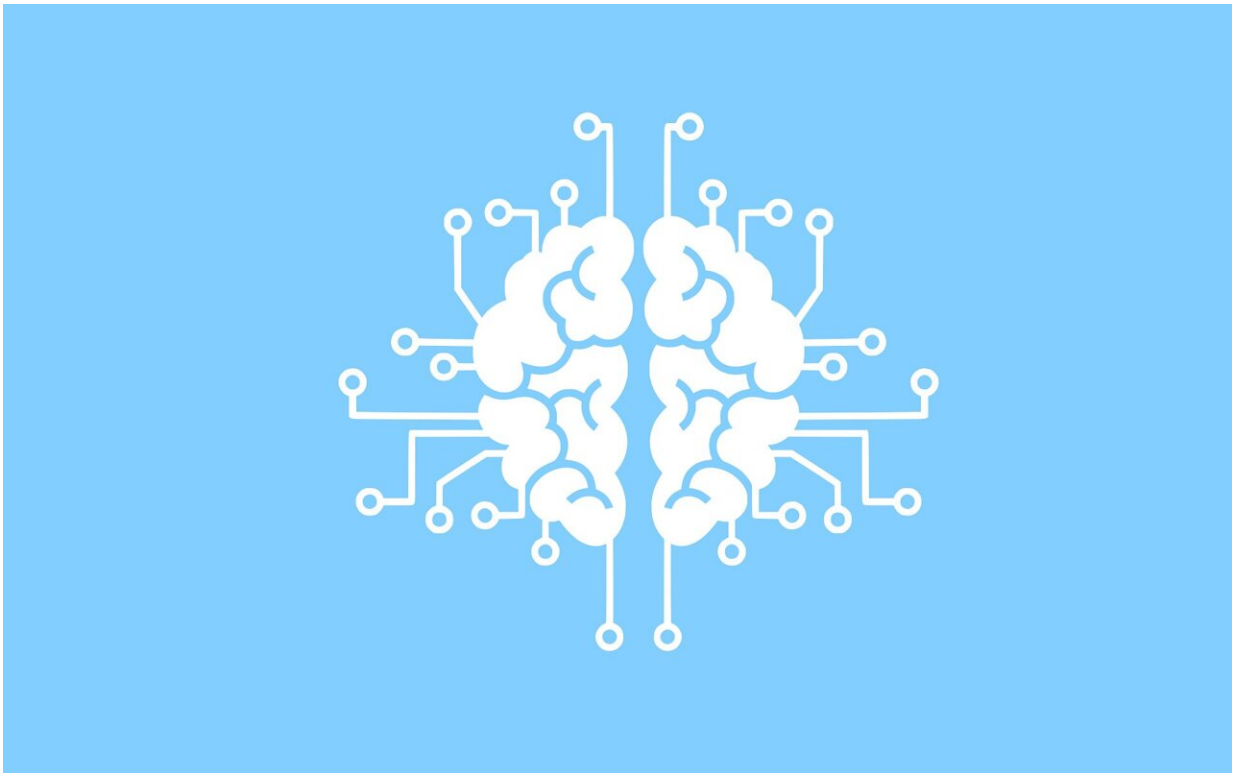# Using AI to detect cancer from patient data securely

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Credit: Pixabay/CC0 Public Domain

A new way of using artificial intelligence to predict cancer from patient data without putting personal information at risk has been developed by a team including University of Leeds medical scientists.

Artificial intelligence (AI) can analyze large amounts of data, such as images or trial results, and can identify patterns often undetectable by humans, making it highly valuable in speeding up disease detection, diagnosis and treatment.

However, using the technology in medical settings is controversial because of the risk of accidental data release and many systems are owned and controlled by private companies, giving them access to confidential [patient data](#)—and the responsibility for protecting it.

The researchers set out to discover whether a form of AI, called swarm learning, could be used to help computers predict cancer in medical images of patient tissue samples, without releasing the data from hospitals.

Swarm learning trains AI algorithms to detect patterns in data in a local hospital or university, such as genetic changes within images of human tissue. The swarm learning system then sends this newly trained [algorithm](#)—but importantly no local data or patient information—to a central computer. There, it is combined with algorithms generated by other hospitals in an identical way to create an optimized algorithm. This is then sent back to the local hospital, where it is reapplied to the original data, improving detection of genetic changes thanks to its more sensitive detection capabilities.

By undertaking this several times, the algorithm can be improved and one created that works on all the data sets. This means that the technique can be applied without the need for any data to be released to third party companies or to be sent between hospitals or across international borders.

The team trained AI algorithms on study data from three groups of patients from Northern Ireland, Germany and the USA. The algorithms

were tested on two large sets of data images generated at Leeds, and were found to have successfully learned how to predict the presence of different sub types of cancer in the images.

The research was led by Jakob Nikolas Kather, Visiting Associate Professor at the University of Leeds' School of Medicine and Researcher at the University Hospital RWTH Aachen. The team included Professors Heike Grabsch and Phil Quirke, and Dr. Nick West from the University of Leeds' School of Medicine.

Dr. Kather says that "based on data from over 5,000 patients, we were able to show that AI models trained with swarm learning can predict clinically relevant genetic changes directly from images of tissue from colon tumors."

Phil Quirke, Professor of Pathology in the University of Leeds's School of Medicine, says that "we have shown that swarm learning can be used in medicine to train independent AI algorithms for any image analysis task. This means it is possible to overcome the need for data transfer without institutions having to relinquish secure control of their data."

"Creating an AI system which can perform this task improves our ability to apply AI in the future."

The research was published in *Nature Medicine*.

Provided by University of Leeds

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