A REPORT ON

ONE DAY INTERNATIONAL SYMPOSIUM ON ARTIFICIAL INTELLIGENCE IN BIOLOGICAL SCIENCES: RECENT TRENDS

Organized by

DEPARTMENT OF BIOSCIENCES

INTEGRAL UNIVERSITY, LUCKNOW

A one-day international symposium on "**Artificial Intelligence in Biological Sciences: Recent Trends**" was organized by the Department of Biosciences, Integral University, Lucknow on 23rd April 2024. The symposium aimed to foster knowledge exchange, collaboration, and innovation in leveraging Artificial Intelligence (AI) for societal and industrial benefit. The symposium commenced with the welcome address by Prof. Abdul Rahman Khan, Dean, Faculty of Science & CoE, Integral University, who extended his deepest appreciation to the speakers and the participants for being a part of this symposium. He emphasized the transformative potential of AI in the field of Biological Sciences and urged the participants to seize this opportunity for their better research prospects. Professor Rahman's address was seamlessly followed by a captivating speech from Professor Haris Siddiqui, the Registrar of Integral University, shedding light on the remarkable journey that led to the establishment of this prestigious institution. Professor Siddiqui eloquently detailed the phases of development, accomplishments, and notable achievements of Integral University, leaving the audience enthralled and informed. The Chief Guest, Dr. Arun Mohan Sherry, Director, Indian Institute of Information Technology, Lucknow provided a simple yet profound explanation of the inception of AI and its significance, particularly focusing on its meaning and implications for the students. He emphasized that maximizing the potential of AI hinges on essential components such as data accessibility, robust processing capabilities, ample storage capacity, and seamless internet connectivity. Drawing from everyday examples like ChatGPT, Google Maps, and Siri, he underscored the ubiquitous presence of AI in our lives. Furthermore, he stressed upon the significance of grasping fundamental AI concepts for students and researchers alike, highlighting AI's inherently practical nature and its universal applicability across diverse fields.

Following the chief guest's address, Professor Aqil Ahmad, the Pro-Vice Chancellor of Integral University, took the stage. He expressed gratitude to the chief guest, Arun Mohan Sherry, for his insightful explanation of the practical applications of Artificial Intelligence in accessible terms. Professor Ahmad emphasized that while AI can enhance efficiency, it's

crucial to remember that the term 'artificial' signifies a level below human intelligence. He stressed the importance of using artificial intelligence judiciously and with careful consideration. Following Prof. Aqil's engaging address, Professor Javed Musarrat, the esteemed Vice Chancellor of Integral University, delivered the presidential address. He congratulated the Biosciences team for their initiative in organizing a timely and pertinent symposium on the highly relevant topic of Artificial Intelligence. His captivating talk explored the diverse applications of AI in genomic analysis, disease prediction, drug discovery, and medical imaging. Professor Musarrat encouraged all biochemical researchers to actively engage with the sessions and leverage AI-driven technology to advance their research. Highlighting the university's commitment to innovation, he announced the integration of AI into the curriculum across various departments, ensuring students gain exposure to this transformative technology.

The end of the inaugural session was marked by the vote of thanks which was presented by Prof. Snober S. Mir, Head, the Department of Biosciences. She expressed gratitude to the dignitaries on the dais, the esteemed speakers, and enthusiastic participants for graciously dedicating their valuable time to participate in this symposium.

The inaugural ceremony was followed by two enlightening sessions featuring speakers from diverse backgrounds and countries, who shared their invaluable insights on the dynamic subject of Artificial Intelligence and its application in modern biology. The lineup of speakers included Dr. Meraj Khan, Clinical Scientist, the Hospital for Sick Children, University of Toronto, Canada; Dr. Subhash Kumar Yadav, Associate Professor, Department of Statistics, BBAU, Lucknow; Dr. Imran Khan Niazi, Director, Centre for Chiropractic Research, College of Chiropractic, New Zealand; Dr. Ahmad Raza Khan, Assistant Professor, Centre of Biomedical Research, Lucknow; Dr. Aditi Sharan, Associate Professor, School of Computer and System Sciences, JNU, New Delhi; and Dr. Firoz Ahmed, Assistant Professor, Department of Biological Sciences, College of Science, University of Jeddah, Saudi Arabia.

