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A context-sensitive deep learning approach for microcalcification detection in mammograms

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Abstract

A challenging issue in computerized detection of clustered microcalcifications (MCs) is the frequent occurrence of false positives (FPs) caused by local image patterns that resemble MCs. We develop a context-sensitive deep neural network (DNN), aimed to take into account both the local image features of an MC and its surrounding tissue background, for MC detection. The DNN classifier is trained to automatically extract the relevant image features of an MC as well as its image context. The proposed approach was evaluated on a set of 292 mammograms using free-response receiver operating characteristic (FROC) analysis on the accuracy both in detecting individual MCs and in detecting MC clusters. The results demonstrate that the proposed approach could achieve significantly higher FROC curves when compared to two MC-based detectors. It indicates that incorporating image context information in MC detection can be beneficial for reducing the FPs in detections.

Keywords: Computer-aided diagnosis (CAD), clustered microcalcifications (MCs), deep neural network (DNN), deep learning.

1. Introduction

Breast cancer is currently the most frequently diagnosed non-skin cancer in women. It is estimated that about 252,710 new breast cancer cases and 40,610

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