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Neural Networks in Bioinformatics for Cancer Diagnosis and Disease Prediction Optimization

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Abstract:

The integration of neural networks into bioinformatics has significantly advanced the capabilities of cancer diagnosis and disease prediction. This study proposes a neural network-based framework for analyzing high-dimensional biological datasets, such as gene expression profiles, protein sequences, and genomic data, to optimize diagnostic accuracy and early disease prediction. Deep learning architectures, including Feedforward Neural Networks (FNNs), Convolutional Neural Networks (CNNs), and Recurrent Neural Networks (RNNs), are employed to detect complex, non-linear patterns associated with various cancer types and other genetic disorders. The model incorporates advanced feature selection methods to reduce data redundancy and improve computational efficiency. Evaluations using benchmark datasets reveal enhanced predictive performance, sensitivity, and specificity when compared to traditional bioinformatics approaches. This intelligent system demonstrates great promise in enabling precision medicine and personalized healthcare solutions.

Keywords:

Neural networks, bioinformatics, cancer diagnosis, disease prediction, deep learning, genomics.

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