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A Transfer Learning Method for Classifying Medical Images: A Pilot Study on Breast Cancer Histopathology

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Introduction

Deep learning has revolutionized computer vision, resulting in a plethora of ready-to-use trained models. Convolutional Neural Networks (CNN) has been widely utilized to develop image classification models, allowing researchers to adapt pre-trained learning models to new categories. We present a strategy for detecting breast cancer using histopathology photos based on Google's Inception v3 model, which was originally trained for non-medical image classification. The practicality of the project is demonstrated by the pilot research. The amount and quality of data used to build the learning model for the target application affects deep learning performance. In this research, we suggest using data augmentation and transfer learning to tackle the problem of limited training data by combining pre-trained learning models with other image sets.

Breast cancer is the most frequent female cancer in 140 of 184 countries, according to Breast Cancer Facts & Figures, with 1.7 million cases reported in 2012. Early identification of breast cancer is critical for survival, as the five-year survival rate of stage 3 (75.8%) and stage 4 (34.0%) is significantly lower than the survival rate of stage 0 to 2 (98.3 percent 91.8 percent). Breast cancer detection is based on pathologic diagnoses made by specialists, which are impacted by the doctor's experience and other external circumstances. In medical imaging, computer-assisted analysis methods, such as machine learning algorithms, have been used to overcome this challenge. Machine learning approaches have been used in medical picture analysis in recent publications. With breast cancer images, various algorithms have achieved great performance in nucleus segmentation and classification. Pattern analysis is recognized to help Convolutional Neural Networks (CNN) achieve great performance in image recognition and natural language processing. CNN is a feed-forward neural network with convolutional layers, pooling layers, and fully connected layers as its hidden layer, and it is a feed-forward neural network with convolutional layers, pooling layers, and fully connected layers as its hidden layer.

CNN is widely utilized in many domains, particularly in computer vision, due to its superior performance. To detect cells mitosis in a breast histopathology picture, a deep cascade CNN was used. In image analysis, recent research using transfer learning has yielded notable results. Transfer learning is a technique for teaching a pre-trained model, which has already learned in one domain, to learn in another. When there is a lack of data or training time and computing resources, the learning approach is recognized to be particularly useful. AlexNet was used to classify breast cancer histopathology images with a better degree of accuracy than usual.

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