

Artificial Intelligence in OpenMRS

In recent years, artificial intelligence and machine learning have surged in popularity to become the hottest trends in software. Artificial intelligence, also known as AI, has been used in dozens of fields, from finance and education to transportation and social media.

But what exactly is Artificial Intelligence?

Artificial intelligence is defined as:

“the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition and decision making.”¹

AI is commonly applied through machine learning, a statistical technique for fitting models to data in order to “train” computer systems to perform tasks without specific instructions. In medical records systems, these machine learning models could help predict patient outcomes, guide medical decisions and improve user experience.

Predicting patient outcomes



AI can be used to predict which patients have the highest risk of developing more serious conditions, or which medicines could be administered for a certain disease. For example, the company Epic has used machine learning to create a popular sepsis prediction model that scans patients’ information every 15 minutes and monitors over 80 variables. This model decreased mortality caused by sepsis by 18%.²

In the case of OpenMRS, artificial intelligence could be used to achieve similar results if applied to detect patterns in entered patient data. Machine learning models could analyse the data inputted into OpenMRS, and find

¹ “Artificial Intelligence | Meaning of Artificial Intelligence by Lexico.” Lexico Dictionaries | English, 2019, www.lexico.com/definition/artificial_intelligence.

² Willyard, Cassandra. “Can AI Fix Medical Records?” *Nature*, vol. 576, no. 7787, Dec. 2019, pp. S59–S62, www.nature.com/articles/d41586-019-03848-y, 10.1038/d41586-019-03848-y. Accessed 19 Jan. 2020.

patterns and correlations that human health care workers may not be able to immediately see, making artificial intelligence infinitely useful for producing predictions and correlations. Implementing AI to predict outcomes for hospitalised patients, such as readmission rates and survival chances, would better equip medical providers with information to guide treatment.

■ Guiding medical decisions

In fact, artificial intelligence could even directly offer suggestions for better clinical decisions. Based on data from previous cases and treatments, an electronic medical records system could recommend treatment strategies for specific patients, enabling more personalised care.

Recently, the University of Iowa Hospitals and Clinics combined machine learning with medical record systems to prevent surgical site infections, by providing clinical decision support to health care providers. This led to a 74% reduction in surgical site infections over three years, saving nearly \$1.2 million.³

For OpenMRS, implementing a feature to help health care providers make better decisions - for example, warning doctors when two prescribed drugs may interact to create bad side effects - would very likely increase the quality of care immensely.



■ Improving user experience

Furthermore, according to an article in Harvard Business Review about electronic health records, “the systems’ rigidity is a real obstacle to improvement... AI, and machine learning specifically, could help EHRs continuously adapt to users’ preferences.”⁴

While OpenMRS already offers many add-on modules to help users configure their software to suit their needs, artificial intelligence could make the system even easier to use. Forms of artificial intelligence,

³ Siwicki, Bill. “Machine Learning Helps UI Health Care Reduce Surgical Site Infection by 74%, Save \$1.2 Million.” Healthcare IT News, 10 Sept. 2018, www.healthcareitnews.com/news/machine-learning-helps-ui-health-care-reduce-surgical-site-infection-74-save-12-million. Accessed 19 Jan. 2020.

⁴ Davenport, Thomas H., et al. “Using AI to Improve Electronic Health Records.” *Harvard Business Review*, 13 Dec. 2018, hbr.org/2018/12/using-ai-to-improve-electronic-health-records.

such as natural language processing, could be applied to medical records, in order to automatically analyse clinical documentation and reports, instead of forcing doctors to enter data piece by piece into long, tedious forms.⁵

That being said, in the past, medical records systems have found it difficult to implement artificial intelligence, due to the sheer volume of data that can be entered into the system. One small condition, such as high blood pressure, could be entered into the system by different doctors in thousands of different ways. These forms of unstructured data can be difficult for a computer to extract.



However, thanks to the OpenMRS FHIR Module in development, data entered into the software can be transformed into an easily readable, standardised format (called Fast Healthcare Interoperability Resources) for training deep learning systems involving many variables. Therefore, integrating artificial intelligence models into OpenMRS is quite feasible.

In conclusion...

From all the possibilities and outcomes mentioned above, it is clear that artificial intelligence can be applied to medical records systems like OpenMRS to improve the quality of health care, benefiting both patients and providers. Hence, integrating artificial intelligence into OpenMRS is a course of action with enormous potential that should definitely be considered.

⁵ Davenport, Thomas, and Ravi Kalakota. "The Potential for Artificial Intelligence in Healthcare." *Future Healthcare Journal*, vol. 6, no. 2, June 2019, pp. 94–98, www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/, 10.7861/futurehosp.6-2-94.

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