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Feature Selection Optimization for Medical Image-Based Cancer Detection Using Neural Network Models

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Abstract:

Accurate cancer detection from medical imaging requires efficient extraction and selection of diagnostic features to improve classification performance and reduce computational complexity. This study introduces an optimized feature selection framework integrated with neural network models for enhancing the accuracy of cancer detection from imaging modalities such as MRI, CT, and mammography. Advanced feature selection techniques—such as mutual information, recursive feature elimination, and principal component analysis—are employed to identify the most discriminative features from high-dimensional image data. These features are then used to train neural network models, including Convolutional Neural Networks (CNNs) and Deep Belief Networks (DBNs), to classify cancerous and non-cancerous tissues. The proposed method demonstrates improved diagnostic performance in terms of sensitivity, specificity, and overall accuracy, offering a reliable approach for aiding clinical decision-making in oncological imaging.

Keywords:

Cancer detection, medical imaging, feature selection, neural networks, CNN, deep learning.

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