A poster presentation was also held during the event, and certificates were awarded to the winners. The symposium attracted a vibrant participation of 139 attendees from various esteemed institutions including AIIMS, New Delhi; IIT (BHU), Varanasi; University of Kashmir; Mangalayatan University, Aligarh; Sharda University, Noida; Era University, Lucknow; and University of Lucknow, among others. This diverse blend of participants greatly enriched the symposium and contributed significantly to its success.

Both the sessions were very informative and enlightening. First session started with an online talk by Dr. Meraj Khan, Clinical Scientist, the Hospital for Sick Children, University of Toronto, Canada on the topic entitled **"AI-Powered Healthcare: Paving the Way for Personalized Treatment"**. He began by introducing the concept of NETosis and discussed drugs that can effectively suppress this phenomenon. Dr. Khan then delved into the main theme of his talk, illustrating how AI can address critical challenges such as data viability, diversity, and gathering inconsistency, while enhancing data explainability. He showcased AI's role in drug screening through transcriptome data analysis and emphasized its ability to generate precise datasets. During his presentation, Dr. Khan highlighted DigiBiomics, an innovative AI tool empowering healthcare professionals with data-driven insights and intelligent automation. This technology enables more efficient diagnoses and personalized treatment plans. He showcased groundbreaking products from DigiBiomics, including Thera predict, a personalized antidepressant therapy prediction system, and Pulmodeep, a deep learning-based tool for early lung disease detection. Dr. Khan's presentation underscored the transformative impact of AI in healthcare, illustrating its potential to revolutionize personalized medicine through advanced data analytics and intelligent technologies.

The second talk, delivered offline by Dr. Subhash Kumar Yadav, was a captivating discussion on **"Statistical and Machine Learning Techniques for Predicting Monkeypox Incidences"**. He began by introducing the scientific quote "Regression has the power of prediction", setting the stage for discussing the fundamental aspects of modelling and data generation within this context. Dr. Yadav's lecture primarily focused on infectious disease modelling, where he explained different types of models and their applications using monkeypox disease as a case study. During his presentation, he effectively distinguished between statistical modelling and machine learning modelling, providing valuable insights into their respective roles and differences in disease prediction. Dr. Yadav gave a brief introduction to monkeypox disease and then demonstrated the application of Random Forest, a machine learning algorithm, to analyse and predict the spread of monkeypox in countries with high infection rates. By integrating multiple modelling techniques, he emphasized how this approach enhances our understanding of disease dynamics and aids in devising more informed strategies for containment and control. In his closing remarks, Dr. Yadav emphasized that machine learning modelling is not inherently superior to statistical modelling, stressing the importance of considering both approaches based on specific needs and contexts. Overall, his presentation provided valuable insights into the synergistic application of

statistical and machine learning techniques for predicting and managing infectious diseases like monkeypox.

Following Dr. Yadav's presentation, Dr. Imran Khan Niazi delivered a talk on "The Integrative Approach: Exploring Synergies Between Chiropractic Care and Data Science to Enhance Biological Understanding." In his presentation, he provided an overview of the New Zealand College of Chiropractic, detailing its structure and research themes. He made the audience familiar with the concept of Chiropractic care and its integration with data science, offering a promising approach in enhancing our understanding of human biology and developing evidence-based healthcare solutions. He underscored the importance of leveraging the complementary strengths of these two fields to explore the mechanisms underlying chiropractic interventions. Moreover, Dr. Niazi emphasized that this integration would facilitate a broader comprehension of the intricate interactions among the musculoskeletal system, the nervous system, and other physiological processes. Lastly, he emphasized on fostering interdisciplinary collaborations and supporting innovative research that would be crucial in harnessing the potential of this integrated approach.

