

Harnessing the Power of Ensemble Machine Learning for the Heart Stroke Classification

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Abstract

A heart stroke, also known as a myocardial infarction or heart attack, is a critical medical condition that arises when there is an obstruction in the coronary arteries that provide blood to the heart muscles. This blockage results in a diminished flow of blood and oxygen to a specific area of the heart. This abrupt interruption initiates a gradual sequence of heart muscle damage, which can lead to varying degrees of functional impairment. The severity of these impairments is primarily determined by the precise location of the heart muscle affected. Therefore, it is of utmost importance to identify the warning signs and symptoms of a stroke as soon as possible. This is the objective of this paper is to early recognition and prompt action can significantly improve the chances of a healthy and fulfilling life following a stroke. In this research work, the Stroke dataset is pre-processed and on pre-processed dataset machine learning and ensemble machine learning techniques were employed to develop and assess several models aimed at creating a stable framework for predicting the enduring stroke risk. And various matrices like accuracy, F1 score, ROC, precision, and recall are calculated. Among all models, AdaBoost model demonstrated exceptional performance validated through multiple metrics, including Precision, AUC, recall, accuracy, and F1-measure. The results underscored superiority of the AdaBoost classification method, achieving an impressive Accuracy of 99%. AdaBoost model may serve as a stable framework for predicting enduring stroke risk, emphasizing its potential utility in clinical settings for identifying individuals at higher risk of experiencing a stroke.

Keywords: Ensemble Machine Learning, Machine Learning, Performance Metrics, Stroke Prediction

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1. Introduction

Heart strokes, commonly referred to as myocardial infarctions or heart attacks, are a critical and prevalent health concern. These events constitute a sudden, often life-threatening condition that necessitates our understanding and vigilance. The heart, a vital organ that sustains our existence, takes centre stage in a heart stroke.

Any disruption in its rhythmic functioning can yield grave consequences. This disruption arises from an interruption in the heart's essential blood supply, an indispensable factor for its optimal performance [1]. Strokes are a serious medical emergency that needs quick medical help [2]. Timely identification and prompt intervention are essential in preventing additional harm from heart complications. The occurrence of fatalities from heart attacks is on the rise in contemporary society. Several behaviours, including alcohol consumption, smoking, and

