advanced Cryptography**
EL-2 (Credit-4)	CSC2061	Computational Intelligence for Cyber Security	CSC2063	**Cyber Security in IoT**
EL-3 (Credit-4)	CSC3051	Language Based Security	CSC3052	**Mobile Communication Security**
EL-4 (Credit-4)	CSC3061	Software Security	CSC3062	**Quantum Computing & Cryptography**

Once the 'Credit Transfer Scheme' is adopted by the university and related regulations are framed & becomes operational, students may be allowed to opt for "SWAYAM MOOCs" courses in place of 'Elective Courses' as per the university regulations.

Curriculum: P. G. Diploma in Computer Programming (PGDCP)

DEPARTMENT OF COMPUTER SCIENCE ALIGARH MUSLIM UNIVERSITY ALIGARH, U.P. – 202002 P. G. Diploma in Computer Programming (PGDCP) Curriculum Structure				
COURSE CODE	**PAPER TITLE**	**Sessional Marks/ Continuous Evaluation**	**Final Marks**	**Total Marks**
DCP-101	Introduction to Computers & Problem Solving	30	70	100
DCP-102	Internet Technology &Web Designing	30	70	100
DCP-103	P. C. Based Application Software	30	70	100
DCP-LAB-I	Programming Lab	40	60	100
DCP-LAB-II	Web Technology & Networking Lab	40	60	100
DCP-LAB-III	Office Automation & Data Processing Lab	40	60	100
	Total			**600**

UG Programme in the Light of NEP-2022

FYUP Course Structure for
B.Sc. (Hons.) Computer Applications
w.e.f. Academic Session 2022-23

S. No.	Course No.	Course Title	Credit	Period Per Week		Marks		
				L/P	T	Sessional	End Sem.	Total
Major Subject								
1	CABSMJ1001	Problem Solving using C	04	03	01	30	70	100
2	CABSMJ1002	Introduction to CS and IT	02	01	01	30	70	100
3	CABSMJ1P01	Lab-I (CABSMJ1001)	02	02	01	60	40	100
***Minor Subject**								
1	CABSMN1003	Introduction to C	04	03	01	30	70	100
2	CABSMN1P01	Lab-I (M) (CABSMN1003)	02	02	01	60	40	100
***Generic Elective Course**								
1	CABSGE1004	Numerical and Statistical Computing	04	03	01	30	70	100
Semester II								
Major Subject								
1	CABSMJ2001	Data Structures using C	04	03	01	30	70	100
2	CABSMJ2002	Digital System Design	02	01	01	30	70	100
3	CABSMJP02	Lab-II	02	02	01	60	40	100
***Minor Subject**								
1	CABSMN2003	Data Structures and Algorithms	04	03	01	30	70	100
2	CABSMN2P02	Lab-II (M)	02	02	01	60	40	100
***Generic Elective Courses**								
1	CABSGE2004	Optimization Techniques	04	03	01	30	70	100
Award of CERTIFICATE (After 1 Year: 44 Credits)								

Semester III								
Major Subject								
1	CABSMJ3001	Object Oriented Programming using Java	04	03	01	30	70	100
2	CABSMJ3002	Computer Architecture	02	02	01	60	40	100
3	CABSMJ3P03	Lab-III	02	01	01	30	70	100
***Minor Subject**								
1	CABSMN3003	Java Programming	04	03	01	30	70	100
2	CABSMN3P03	Lab-III (M)	02	02	01	60	40	100
***Generic Elective Course**								
1	CABSGE3004	Discrete Structures	04	03	01	30	70	100
Semester IV								
Major Subject								
1	CABSMJ4001	Database Management System	04	03	01	30	70	100
	CABSMJ4002	Discrete Mathematics	02	01	01	30	70	100
2	CABSMJ4P04	Lab-IV	02	02	01	60	40	100
3								
***Minor Subject**								
1	CABSMN4003	Database Concepts	04	03	01	30	70	100
2	CABSMN4P04	Lab-IV (M)	02	02	01	60	40	100
***Generic Elective**								
1	CABSGE4004	Automata Theory	04	03	01	30	70	100
Award of DIPLOMA (After 2 Year: 88 Credits)								
Semester V								
Major Subject								
1	CABSMJ5001	Operating System and Shell Programming	04	03	01	30	70	100
2	CABSMJ5002	Object Oriented Analysis and Design	04	03	01	30	70	100
3	CABSMJ5P05	Lab-V	04	04	02	60	40	100
Elective (Choose Anyone of the following)								
1	CABSXO5003	Parallel and Cloud Computing	04	03	01	30	70	100
2	CABSXO5004	Mobile Programming Languages	04	03	01	30	70	100

