

Chapter 7

Machine Learning Model for Breast Cancer Detection and Classification

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Abstract

Breast cancer is still one of the prevalent diseases affecting females globally. Machine learning (ML) has come in handy in breast cancer detection by assisting doctors and other healthcare workers with accurate diagnosis in a short time period. The research aims to utilize ML technologies such as Support Vector Machines (SVM), Random Forest (RF), and Convolutional Neural Networks (CNN) to improve patient data analysis techniques, specifically differentiating cancerous tumors from non-cancerous tumors. The models have been trained using a useful dataset so that the project aims to have good sensitivity as well as specificity so as to work towards reducing chances of false calls and decreasing the number of biopsies performed. The findings suggest that ML-based approaches have the potential to significantly enhance diagnostic accuracy when compared to conventional methods. This research sheds light not only on design and anticipated model performance metrics but also on moral aspects, which in their turn demonstrate a wide potential of ML to improve breast cancer's diagnostics and management allowing for earlier detection and therefore better treatment of patients.

Keywords: Classification, Linear Regression, Decision Tree, breast cancer prediction, feature selection, machine learning.

1. Introduction

Every year, breast cancer proves to be a cause of concern for many women due to the uncontrollable and abnormal growth of cells in the breast, which leads to death. Appropriate strategies must be adopted in order to properly process the data by medical professionals as this type of cancer is recurrent globally. Breast cancer data processes have become more efficient and multidimensional thanks to the more advanced classification techniques and data mining.

In today's date, machine learning comes across as a new era in healthcare, working to target any disease in a clinical-based approach. Breast cancer involves various tumors which makes it quite difficult for the practitioners to work on targeting it, thus making early detection paramount. This technology not just enhances the accuracy of diagnosis but also helps in selecting the appropriate treatment which can be beneficial for the survival of the patients.

For the effective classification of breast cancer, understandable aspects of cancer classification focusing on detection, and analysis, are provided by the Breast Cancer Classification Project. Owing to their different treatment aspects, newly formed breast tumors can be grouped into two major divisions. This classification is fundamental for dev.