After the much mind-provoking lectures of the speakers in session I, the session II started with an informative and interesting talk of Mr. Ahamad Raza Khan, Ramalingaswami Fellow, Centre of Bio-Medical Research (CBMR), Lucknow, India. Mr. Ahamad Raza Khan gave his inspirational talk on the topic **"Advancement in Neuroimaging using Artificial Intelligence"**. He discussed the importance of development and progress in the area of neuroimaging tools which is much needed for early detection and proper treatment of subtle CNS alterations. He made the audience aware of various advancements in the field of neuroimaging technique making it an essential requisite tool for understanding the function, brain anatomy, and pathology. In his talk, he mentioned Diffusion tensor imaging (DTI) which is an advanced magnetic resonance imaging enabling in the visualization of neural pathways and its connectivity. He further introduced the audience to DKI which is a cutting-edge imaging method that takes diffusion-weighted imaging (DWI) and diffusion tensor imaging (DTI) to new heights. Kurtosis, a measure of probability distribution skewness, plays a key role here, showcasing how far a distribution strays from the norm. With DKI, we unlock the secrets of tissue microstructure by capturing its unique, non-Gaussian diffusion behavior. It helps in revealing vital markers for tissue heterogeneity.

Prof. Ahmad Raza highlighted the power of deep learning, its remarkable ability to reconstruct high-quality diagnostic images and in eliminating artifacts. He further added that there has been a surge of excitement around harnessing artificial intelligence methods to streamline workflows, enhance diagnosis and treatment, and elevate the effectiveness of quantitative imaging techniques. It's a promising frontier where technology is revolutionizing how we approach medical imaging, unlocking new possibilities for improving patient care and outcomes.

The session was followed by yet another enlightening and knowledgeable talk by Dr. Firoz Ahmed, Associate Professor of Bioinformatics and Systems Biology, Department of Biological Sciences, College of Science, University of Jeddah, Saudi Arabia. The topic of his lecture was **"AI-Driven Identification of Transcriptome-Interactome Signature for Predicting Non-Small Cell Lung Cancer"**. His talk started by an introductory insight of non-small cell lung cancer (NSCLC) which has become a serious health issue globally due to lack of precise molecular signatures limiting the early diagnosis. He focused on the need to develop and validate a biomarker-based prediction tool that can accurately identify and diagnose NSCLC patients allowing the accurate detection of the disease. He talked about integrating gene expression and interactive data for creating a highly accurate model with the least absolute shrinkage and selection operator (LASSO) for predicting NSCLC. Dr. Firoz dealt with the importance of Artificial intelligence which is a machine learning technique for identification of 17 signature genes for predicting NSCLC. The genes have significant involvement in cancer pathways and cell cycle. Later, he also talked about a user-friendly web tool, NSCLCpred, designed to predict NSCLC using the expression profile of 17 genes. This would definitely help in early detection of NSCLC leading to improved patient outcomes and offer potential avenues for therapeutic interventions.

Session 2 of the International Symposium was concluded with an illuminating discourse by Prof. Aditi Sharan on the topic entitled **"Intelligent Text mining for Biomedical domain"**. She first of all thanked the organising committee for inviting her to the talk and congratulated the earlier speakers for giving capitative and informative presentations. She emphasised on the importance of research in the biomedical field and shared her journey towards the biomedical text mining field. She made the audience well aware of the concept of text mining which is a process of discovering and extracting knowledge from unstructured data. She discussed the challenges faced during the process of text mining and the various approaches for biomedical text mining which included Ontology knowledge-based approach, Deep

learning-based approach and Hybrid based approach. Moreover, she emphasized that biomedical research should incorporate AI in addressing their research problems. So, there is a need to hybridize these two approaches viz. Ontology and Deep learning in order to overcome the limitations of individual approaches. Prof. Aditi Sharan highlighted few case studies such as extracting structural information from Discharge summary present in MIMIC database, drug recommendation based on patient's characteristics, extraction of adverse drug reaction for cancer and Multilabel classification of hallmark of Cancer data.

Brochure of International Symposium on "Artificial Intelligence in Biological Sciences: Recent Trends"

Glimpses of symposium showing inaugural session and presentation by invited speakers in offline mode

Glimpses of symposium showing presentation by invited speakers in online mode and distribution of certificates to the winners of poster presentation

Participants attendance, Certificates of participation and coverage of the symposium by different news media