

A Hybrid Ensemble Machine Learning Framework for Breast Cancer Detection

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Abstract

Problem to detect the Breast Cancer timely and with accuracy is one of the most important diseases in modern health care industry. We have a lot of algorithms related to machine learning shows accurate results but due to data imbalance and other problems in data there is fluctuation in the results. In this paper, the combination of different ml algorithms has been used as a hybrid assembly for better results, enhancing the separate results of these algorithms and correcting the drawbacks of such procedures. The important factor is to increase the robustness and generalization of model so that the consistency in prediction remains. So the hybrid model is used in Biomedical Data Analysis. I compared the hybrid with classical ml models. And I got 99.3% accuracy that shows the better performance than others. Visualization charts prove the diagnostic capacity of hybrid model. The results shows that when we work on different methods together then prediction and detection of breast cancer can effectively complete This research provide a feasible solution for the applications of diagnosis.

Keywords: ROC Curve, Ensemble Stacking, Hybrid Machine Learning, Breast Cancer Detection, Feature Importance, and Predictive Analytics.

I. Introduction

According to a survey one out of 8 women is suffering from breast cancer [WHO-2024 survey][1],[2]. The death rate depends on early prediction with accuracy. There are a lot of imaging techniques for breast cancer prediction. Like MRI & Mammograms are basically used as screening tools in prediction. But there are certain problems as the variability of data of diagnosis and the process interpretation. Also, certain questions as what is the stage of tumor? How can we analysis the aggressiveness and abnormalities of cells? Are the strongly answerable questions.