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AI in Precision Cardiovascular Medicine

Artificial intelligence (AI) techniques, such as machine learning, deep learning, and cognitive computing are promising and can potentially change the way in which medicine is practised. Over the past decade, several machine-learning techniques have been used for cardiovascular disease diagnosis and prediction. In the near future, AI will result in a paradigm shift towards precision cardiovascular medicine, according to an article published in Journal of the American College of Cardiology.

Cardiovascular (CV) clinical care currently faces practical challenges pertaining to cost reductions in prevention and treatment, overutilisation, inadequate patient care, and high readmission and mortality rates. Productive interactions between physicians and data scientists are needed to enable clinically meaningful automated and predictive data analysis.

AI has the potential to exploit big data and be used in advanced patient care. Deep-learning AI using big data can be used in pattern recognition in heterogeneous syndromes and image recognition in CV imaging, the authors say. For example, AI can classify new genotypes or phenotypes of heterogeneous syndromes, such as heart failure with preserved ejection fraction (HFpEF), Takotsubo cardiomyopathy, hypertrophic cardiomyopathy, hypertension, and coronary artery disease, leading to personalised, targeted therapy.

Furthermore, big data analytics has the potential to identify unknown risk factors for acute coronary syndrome (ACS), spontaneous coronary artery dissection (SCAD), or Brugada syndrome, and even the controversial issue of statins in the older population (age >75 years). "In the big data realm, AI techniques, such as machine learning, are revolutionising the way physicians make clinical decisions and diagnosis, and have the potential to improve the estimated CVD risk scores to automate prediction," the article says.

Cognitive computing involves self-learning systems using machine learning, pattern recognition, and natural language processing to mimic the operation of human thought processes. In cognitive computing, a system or device is trained by machine-learning or deep-learning algorithms. IBM Watson, a well-known example of cognitive computing, continuously learns from datasets (e.g., EHR, social media) and can predict outcomes using multiple algorithms more accurately than humans. Cognitive computing can leverage machine learning to extend the ability of HF diagnosis efficiently by helping physicians discover diagnosis patterns that they may not observe by themselves.

The article says cognitive computers, such as IBM Watson, will likely be standard in healthcare facilities and assist physicians with their decision making and prediction of patient outcomes.

"We believe that AI will not replace physicians, but it is important that physicians know how to use AI sufficiently to generate their hypotheses, perform big data analytics, and optimise AI applications in clinical practice to bring on the era of precision CV medicine," the authors conclude.

Source: Journal of the American College of Cardiology
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