SingHealth DukeNUS ACADEMIC MEDICAL CENTRE
Joint Office of Research
Research e-Bulletin
A weekly e-newsletter for the research community

Where Healthcare Meets Technology

From customer service chatbots to GPS and automated driving cars, Artificial Intelligence is rapidly becoming a key facet of our everyday lives. With various industries quickly catching on, healthcare professionals too are quickly realising the immense potential of Artificial Intelligence applications in Medicine. In this edition of the Research e-Bulletin, we cover the inaugural Artificial Intelligence in Medicine, an event which aims to inform and promote the collaboration between healthcare practitioners and technical experts in health services and medicine.

The flashes of computer-generated fireworks resonated throughout the Academia auditorium on the 4th of April, 2018. The cause? The stage of the inaugural Symposium of Artificial Intelligence in Medicine, a collaboration between SingHealth, AI Singapore, and the National University of Singapore (NUS). Gathered in the tightly-packed hall was a collection of over four hundred healthcare practitioners and technical experts alike; all seated and eager to find out the answer to a single question:

How will Artificial Intelligence alter the future of healthcare from here on out?

The event began with an opening address by Prof Wong Tien Yin, DyGCEO, Research and Education, SingHealth and Vice Dean, Office of Academic and Clinical Development, Duke-NUS Medical School. In his address, Prof Wong shared an overview of the need for Artificial Intelligence in healthcare, the opportunities of AI, and the paths forward and associated roadblocks. AI gives patients what they really want from healthcare, namely, precision, timeliness, continuity, choice, and coordination. “AI is the fourth revolution in healthcare,” he declared.

Deep learning and predictive algorithms are now giving us access to additional information which are, in turn, paving the way for healthcare practitioners to either change their existing practices or form new ones. As a pitfall, however, we have to note to have realistic expectations in AI as machine learning and prediction continues to grow. Prof Wong cautioned listeners against overestimating technology, which may result in poor or inflated diagnoses.

Professor Leong Tze Yun, Director, AI Technology, AI Singapore, and Professor of Practice, NUS School of Computing then took to the stage for a keynote address. In her address, Prof Leong reflected on the field based on her experiences as a computer scientist. She began by addressing the promises and transformational changes of healthcare. While AI development initially began with a goal of making computers think like humans, it has slowly changed into the development of techniques to complement the current understanding and decision-making of humans. “AI in Medicine has now transitioned from the laboratory to making a difference in our real lives,” said Prof Leong.

However, there is still more to be done. AI in Medicine cannot be deemed ‘successful’ as it currently still remains just one set of methodologies in biomedical informatics and practical influence depends on impact on the practice of medicine. She stressed the consideration of discovery or decision support instead of automated decision, beyond technical and socio-technical requirements, impact on multiple stakeholders with different expectations. She also stated the need for context-sensitive, human-aware, integrative, changeable systems; collaboration between both the public-private sector; and sustainable, innovative solutions. Additionally, beyond technical challenges, issues continue to arise with the data being used to make such predictions. Data quality, usability and storage, accessibility, and relevance are just some of many issues in AI in medical practice.

Prof Leong’s talk was followed by a series of short talks and the first panel discussion, ‘Artificial Intelligence for Smart Care’. The panel broached potential developments, opportunities and consequences in the areas of applications of Artificial Intelligence in the public health and service industry. The panel was moderated by Associate Prof Marcus Ong, Vice-Chair (Research), Emergency Medicine ACP and Head of SingHealth HSRC Data Science Core and included panel members Prof Feng Meng Ling of SSHSPH; Dr He Shuangchi of NUS, IORA, Dr Iain Tan of NCCS, Dr Low Lian Ling of SingHealth, and Prof Ng Hwee Tou of NUS.

The series of short talks began with each panel participant focusing on the application of artificial intelligence in their respective experiences. Prof Feng began the first short talk, opting to focus on three main areas of disease diagnosis, treatment optimization, and prevention. Dr Low then gave an overview of the SingHealth Regional Health System (RHS), the nationwide frequent admitter prediction tool, and future opportunities for the RHS. Prof Ng then spoke on the growing technology of natural language processing (NLP) and its impact on clinical notes. Dr Tan spoke of AI in Oncology. Dr He then spoke of Data-Driven inpatient bed assignment: balancing boarding and overflowing.

During the pigeonhole discussion, a variety of issues such as additional AI-based training for medical students and PDPA becoming a restriction to AI progression in the case of patient data access were raised. In response to a pigeonhole query of 'how do you balance daily operations with disrupting day to day for a possibility of future AI advancement', the panel discussed the need to manage expectations and the communication behind the implementation of new projects. They highlighted the challenges of technology insertion in medicine, coping with changes and the initial loss of efficiency at the early implementation stage. It is key to get buy-ins from members, they stressed. A member of the audience suggested the creation of a database for researchers to introduce their projects to increase opportunities for collaboration. A database would make the buy-in process easier as well as external parties would have a better understanding of what other researchers are doing.

Next, the second round of discussions on 'Artificial Intelligence for Smart Diagnostic' commenced. The panel was moderated by Professor David Matchar, Director, HSSR Programme, Duke NUS, Co-Director, HSRI, SingHealth Duke-NUS AMC and included panel members Prof Ng See Kiong, Deputy Director, IDS, Professor of Practice, NUS School of Computing; Prof Patrick Tan, Director, PRISM, SingHealth Duke-NUS AMC, Deputy ED, BMRC, A*STAR, Professor, CSCB, Duke-NUS; Dr Daniel Ting, Assistant Professor in Ophthalmology, Duke-NUS Medical School; and Prof Wong Limsoon, Kwan-Im-Thong-Hood-Cho-Temple Chair Professor, NUS School of Computing.

The second series of talks commenced with Dr Ting's focus on diabetic eye screening. He spoke on deep learning, emphasizing on the highly critical nature of the training dictionary. Dr Ng then followed with his talk, and gave the audience an overview on unstructured medical data. Prof Patrick Tan then followed with a talk about multi-modality profiling on Asian normality.

He focused his talk on how data applications rather than AI. Prof Wong Limsoon then shared on the opportunities, pitfalls, and need for AI systems.

The panel then deliberated over recent developments, prospects, and potential shortcomings in the application of artificial intelligence in diagnostics and decision support for patient. Prof Matchar began with a his own question in line with the theme of collaboration between technical and medical specialists, namely, 'given your experiences across this divide, what is or should be a good experience between a clinician and technical expert be like?' The panel spoke about their difficulties in bridging data in AI and highlighted the importance of working together and recognizing each other parties' differences.

The panel also engaged in an interesting AI ethical query which questioned the responsibility of the physician in the case of the computer's misdiagnosis. Dr Ting determined that at this point of time, the culpability remains with the doctor as AI applications currently function as a diagnostic tool and the final decision making ultimately remains with the physician.

The symposium was followed by a series of parallel workshops in the areas of REDCap Advanced User Training, Deep learning with Python, and Health Systems Modeling using System Dynamics.

About the Artificial Intelligence in Medicine Symposium

The Artificial Intelligence in Medicine Symposium was created with the aim of promoting collaboration between healthcare practitioners and technical experts in the use of Artificial Intelligence (AI) to catalyse, synergise, and boost our Nation's capabilities to power our future digital economy in the area of health services and medicine.

The event was jointly organised by SingHealth, AI Singapore and the National University of Singapore (NUS). Its key partners include the NUS Institute of Data Science, the NUS Institute of Operations Research and Analytics, Duke-NUS Medical School, and the NUS Saw Swee Hock School of Public Health.