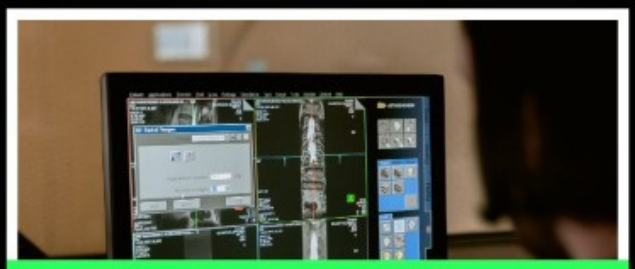
Issue 5/2023 MAY 2023

PRESCRIPTION

Latest news and updates from the Faculty of Pharmacy



Medical Imaging

Disease Surveillance

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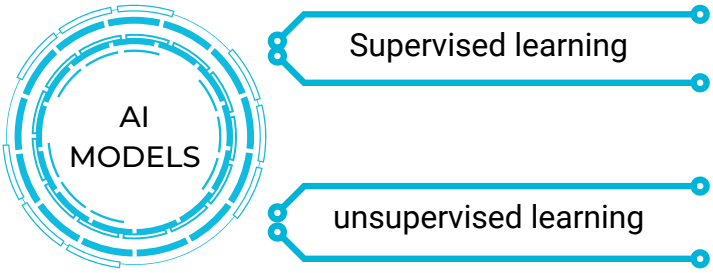
HOW ARTIFICIAL INTELLIGENCE IS ENHANCING INNOVATION IN HEALTHCARE

By Assoc. Prof. Dr. Fazlin Mohd Fauzi

The healthcare industry is constantly evolving, with new advancements and technologies emerging frequently. One of the most promising developments in recent years is the increasing integration of artificial intelligence (AI) in healthcare. AI has the potential to revolutionise healthcare by predicting and preventing disease outbreaks, as well as identifying the most effective treatments for individual patients. With the ability to analyse vast amounts of data, AI algorithms can uncover patterns and relationships that may not be immediately apparent to humans.



Main categories of AI models

There are two main categories of AI models: supervised and unsupervised learning. Supervised learning involves training a computer program to make predictions or decisions based on labelled data/ known outcome, while unsupervised learning involves recognizing patterns in the data without any explicit labelling. By utilising these computational models, healthcare providers and policymakers can make more informed decisions about patient care, leading to better outcomes and more efficient resource allocation.

The COVID-19 pandemic has seen a significant increase in the use of AI models, including supervised and unsupervised learning.

Publicly available bioactivity databases have been used to repurpose old drugs and predict compounds that may inhibit the virus, as well as develop vaccine prototypes. Additionally, deep learning AI models have been utilised to predict the structure of proteins associated with the SARS-CoV-2 virus. This application of AI in drug discovery is not limited to COVID-19, as Exscientia, an AI-driven pharmatech company, reported the first AI-designed drug candidate to enter clinical trials in early 2020. Biotech companies using an AI-first approach have over 150 small-molecule drugs in discovery, with more than 15 already in clinical trials. Moreover, established tech companies like IBM, Microsoft, and Google are also investing in AI drug discovery. Investment in AI-driven drug discovery companies has tripled over the past four years, reaching $24.6 billion in 2022.

AI was also used to address public health concerns during the pandemic. Initiatives to make data publicly available during the pandemic have aided in several decision-making processes and policies. An example of this is the Harvard Dataverse COVID-19 Initiative, which is a collaborative effort to collect and share data related to the COVID-19 pandemic worldwide.

The data collected and shared include epidemiological data, clinical trial data, and social media data.

Some of the models constructed using these data were used to track cases and deaths, look at the patterns of misinformation related to Ivermectin and COVID-19 spread, understand how the population moves to minimise risk and maximise operational efficiency, as well as identifying the best time to reopen universities for students.

Another area where AI has been applied is in medical diagnosis. Medical images such as chest X-rays, MRI, and CT scans are analysed by AI algorithms to detect the presence of a disease, making it an essential tool in medical diagnosis. This is particularly useful in diseases such as Alzheimer's Disease. This progressive neurological disorder affects memory and cognitive function and is challenging to diagnose, especially in the early stages when symptoms are mild and easily overlooked. However, machine learning algorithms can analyse large amounts of patient data, including brain scans and medical histories, to identify patterns and detect early signs of the disease that may not be visible to the naked eye. Studies have shown that AI-based diagnostic tools can accurately predict Alzheimer's Disease years before symptoms appear, allowing for early intervention and treatment. This early detection can enable patients to receive treatments and interventions that may slow the progression of the disease, improve quality of life, and delay the need for long-term care.

Although AI has great potential in healthcare, privacy concerns are an issue when dealing with patient data. However, wastewater analysis provides a solution to this issue. By analysing large amounts of data generated from wastewater testing, AI algorithms can detect patterns and trends that may indicate the presence of a virus. This approach has been successfully implemented in several countries, including Australia, the Netherlands, and the United States. One of the benefits of using AI for wastewater analysis is its ability to detect outbreaks in areas with a large population, where testing every individual may not be feasible. This can help public health officials make informed decisions about implementing measures to control the spread of the virus, such as lockdowns or targeted testing and tracing. Although the use of AI technology in wastewater analysis for outbreak detection is still in its early stages, it has shown great promise in detecting COVID-19 outbreaks and has the potential to detect future outbreaks.

The examples presented in this article only provides a glimpse into the vast possibilities of how AI can revolutionise healthcare. As AI technology advances, we can anticipate even more innovative applications in the future, such as tailored treatments, early disease identification, and outbreak forecasting. Nevertheless, as we incorporate AI into healthcare, it is important to consider the ethical implications and ensure that we maintain a balance between technology and human expertise. By thoughtfully integrating AI and implementing it responsibly, we can transform healthcare and achieve better outcomes for patients worldwide.

ABOUT THE AUTHOR

Associate Professor Dr Fazlin Mohd Fauzi is currently the Head of Pharmacology and Pharmaceutical Chemistry at the Faculty of Pharmacy UiTM. She holds a B.Pharm from Curtin University, MSc (Res) from University of Sheffield, and PhD from University of Cambridge. Her primary research interest is Cheminformatics and has recently expanded to applying Artificial Intelligence in Medical Imaging.

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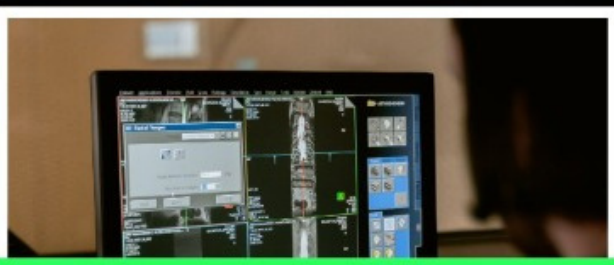

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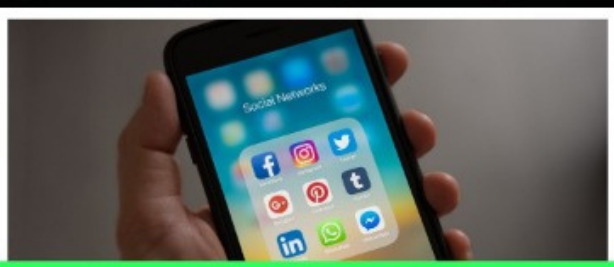

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