

Mammographic Multi-View Cancer Identification Using Siamese Neural Networks

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Abstract : Mammography plays a critical role in screening for breast cancer in women, and artificial intelligence has enabled the automatic detection of diseases in medical images. Many of the current techniques used for mammogram analysis focus on a single view (mediolateral or craniocaudal view), while in clinical practice, radiologists consider multiple views of mammograms from both breasts to make a correct decision. Consequently, computer-aided diagnosis (CAD) systems could benefit from incorporating information gathered from multiple views. In this study, we introduce a method based on a Siamese neural network (SNN) model that simultaneously analyzes mammographic images from tri-view: bilateral and ipsilateral. In this way, when a decision is made on a single image of one breast, attention is also paid to two other images - a view of the same breast in a different projection and an image of the other breast as well. Consequently, the algorithm closely mimics the radiologist's practice of paying attention to the entire examination of a patient rather than to a single image. Additionally, to the best of our knowledge, this research represents the first experiments conducted using the recently released Vietnamese dataset of digital mammography (VinDr-Mammo). On an independent test set of images from this dataset, the best model achieved an AUC of 0.87 per image. Therefore, this suggests that there is a valuable automated second opinion in the interpretation of mammograms and breast cancer diagnosis, which in the future may help to alleviate the burden on radiologists and serve as an additional layer of verification.

Keywords : breast cancer, computer-aided diagnosis, deep learning, multi-view mammogram, siamese neural network

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