

Machines faster than humans at diagnosing brain injuries

Tom Whipple Science Editor

Computers have outperformed doctors in diagnosing neurological illnesses and retinal disease — a finding that scientists said could speed up treatments.

In two separate studies, artificial intelligence programs were trained to spot the signs of illness in CT scans. They did it as well as humans and were 100 times faster.

Scientists said this meant dangerous conditions could be spotted far more quickly. Eric Oermann, from Icahn School of Medicine at Mount Sinai, said: "With a total processing and interpretation time of 1.2 seconds, such a triage system can alert physicians to a critical finding that may otherwise remain in a queue for minutes to hours."

His study, published in the journal *Nature Medicine*, used tens of thousands of brain scans to train an algorithm to see the signs of stroke, haemorrhage, and hydrocephalus. The program was then tested against

humans in a simulated clinical environment. The researchers said that the intention was not to replace people but to flag up worrying scans earlier — so that they did not sit in a queue for potentially critical minutes and hours.

"The expression 'time is brain' signifies that rapid response is critical in the treatment of acute neurological illnesses, so any tools that decrease time to diagnosis may lead to improved patient outcomes," Joshua Bederson, from Mount Sinai Health, said.

In a separate study in the same journal, a British team from Moorfields Eye Hospital, London, and the Google company DeepMind, used similar techniques to classify retinal scans and diagnose early signs of blindness. While with neurological conditions, extremely rapid diagnosis is crucial, with blindness the team said that the usefulness of such approaches came because human expertise in the area can be limited.

Nasir Rajpoot, professor in computer science at the University of Warwick,

said the papers were "immensely exciting". "It can significantly help with making the diagnostic process faster and more objective while being accurate," he said.

Duc Pham, from the University of Birmingham, emphasised though that this was not about humans being replaced. "These two excellent applications of deep learning do indeed have the potential to improve healthcare by assisting clinicians in making rapid and accurate diagnoses. The emphasis on assisting is because the deep learning tools developed will not replace clinicians. Like other forms of machine learning, deep learning is inductive, i.e. it forms general rules and principles from specific training examples.

"Inductive systems cannot be guaranteed to produce 100 per cent correct results, no matter how many training examples they use or how much training they received. Thus, critical judgments or decisions must always be left to qualified human experts to make."