

Mammogram Library From Cancer Research Horizons Helps AI Improve Diagnosis

Cancer Research Horizons



Regular mammography screening is the most effective tool available for detecting breast cancer early enough to save lives, but there is currently a global shortage of breast radiologists trained to interpret mammography scans. Academic and commercial institutions around the world are developing artificial intelligence (AI)-driven software to assist doctors with mammogram interpretation, using a breast imaging database developed by researchers in the UK to teach the AI what to look for.

OPTIMAM is a library of 3.3 million mammography images from more than 170,000 women, collected from seven sites in the UK, along with details from expert radiologists' interpretations of those images. Funded by Cancer Research UK (CRUK), the researchers initially began developing OPTIMAM with the goal of improving the accuracy and efficiency of radiologist performance within the National Health Service's breast cancer screening program.

"AI wasn't on the cards at all," says Professor Mark Halling-Brown, Head of Scientific Computing at the Royal Surrey NHS Foundation Trust, who now jointly manages the OPTIMAM database with Professor Kenneth Young.

As time went by during the development of OPTIMAM, it became clear to the team that AI could be immensely helpful

in the screening process. Consequently, in 2013, the team applied for further funding from Cancer Research Horizons (the innovation and technology commercialization arm of CRUK) to expand on this idea. Now more than 40 academic and commercial institutions have used the database, a group that includes medical AI companies. Google-owned DeepMind, for example, used the OPTIMAM dataset to help train a deep-learning system to detect breast cancer as accurately as the current UK system in which mammograms are screened initially by two independent human radiologists. The findings were published in *Nature* in 2020.

Under the UK's "double reading" protocol, if the two initial expert readers do not agree, the mammogram is sent to two additional radiologists for further analysis. If AI-based screening can take the place of one of those readers, as studies suggest, that could help address the current radiologist shortage and improve diagnostic efficiency without compromising accuracy.

Cancer Research UK now solely supports the upkeep of the mature database, rather than funding its further development. The arrangement works well, says Halling-Brown, with Cancer Research Horizons' legal and administrative expertise smoothly arranging new partnerships and collaborations that not only allow the data to be used for new purposes, but also help grow and diversify the dataset to make it more representative of the general population.

Access to the database is open to academic and commercial organizations through a request process. A panel of specialists and patients review all applications and determine if there is reasonable justification for accessing the images. If approved, a legal agreement is signed between the organization and Cancer Research Horizons to start the licensing process, which grants access.

The success of the OPTIMAM system prompted the development of a database for chest X-rays from COVID-19 patients and served as a guide for organizing the data. Due to its usage and overall benefits to the medical community, it is likely that other similar systems will be created based on OPTIMAM.

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