Breast-Tumors-Classification-with-Machine-Learning-Model

Overview

This project focuses on utilizing machine learning techniques to enhance the accuracy of breast tumor classification. The goal is to develop a predictive model that assists medical professionals and researchers in accurately diagnosing breast cancer based on the characteristics of breast masses. The project aims to improve medical decision-making and patient care by providing reliable tools for early diagnosis of breast cancer.

Business and Data Understanding

Stakeholder Audience

The stakeholders for this project are medical professionals and researchers who require reliable tools for the early diagnosis of breast cancer. The predictive model developed in this project will aid these stakeholders in accurately identifying whether breast tumors are malignant or benign.

Dataset Choice

For this project, I chose the Breast Cancer Wisconsin (Diagnostic) Dataset from the UCI Machine Learning Repository. This dataset contains features extracted from digitized images of breast masses, along with their corresponding diagnoses (malignant or benign). The features provide insights into various characteristics of the tumors, such as size, shape, and texture, which are crucial for accurate classification.

Modeling

I developed three main classification models for this project: Logistic Regression, Support Vector Machine (SVM), and Random Forest. These models analyze the selected features from the dataset to predict whether a breast tumor is malignant or benign.

Evaluation

The models were evaluated using various performance metrics, including accuracy, precision, recall, and ROC-AUC. These metrics assess the models' ability to correctly classify breast tumors and provide insights into their effectiveness in medical diagnosis.

Conclusion

Based on the evaluation results, the Logistic Regression model demonstrated superior performance in accurately classifying breast tumors. It showed high accuracy, precision, recall, and ROC-AUC scores, indicating its reliability and effectiveness in tumor classification. The predictive model developed in this project has the potential to significantly improve early diagnosis and treatment decisions for breast cancer, ultimately leading to better patient outcomes.