Could artificial intelligence improve patient care in the NHS?

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The adoption of artificial intelligence in the diagnosis and prognosis of disease could help to extend people's lives whilst providing significant savings for the NHS.

This is according to researchers from Cardiff University who have provided compelling evidence showing the benefits that state-of-the-art techniques can bring to risk assessments in patients.

In a new study published in *PLOS One*, the team of researchers has demonstrated how artificial intelligence can provide an equally accurate and reliable prognosis for patients with cardiovascular disease, compared to traditional methods.

The machine-learning techniques they used required no expertise or human interaction and therefore overcame a major bottleneck in the process.

Co-author of the study Professor Craig Currie, from Cardiff University's School of Medicine, said: "If we can refine these methods, they will allow us to determine much earlier those people who require preventative measures. This will extend people's lives and conserve NHS resources."

In an era of evidence-based medicine, the use of statistics has become a crucial part of estimating the risks of certain types of disease.

Traditionally, clinicians and statisticians have approached this task by manually developing mathematical equations. However, artificial intelligence provides techniques that can uncover complex associations in the data.

"Although we already have reliable methods of forecasting people according to their degree of risk of serious heart events, artificial intelligence promises new ways of interrogating data and the likelihood of more reliable classification of risk," Professor Currie continued.

In their study, the team trialled a technique known as genetic programming (GP) – a method inspired by evolution in nature whereby computer programs are encoded as a set of genes that are then iteratively modified or evolved.

GP is advantageous over algorithms produced by humans in that it reduces bias and the possibility of human error, whilst at the same time allows for any changes in the environment to be automatically integrated into mathematical formulas.

An advantage of this particular approach is that the complex associations uncovered by artificial intelligence from the data can be made transparent to the clinicians, meaning that there is no need for them to diverge from their existing practice.

In the study the team used GP to assess the future risks of a cardiovascular event, such as cardiovascular death, non-fatal stroke or non-fatal myocardial infarction, in over 3,800 cardiovascular patients, aged 19-83, over a 10 year period.

The machine-learning algorithms used a total of 25 predictors taken from patient data, including age, sex, BMI, alcohol and smoking use and blood pressure.

The results showed that the machine-learning algorithms could perform comparably to traditional methods when predicting the risk associated with individual patients.

Co-author of the study Professor Irena Spasi?, from Cardiff University's School of Computer Science and Informatics, said: "The ability to interpret solutions offered by machine learning has so far held the technology back in terms of integration into clinical practice.

"However, in light of the recent resurgence of neural networks, it is important not to side line other machine learning methods, especially those that offer transparency such as genetic programming or decision trees. After all, we are looking to use artificial intelligence to aid human experts and not to take them out of the equation altogether."

More information: Christian A. Bannister et al. A genetic programming approach to development of clinical prediction models: A case study in symptomatic cardiovascular disease, *PLOS ONE* (2018). DOI: 10.1371/journal.pone.0202685 , journals.plos.org/plosone/arti … journal.pone.0202685

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