Artificial intelligence accurately predicts who will develop dementia in two years

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Artificial intelligence can predict which people who attend memory clinics will develop dementia within two years with 92 percent accuracy, a largescale new study has concluded.

Using data from more than 15,300 patients in the US, research from the

University of Exeter found that a form of artificial intelligence called machine learning can accurately tell who will go on to develop dementia.

The technique works by spotting hidden patterns in the data and learning who is most at risk. The study, published in *JAMA Network Open* and funded by funded by Alzheimer's Research UK, also suggested that the algorithm could help reduce the number of people who may have been falsely diagnosed with dementia.

The researchers analyzed data from people who attended a network of 30 National Alzheimer's Coordinating Center memory clinics in the US. The attendees did not have dementia at the start of the study, though many were experiencing problems with memory or other brain functions.

In the study timeframe between 2005 and 2015, one in ten attendees (1,568) received a new diagnosis of dementia within two years of visiting the memory clinic. The research found that the machine learning model could predict these new dementia cases with up to 92 percent accuracy—and far more accurately than two existing alternative research methods.

The researchers also found for the first time that around eight percent (130) of the dementia diagnoses appeared to be made in error, as their diagnosis was subsequently reversed. Machine learning models accurately identified more than 80 percent of these inconsistent diagnoses. Artificial intelligence can not only accurately predict who will be diagnosed with dementia, it also has the potential to improve the accuracy of these diagnoses.

Professor David Llewellyn, an Alan Turing Fellow based at the University of Exeter, who oversaw the study, said: "We're now able to teach computers to accurately predict who will go on to develop

dementia within two years. We're also excited to learn that our machine learning approach was able to identify patients who may have been misdiagnosed. This has the potential to reduce the guesswork in clinical practice and significantly improve the diagnostic pathway, helping families access the support they need as swiftly and as accurately as possible."

Dr. Janice Ranson, Research Fellow at the University of Exeter added "We know that dementia is a highly feared condition. Embedding machine learning in memory clinics could help ensure diagnosis is far more accurate, reducing the unnecessary distress that a wrong diagnosis could cause."

The researchers found that machine learning works efficiently, using patient information routinely available in clinic, such as memory and brain function, performance on cognitive tests and specific lifestyle factors. The team now plans to conduct follow-up studies to evaluate the practical use of the machine learning method in clinics, to assess whether it can be rolled out to improve dementia diagnosis, treatment and care.

Dr. Rosa Sancho, Head of Research at Alzheimer's Research UK said "Artificial intelligence has huge potential for improving early detection of the diseases that cause dementia and could revolutionize the diagnosis process for people concerned about themselves or a loved one showing symptoms. This technique is a significant improvement over existing alternative approaches and could give doctors a basis for recommending life-style changes and identifying people who might benefit from support or in-depth assessments."

The study is entitled "Performance of Machine Learning Algorithms for Predicting Progression to Dementia in Memory Clinic Patients," by Charlotte James, Janice M. Ranson, Richard Everson and David J Llewellyn. It is published in *JAMA Network Open*.

More information: "Performance of Machine Learning Algorithms for Predicting Progression to Dementia in Memory Clinic Patients," *JAMA Network Open* (2021). jamanetwork.com/journals/jaman … tworkopen.2021.36553

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