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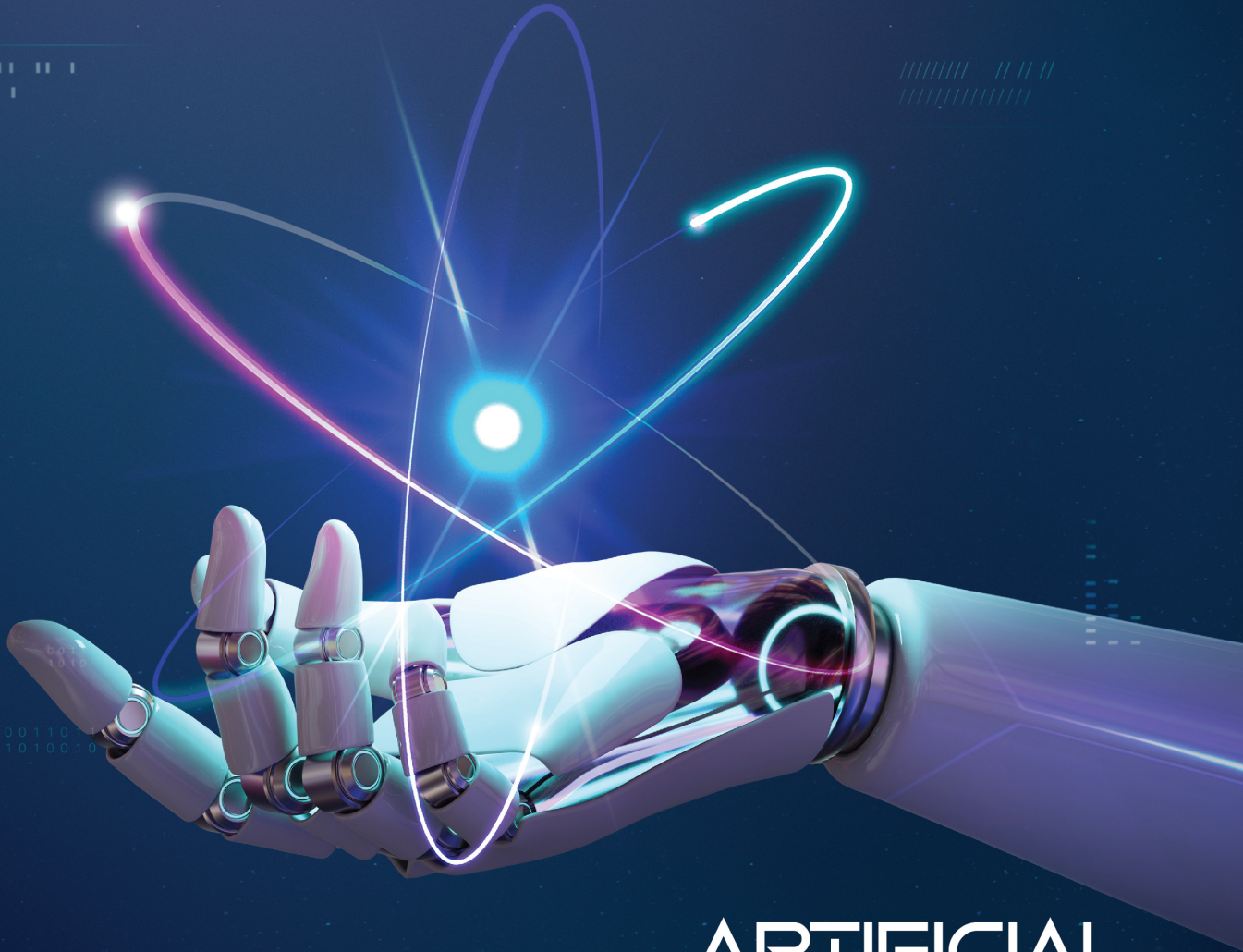
ARTIFICIAL INTELLIGENCE (AI):
Embracing the Future

RISE

UNIVERSITI TEKNOLOGI MARA

ADMINISTRATION

PROF. TS. DR NORAZAH ABD RAHMAN
Deputy Vice-Chancellor (Research & Innovation)
Office of Deputy Vice-Chancellor (Research & Innovation)
noraz695@uitm.edu.my
+603 – 5544 2004

ASSOC. PROF. DR MOHD MUZAMIR MAHAT
Head of Research Communication & Visibility Unit (UKPV)
mmuzamir@uitm.edu.my
+603 – 5544 3097

ABOUT THE MAGAZINE

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research and Innovation) with aims to highlight a research and innovation on multidisciplinary expert of fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and stride to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that is accepted by all expertise.

ABOUT UiTM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. The Office of the Deputy Vice-Chancellor (Research and Innovation) also known as PTNCPI *(Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi))* serves as a *Pusat Tanggungjawab* (PTJ) for navigating the research and innovation agenda of the university to achieve UiTM's goals.The PTNCPI office strives to mobilize faculty and campuses, fostering collaboration among researchers, with the aim of transforming the University into a Globally Renowned University by 2025

Artificial Intelligence in Medical Imaging Symposium 2023
Challenges and Barriers

Technology has tremendously revolutionized the medical imaging industry, allowing healthcare professionals in the country to access better treatment options and improve patients' quality of life. Today, medical imaging technology is equipped with Artificial Intelligence (AI) and Machine Learning (ML), bringing promising innovations to healthcare. It can analyze medical images with a high degree of accuracy and consistency.

