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Brain Stroke Prediction

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Abstract: *A study focused on predicting the likelihood of a stroke occurring at an early stage using both deep learning and machine learning techniques. Stroke is highlighted as a critical medical emergency, with the potential for severe consequences such as long-term neurological damage and death. Early detection of stroke warning symptoms is emphasized as crucial for reducing its severity.*

To evaluate the effectiveness of the prediction algorithm, the study utilized a dataset sourced from Kaggle, a platform for data science competitions. Several classification models were employed, including popular machine learning algorithms such as Extreme Gradient Boosting (XGBoost), Ada Boost, Light Gradient Boosting Machine, Random Forest, Decision Tree, Logistic Regression, K Neighbours, SVM with a Linear Kernel, and Naive Bayes. Additionally, deep neural networks, specifically three-layer and four-layer artificial neural networks (ANN), were employed for classification tasks.

Among the machine learning classifiers, the Random Forest model achieved the highest classification accuracy of 99%. This indicates that Random Forest was exceptionally effective in predicting the likelihood of stroke based on the dataset features. Furthermore, the four-layer deep neural network (4-Layer ANN) surpassed the performance of the three-layer ANN, achieving an accuracy of 92.39% when utilizing selected features as input.

Interestingly, despite the success of both machine learning and deep learning techniques, the research findings suggested that machine learning methods generally outperformed deep neural networks in this specific study. This insight highlights the importance of carefully selecting the appropriate modeling approach based on the nature of the data and the task at hand. In the context of predicting stroke occurrence, machine learning algorithms like Random Forest demonstrated superior performance compared to deep neural networks. However, further investigation and experimentation may be necessary to fully understand the reasons behind this performance discrepancy and to refine the predictive models for stroke risk assessment.

Keywords: Deep Neural Networks, Extreme Gradient Boosting, Machine Learning for Stroke Prediction, deep learning

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