Abstract

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A Novel Breast Cancer Classification Framework Based on Deep Learning

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Breast cancer is a major cause of transience amongst women. In this paper, two novel techniques, ResNet50 and VGG-16, are utilised and re-trained to recognise two classes rather than 1000 classes with high accuracy and low computational requirements. In addition, transfer learning and data augmentation are performed to solve the problem of lack of tagged data. To get a better accuracy, the support vector machine (SVM) classifier is utilised instead of the last fully connected layer. Our models performance are verified utilising k-fold cross-validation. Our proposed techniques are trained and evaluated on three mammographic datasets: mammographic image analysis society, digital database for screening mammography (DDSM) and the curated breast imaging subset of DDSM. This paper explains end-to-end fully convolutional neural networks without any prepossessing post-processing. The proposed technique of employing ResNet50 hybridised with SVM achieves the best performance, specifically with the DDSM dataset, producing 97.98% accuracy, 98.46% area under the curve, 97.63% sensitivity, 96.51% precision, 95.97% F1 score and computational time 1.8934 s.