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TRACK 2

TECHNOLOGY

PERFORMANCE COMPARISON OF NEURAL NETWORK MODELS IN PREDICTING HEART DISEASE

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ABSTRACT

Cardiovascular diseases (CVDs) remain among the leading global causes of death because this now affect younger populations at increasing rates throughout India and other countries. This research investigates deep learning capabilities through analysis of two leading models: the Multilayer Perceptron (MLP) and Convolutional Neural Network (CNN). The research uses one million patient records containing 13 clinical indicators and binary classification outcomes to explore four sequential stages beginning with benchmarking followed by feature selection and then k-fold cross-validation and Bayesian Optimization for hyperparameter tuning. The initial assessment showed that MLP performed slightly better than CNN but both models achieved significant accuracy and generalization improvements after feature refinement. The prediction performance remained stable when the model was validated through multiple data split cross-validation tests. The ensemble model which combined optimized architectures produced the best results with accuracy at 92.94% and precision at 92.27% and recall at 92.70% and specificity at 93.11% and F1-score at 92.48%. The research demonstrates that developing scalable clinical heart disease detection systems requires machine learning techniques with advanced methods and thorough model optimization and strategic feature development.

***Keywords**: Emotional Intelligence, Academic Achievement, XGBoost, Machine Learning, Predictive Modeling, Student Performance*