In sync with the current technology and the National Policy on Industry 4.0: Industry 4WRD, the Centre of Medical Imaging Studies, Faculty of Health Sciences, UiTM, has organized the first face-to-face symposium after two years of pandemic lockdown on artificial intelligence (AI) in medical imaging on 4th March 2023. The symposium was held in collaboration with Teesside University, United Kingdom, and UTechtium Sdn. Bhd., parallel with the UiTM's strategic goal, becoming a Globally Renowned University (GRU) with "Globally Marketable" as the 2023 theme,to support collaboration and mutual inspiration across the world. Held at Nilai Springs Resort Hotel, Negeri Sembilan. The one-day symposium saw over 100 participants, including healthcare professionals, academicians, and scientists. Local and international experts from the clinical and medical imaging industries were brought together with a targeted focus on the impact of artificial intelligence in clinical practice, clinical practitioners' perspective, and challenges of artificial intelligence in medical imaging.

The symposium was officiated by Dr. Veronica Lugah, Senior Deputy Director of the Planning Division, Ministry of Health Malaysia, accompanied by Professor Dr. Zulkhairi Hj Amom, the Dean of the Faculty of Health Sciences, UiTM, and Mdm. Ann Erynna Lema Thomas Sudin, the Head of the Centre for Medical Imaging Studies, Faculty of Health Sciences, UiTM. In her speech at the opening ceremony, Dr. Veronica Lugah emphasized that the application of artificial intelligence technology in the healthcare industry has revolutionized clinical practice.

"The world is witnessing a global shift towards AI in the healthcare industry, and I am delighted to see several potential AI research projects in healthcare under the Health Ministry. Furthermore, it is important to understand the key role of AI in the future and to elucidate its potential contributions in the management of outpatients," she said.

Following the opening speech, Dr. Veronica has visited the exhibition booths of Canon Medical Systems Malaysia and LUNIT. These two companies served as the main sponsors for the symposium.

Why considers AI?

With the pre-pandemic strains and growing backlog of medical cases, the healthcare industry in the UK is facing tremendous pressure. Fiona MacGregor, Senior Lecturer from Teesside University, UK, said, "We were experiencing a 30% increase in reporting workload in the past five years. The shortfall in radiologists is expected to increase by 10% by 2026." AI in the Healthcare industry, especially in medical imaging, is advanced. An AI-driven system that automatically combs through image abnormalities could be used as a triage tool to speed care for those who need it most with backup from the radiologist. "AI also has the potential to improve image quality. For example, CT dose likely could be reduced without increasing image noise", MacGregor shared.

However, the primary concerns of the AI implementation are how this will be achieved.

AI-powered healthcare technologies are mostly data-rich; in other words, AI algorithms require large quantities of patient imaging images. From a human rights perspective, an individual should always control personal data. Consent must be obtained for the use of their images for AI training.

However, the primary concerns surrounding AI implementation revolve around how to achieve it. AI-powered healthcare technologies rely heavily on data; in other words, AI algorithms require large quantities of patient imaging images. From a human rights perspective, individuals should always have control over their personal data, and consent must be obtained for the use of their images in AI training.

"Appropriate legislation and governance are necessary to uphold data protection rights in the use of AI. However, no regulatory framework for the implementation of AI in medical imaging has been established in the UK. More recently, the National Health Service AI lab was created to address the barriers to AI development and application. AI is expected to be regularly utilized in the UK within 5 to 10 years. By regularly reviewing healthcare education delivery, ensuring the currency of knowledge and awareness of AI developments in practice, and providing adequate training in AI, the role of medical imaging practitioners will be enhanced within the next 20 years," stated MacGregor.

AI from the Radiologists' and Radiographers' Perspective

As a consultant radiologist at Sunway Medical Centre, Dr. Adam Pany pointed out that AI will serve as an additional layer of precision and consistency in detecting anomalies that may otherwise go unnoticed. Furthermore, AI can help prioritize time-sensitive cases such as strokes and enhance the workflow of radiologists. Additionally, AI can reliably handle tedious and repetitive quantitative tasks, such as breast lesion analysis, allowing radiologists to focus on more critical work.

Despite the benefits of AI in medical imaging, the interpretation used by AI may introduce bias. AI bias occurs when the machine produces different results for one patient group compared to another due to erroneous assumptions made by the machine. Dr. Adam Pany emphasized the need for more local data to avoid AI bias. "Disease patterns vary across different geographies, ethnic groups, genders, and social behaviors. Therefore, we cannot simply rely on standard datasets provided by vendors as the results may not accurately reflect the local population," he added.