3	CABSXO5005	Graph Theory	04	03	01	30	70	100
Elective (Choose Anyone of the following)								
1	CABSXO5P01	Lab-I	02	02	01	60	40	100
2	CABSXO5P02	Lab-II	02	02	01	60	40	100
3	CABSXO5P03	Lab-III	02	02	01	60	40	100
Semester VI								
Major Subject								
1	CABSMJ6001	Software Engineering	04	03	01	30	70	100
2	CABSMJ6002	Analysis and Design of Algorithms	04	03	01	30	70	100
3	CABSMJ6P06	Lab-VI	04	03	01	60	40	100
Elective (Choose Anyone of the following)								
1	CABSXO6003	Cyber Security	04	03	01	30	70	100
2	CABSXO6004	Computer Graphics	04	03	01	30	70	100
3	CABSXO6005	Optimization Techniques	04	03	01	30	70	100
Elective (Choose Anyone of the following)								
1	CABSXO6P04	Lab-IV	02	02	01	60	40	100
2	CABSXO6P05	Lab-V	02	02	01	60	40	100
3	CABSXO6P06	Lab-VI	02	02	01	60	40	100
Award of Bachelor of Sciences (After 3 Years: 132 Credits)								
Semester VII								
Major Subject								
1	CABSMJ7001	Soft Computing	04	03	01	30	70	100
2	CABSMJ7002	Internet and Web Technology	04	03	01	30	70	100
3	CABSMJ7P07	Lab-VII (H)	04	04	02	60	40	100
Elective (Choose Anyone of the following)								
1	CABSMJ7003	Artificial Intelligence	04	03	01	30	70	100
2	CABSMJ7004	Distributed Computing and IoT	04	03	01	30	70	100
3	CABSMJ7005	Web Application Security	04	03	01	30	70	100
Vocational & Skill Enhancement Course								
1	CABSMJ7101	Research Methodology	02	01	01	30	70	100

Seminar								
1	CABSMJ7S01	Seminar	04	03	01	60	40	100
Semester VIII								
Major Subject								
1	CABSMJ8001	Computer Networks	04	03	01	30	70	100
2	CABSMJ8002	Python Programming	04	03	01	30	70	100
3	CABSMJ8P08	Lab-VIII (H)	04	04	02	60	40	100
Elective (Choose Anyone of the following)								
1	CABSMJ8003	Machine Learning	04	03	01	30	70	100
2	CABSMJ8004	Cloud and IoT Security	04	03	01	30	70	100
3	CABSMJ8005	Digital Forensics	04	03	01	30	70	100
Project/Internship/Community Engagement & Services								
1	CABSMJ8D01	Dissertation	06			60	40	100
Award of Bachelor of Science (Hons.) (After 4 Years: 176 Credits)								
Semester VII								
Major Subject								
1	CABSMJ7001	Soft Computing	04	03	01	30	70	100
2	CABSMJ7002	Internet and Web Technology	04	03	01	30	70	100
3	CABSMJ7P09	Lab-IX (R)	02	02	01	60	40	100
Elective (Choose Anyone of the following)								
1	CABSMJ7003	Artificial Intelligence	04	03	01	30	70	100
2	CABSMJ7004	Distributed Computing and IoT	04	03	01	30	70	100
3	CABSMJ7005	Web Application Security	04	03	01	30	70	100
Vocational & Skill Enhancement Course								
1	CABSMJ7102	Research Methodology	04	03	01	30	70	100
Dissertation								
1	CABSMJ7D01	Dissertation-I	04			60	40	100
Semester VIII								
Major Subject								

1	CABSMJ8001	Computer Networks	04	03	01	30	70	100
2	CABSMJ8002	Python Programming	04	03	01	30	70	100
3	CABSMJ8P10	Lab-X (R)	02	02	01	60	40	100
Elective (Choose Anyone of the following)								
1	CABSMJ8003	Machine Learning	04	03	01	30	70	100
2	CABSMJ8004	Cloud and IoT Security	04	03	01	30	70	100
3	CABSMJ8005	Digital Forensics	04	03	01	30	70	100
Dissertation								
1	CABSMJ8D02	Dissertation-II	08			60	40	100
Award of Bachelor of Science (Hons.) with Research (After 4 Years: 176 Credits)								

Credit Framework

Type of Award/Stage of Exit	Major	Minor	Generic Elective Courses	Elective (Major) Courses	Vocational & Skill Enhancement Courses	Value Addition Courses/ Project & Dissertation	Total
Certificate (after successful completion of IInd semester)	16	12	08		04	04	44
Diploma (after successful completion of IVth semester)	16	12	08		04	04	88
B.Sc. (after successful completion of VIth semester)	24			12	04	04	132
B.Sc. (Hons.) (after successful completion of VIIIth semester)	24			08	02	10	176
B.Sc. (Hons.) with Research (after successful completion of VIIIth semester)	20			08	04	12	176

Specialization Tracks:

Semester	Track 1 (Artificial Intelligence & Machine Learning)	Track 2 (Cloud and IoT)	Track 3 (Information Security)
VII	**E71:** Artificial Intelligence	**E72:** Distributed Computing and IoT	**E73:** Web Application Security
VIII	**E81:** Machine Learning	**E82:** Cloud and IoT Security	**E83:** Digital Forensics

Note: Further, the Chairperson is authorized to make necessary changes in the Curriculum/Syllabi of 4-years B.Sc. (Hons.) Computer Applications programme as and when required.

Our Sponsors

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