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Advanced Neural Network Applications in Bioinformatics for Cancer Detection and Disease Prediction

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Abstract:

Advanced neural network applications have significantly enhanced bioinformatics approaches for cancer detection and disease prediction. Deep learning models, particularly convolutional neural networks (CNNs) and graph convolutional networks (GCNs), have demonstrated high accuracy in analyzing complex biological data such as gene expression profiles and histopathological images. For instance, a study employing a 4-layer GCN on whole slide images of gastric and colon adenocarcinomas achieved improved survival prediction outcomes, surpassing traditional CNN models. Additionally, integrating noncoding RNA biomarkers with deep learning neural networks has enabled the discrimination of multiple cancer types with high accuracy, facilitating early detection and personalized treatment strategies. These advancements underscore the potential of neural network-based models in transforming cancer diagnostics and prognostics by providing more precise and individualized patient care.

Keywords: Neural Networks, Bioinformatics, Cancer Detection, Disease Prediction, Deep Learning, Graph Convolutional Networks

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