Radiographers play a crucial role in integrating AI systems into medical imaging as they serve as the interface between technology and patients. Mr. Sawal Marsait, the president of the Malaysian Society of Radiographers (MSR), advised that radiographers need to familiarize themselves with the utilization of AI in their daily work. "Although AI is not fully utilized in Malaysia yet, the technology is available, and its utilization is inevitable in the future. As radiographers, we need to be prepared for when that day comes," advised Sawal Marsait.

AI within Malaysia

There are numerous automations and AI use cases in healthcare, ranging from workflow optimization to disease diagnosis. These solutions hold the promise of enhancing patient health outcomes and workflow efficiencies by supporting and assisting healthcare professionals and patients at every stage of care. Mohammad Norman bin Mohd Nordin, a Senior Radiographer from Hospital Chancellor Tunku Muhriz Universiti Kebangsaan Malaysia, stated, "Long scanning times are a major limitation in Magnetic Resonance Imaging (MRI). With the increasing demand for MRIs from consultants, the workload in radiology has increased, resulting in extended waiting times for patients to obtain an MRI appointment. Prioritizing the ability to scan more patients by shortening the time from the initial scan to the final diagnosis is of utmost importance. AI-based image reconstruction has successfully accelerated MRI examinations, thereby improving department productivity. Moreover, AI has the potential to minimize equipment downtime by predicting when medical equipment needs maintenance, thus preventing unnecessary service interruptions."

Hospital Chancellor Tunku Muhriz Universiti Kebangsaan Malaysia is the first center in Southeast Asia equipped with the Twin Robotic X-ray System, which offers unparalleled positioning flexibility and unique automated workflows around the patient. "This system enables automatic alignment and exposure settings, as well as automatic collimation, which can significantly reduce radiation exposure. Most importantly, it reduces examination time and errors, and improves our workflow," added Mohammad Norman.

Potential Roles for AI in Breast Imaging

According to the World Health Organization (WHO), nearly 50,000 newly diagnosed cancer cases were reported in Malaysia in 2020, and a twofold increase is expected by 2040. Among these cancer cases, breast cancer is the most common cancer among women in Malaysia (Portal MyHEALTH). Early detection plays a crucial role in improving the survival rate of breast cancer patients, and it relies on disease awareness and screening participation. Early diagnosis can enhance the 5-year survival rate of breast cancer patients from 22% to 100%[1]. Among the various imaging modalities, mammography is the only screening method proven effective in reducing breast cancer mortality.

Associate Professor Dr. Nazimah Ab Mumim, a Consultant Breast Radiologist at Universiti Teknologi MARA, stated, "Computer-aided detection (CAD) has been FDA-approved for mammography use since 1998 to assist radiologists in detecting subtle cancers that may otherwise be missed. However, traditional CAD systems have shown lower specificity and higher false-positive rates, leading to unnecessary recalls. In recent years, AI through deep learning has demonstrated impressive accuracy and sensitivity in identifying breast abnormalities."

In her presentation, Dr. Nazimah shared her experience with LUNIT, an AI solution from South Korea, in a breast imaging project. She stated, "LUNIT INSIGHT MMG is a fully automated solution that analyzes mammogram images without human intervention. This solution can detect lesions of any size, regardless of the number. The analysis results are sent back to the Picture Archiving and Communication System (PACS) in less than a minute."

Asian women, including those in Malaysia, often have higher breast mammographic density. In fact, over 50% of Malaysian women have dense breasts, and breast density is inversely related to age and parity [2]. Unfortunately, dense breasts can affect the sensitivity of mammographic screening. Ultrasound is a valuable supplementary tool to mammography for evaluating dense breasts and breast lumps. Dr. Nazimah explained, "Previously, after taking the mammogram, patients had to wait for the breast specialist to review all the 2D images. Patients with breast densities C and D or any suspicious lesions would then proceed for an ultrasound. After the ultrasound, the breast radiologist had to review the same cases that now included mammograms and ultrasounds. However, with LUNIT INSIGHT MMG, radiographers can refer to the AI analysis results for breast density and the presence of suspicious lesions, and subsequently send patients for an ultrasound. This way, the radiologist only needs to review the images once."

Regarding the accuracy of the solution, Dr. Nazimah further explained, "Based on research findings, this solution demonstrated excellent diagnostic performance in detecting malignant lesions, achieving over 80% sensitivity and specificity at various thresholds. AI CAD has the potential to serve as a second reader, acting as a triage tool to identify and prioritize negative screening mammograms, thereby optimizing workload and increasing efficiency."

The closing ceremony was facilitated by Fiona MacGregor from Teesside University. The symposium was highly successful, with many attendees expressing their willingness to incorporate AI into their professional practices, provided suitable solutions are available.

For those interested in learning more about upcoming events organized by the Centre for Medical Imaging Studies, Faculty of Health Science, UiTM, please visit https://www.facebook.com/uitm.fskmi.

Dr Leong Sook Sam
Centre for Medical Imaging Studies,
Faculty of Health Sciences, UiTM

Zanariah Mohd
Centre for Medical Imaging Studies,
Faculty of Health Sciences, UiTM