

BREAST DETECT - X REFERS TO EXPLAINABILITY, TRANSPARENCY, AND COMPREHENSIVE MATRIX

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Like other types of cancer, breast cancer is of public health importance and especially pertinent for women. Early diagnosis, as well as accurate detection, can greatly aid in treatment outcomes and survival. This project aims to design a diagnostic assistance system called "BREAST DETECT - X", which incorporates SVM-based classification augmented with explainable artificial intelligence (XAI) for reliable and transparent diagnosis of tumors. In WBCD, the system retrieves important tumor features including mean radius, mean texture, perimeter, area, concavity, symmetry, and others to aid in the prediction of tumor malignancy or benignity. The proposed model implements SVM employing a Radial Basis Function (RBF) kernel, considered to be highly effective for non-linear, high-dimensional datasets. Model reliability is improved by hyperparameter tuning through grid search which also optimizes the model classification. The application also integrates explanation features SHAP and LIME so that the physicians and patients can grasp the reasoning that goes into each formulated prediction. The evaluation of the model is based on SHAP and LIME explanatory effectiveness as well as accuracy, confusion matrix, ROC-AUC, and other defined measures of empirically provable effectiveness. An R-Shiny web dashboard has been created which is user-friendly and allows for constantly updated risk assessment in relation to specific patients. Visual feedback from the system, such as ROC curves and class predictions, is provided in an intuitive manner. These promote transparency in interpreting medical decisions. In addition to performance, the model focuses on fairness and mitigates bias with regards to predictive equality across multi-different demographic regions. With this, the project aims to eliminate the divide between trustful clinical practice and AI-operated diagnostics by providing not just accuracy, but transparent, interpretable, and ethical healthcare standards.