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Combining Traditional Feature Engineering and Deep Learning for Robust Breast Cancer

Communication Info

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Abstract

Breast cancer is a disease in which abnormal breast cells grow out of control and form tumors. If left unchecked, the tumors can spread throughout the body and become fatal. Female gender is the strongest breast cancer risk factor. We have proposed a model that gives good accuracy compared with existing transfer learning models and transformed vision models. Our model leverages SIFT (scale-invariant feature transform), a performance-enhancing algorithm for breast cancer detection and classification. To prepare our data for analysis, we applied several data preprocessing techniques, including data splitting, normalization, and image augmentation, after which our model's generalization ability improved.

To train and validate our model, we used ultrasound images, which are the most commonly used images for breast cancer. The results of our experiments show that the proposed model achieves 90.66\% accuracy on the BUSI dataset and 87.16\% on the UDIAT dataset, outperforming several well-known transfer learning models and the Vision Transformer model. In addition, an AUC value of 0.96 on the BUSI dataset shows that our model is robust. Furthermore, we tested Segmentation using the Unet model, which enabled us to identify and isolate tumors, facilitating analysis of breast antecedent characteristics.

To conclude our study, we present an approach aimed at detecting and classifying breast cancer. We demonstrate superior performance for our model compared to transfer learning and vision transformer models.

This study aims to improve breast cancer diagnosis.

And treatment outcomes by exploiting advanced deep learning and image segmentation techniques. By proposing an approach that improves breast cancer detection and classification by utilizing the strength of the Sift algorithm. The proposed method improves accuracy and performance in both breast cancer identification and classification. Experimental results show that our model outperforms existing models according to evaluation metrics for both ultrasound datasets, BUSI and UDIAT. Furthermore, our images are segmented using a U-Net to identify areas containing the tumor that causes the cancer.

References