
Machine learning cuts mammogram volume radiologists need to read



Over 40 million mammography exams are conducted in the United States every year, with the volume of images growing exponentially. Radiologists workloads further increase with the implementation of innovative screening technologies like digital breast tomosynthesis (DBT) that require more reading and testing time, increasing the pressure to deliver timely and accurate diagnosis.

As the majority of mammograms a radiologist reviews are negative, a new study applies machine learning to accurately triage examinations found to be negative and refer any other findings to a breast imager, significantly reducing the day-to-day strain of radiologists workloads, helping to free up valuable time for them to focus on examinations that may present higher risk of suspicious findings and diagnostic workups.

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The goal of this study published in [JACR](#) was to determine whether machine learning could reduce the number of mammograms the radiologist must read by using a machine learning classifier to correctly identify normal mammograms and to select the uncertain and abnormal examinations for radiological interpretation.

Unlike related research using convolutional neural networks (CNNs) for mammography developed to completely automate and replace the radiologist, this research explores a more conservative approach. Specifically, the study explores a hybridized approach of mammography triage where some mammograms are autonomously diagnosed as being negative by a machine learning classifier and the remaining mammograms are read by a radiologist.

Mammograms in a research data set from over 7,000 women who were recalled for assessment at six UK National Health Service Breast Screening Program centres were used. A convolutional neural network in conjunction with multitask learning was used to extract imaging features from mammograms that mimic the radiological assessment provided by a radiologist, the patient's non-imaging features, and pathology outcomes. A deep neural network was then used to concatenate and fuse multiple mammogram views to predict both a diagnosis and a recommendation of whether or not additional radiological assessment was needed.

Ten-fold cross-validation was used on 2,000 randomly selected patients from the data set; the remainder of the data set was used for convolutional neural network training. While maintaining an acceptable negative predictive value of 0.99, the proposed model was able to identify 34% (95% confidence interval, 25%-43%) and 91% (95% confidence interval: 88%-94%) of the negative mammograms for test sets with a cancer prevalence of 15% and 1%, respectively.

Machine learning was leveraged to successfully reduce the number of normal mammograms that radiologists need to read without degrading diagnostic accuracy.

Source: [JACR](#)

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Published on : Wed, 5 Jun 2019