ABSTRACT

One of the biggest causes of death for women is still breast cancer and survival rates are significantly decreased by delayed identification. This study aims to employ machine learning approaches to classify breast cancer subtypes by utilizing sophisticated genomic profiling. The web-based application that was built makes use of data from genomic profiling. It provides precise and effective diagnostics for categorizing breast cancer by combining Artificial Neural Networks (ANN) with 30 features and with 6 features.

Rigorous testing of the models demonstrated their effectiveness in classifying breast cancer subtypes. The ANN model with 30 features achieved a remarkable accuracy rate of 99%, while the ANN model with 6 features achieved 100%, showcasing its superior ability to capture targeted genomic patterns with fewer features. The fundamental difference between the two models lies in the number of features used for training, where the ANN with 30 features incorporates a broader feature set. In contrast, the ANN with 6 features streamlines the analysis for efficiency. Additionally, the application features are optimized for each model: the ANN with 30 features provides comprehensive diagnostics, while the ANN with 6 features ensures a more targeted and simplified analysis.

The system's performance was validated through black box testing, confirming its reliability and usability in real-time scenarios. The application ensures seamless interaction and robust data handling by integrating Streamlit for an intuitive interface and Supabase for backend data storage. This platform offers healthcare providers a cost-effective and scalable solution for genomic analysis, facilitating early detection and personalized treatment strategies for breast cancer patients.

In conclusion, this research emphasizes the transformative potential of combining machine learning techniques for genomic profiling and cancer diagnostics. By bridging advanced computational models with real-world healthcare needs, the application contributes to developing innovative, accessible, and accurate solutions for improving breast cancer patient outcomes.

Keywords: Genomic Profile, Breast Cancer, Machine Learning, Classification, Website