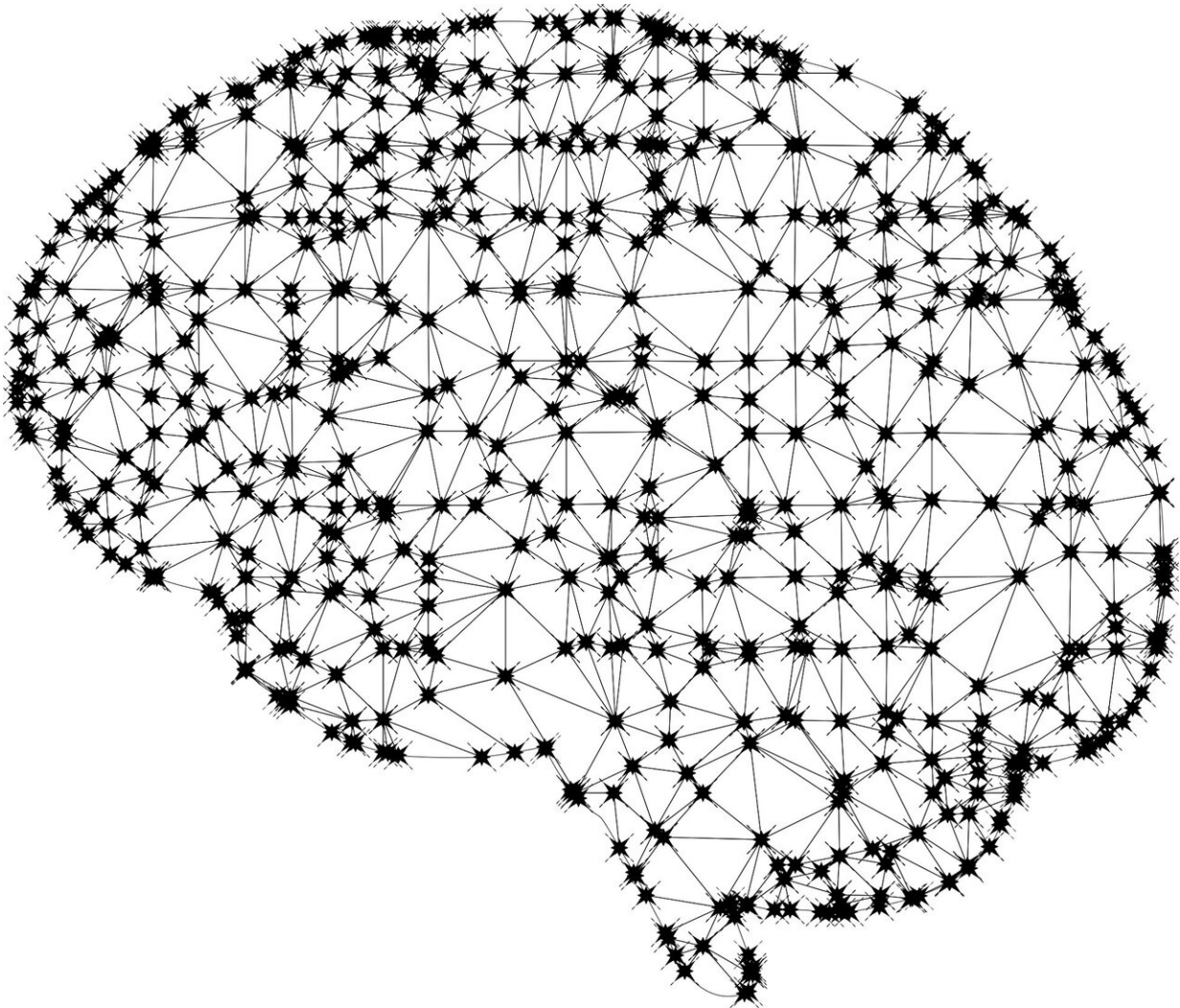


# Scientists use machine learning to improve gut disease diagnosis

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A study published in the open access journal *JAMA Open Network* June 14 by scientists at the University of Virginia schools of Engineering and Medicine and the Data Science Institute says machine learning algorithms applied to biopsy images can shorten the time for diagnosing and treating a gut disease that often causes permanent physical and cognitive damage in children from impoverished areas.

In places where sanitation, [potable water](#) and food are scarce, there are high rates of children suffering from environmental enteric dysfunction, a disease that limits the gut's ability to absorb [essential nutrients](#) and can lead to stunted growth, impaired brain development and even death.

The disease affects 20 percent of children under the age of 5 in low- and [middle-income countries](#), such as Bangladesh, Zambia and Pakistan, but it also affects some children in rural Virginia.

For Dr. Sana Syed, an assistant professor of pediatrics in the UVA School of Medicine, this project is an example of why she got into medicine. "You're talking about a disease that affects hundreds of thousands of children, and that is entirely preventable," she said.

Syed is working with Donald Brown, founding director of the UVA Data Science Institute and W.S. Calcott Professor in the Department of Engineering Systems and Environment, to incorporate machine learning into the diagnostic process for health officials combating this disease. Syed and Brown are using a [deep learning approach](#) called "[convolutional neural networks](#)" to train computers to read thousands of images of biopsies. Pathologists can then learn from the algorithms how to more effectively screen patients based on where the neural network is looking for differences and where it is focusing its analysis to get results.

"These are the same types of algorithms Google is using in [facial recognition](#), but we're using them to aid in the diagnosis of disease

through biopsy images," said Brown.

The machine learning algorithm can provide insights that have evaded [human eyes](#), validate pathologists' diagnoses and shorten the time between imaging and diagnosis, and from a technical engineering perspective, might be able to offer a look into data science's "black boxes" by giving clues into the thinking mechanism of the machine.

But for Syed, it is still about saving lives.

"There is so much poverty and such an unfair set of consequences," she said. "If we can use these cutting-edge technologies and ways of looking at data through data science, we can get answers faster and help these children sooner."

**More information:** Sana Syed et al, Assessment of Machine Learning Detection of Environmental Enteropathy and Celiac Disease in Children, *JAMA Network Open* (2019). [DOI: 10.1001/jamanetworkopen.2019.5822](#)

Provided by University of Virginia School of Engineering and Applied Science

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