Submission Summary

Conference Name

2025 IEEE Pune Section International Conference (IEEE PuneCon 2025)

Track Name

Track 7: Bioinformatics and Computational Biology

Paper ID

1866

Paper Title

StrokeGuardian: Hybrid Ensemble ML for Real-Time Brain Stroke Prediction

Abstract

Stroke is becoming a significant cause of death
and disability in the world, and there is an urgent need to
have accurate and interpretable systems of risk prediction. This
paper will present a proposal of a hybrid ensemble machine
learning system named StrokeGuardian, to be used in prediction
of stroke and clinical decisions in real-time. The model is based
on a combination of the Nonlinear representation learning,
boundary optimization, and gradient-based feature boosting, and
it is integrated with Neural Network (NN), Support Vector
Machine (SVM), and XGBoost (XGB) by a weighted voting
mechanism. The dataset comprising 35,000 of clinical records
comprising seventeen demographic and medical variables was
preprocessed using outlier removal, feature-scaling and balancingusing SMOTE to alleviate
data imbalance.
The highest score of 99.15 percent, 99.31 percent and 0.9979
were reached by the experimental evaluation using 10-Fold Cross Validation, exceeding other
models and those that are already benchmarked. To guarantee transparency and clinical trust,
Explainable AI (XAI) approaches, like SHAP and LIME, were included to draw attention to the
influential predictors, such as age, BMI, and avg glucose level. The system was implemented as
a web application that is a cloud deployed software written in FastAPI and React.JS and allows
healthcare practitioners to make real-time predictions and interpret a prediction. Generally,
StrokeGuardian exhibits a strong combination of predictive capabilities, explainability, and
deployability hence a useful AIpoweredsystem of early stroke risk detection.

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Authors

Md.Sakib Hasan (Patuakhali Science And Technology University)
<ug2102052@cse.pstu.ac.bd>

Jihadul Islam (Patuakhali Science And Technology University) <ug2102071@cse.pstu.ac.bd>

Md.Abdul Jobayer (Patuakhali Science And Technology University)
<ug2102008@cse.pstu.ac.bd>

Submission Files

StrokeGuardian.pdf (4 Mb, 10/11/2025, 6:41:16 AM)