

Comparison of Deep Learning and Machine Learning Algorithms to Diagnose and Predict Breast Cancer

Authors : F. Ghazalnaz Sharifonnasabi, Iman Makhdoom

Abstract : Breast cancer is a serious health concern that affects many people around the world. According to a study published in the Breast journal, the global burden of breast cancer is expected to increase significantly over the next few decades. The number of deaths from breast cancer has been increasing over the years, but the age-standardized mortality rate has decreased in some countries. It's important to be aware of the risk factors for breast cancer and to get regular check-ups to catch it early if it does occur. Machine learning techniques have been used to aid in the early detection and diagnosis of breast cancer. These techniques, that have been shown to be effective in predicting and diagnosing the disease, have become a research hotspot. In this study, we consider two deep learning approaches including: Multi-Layer Perceptron (MLP), and Convolutional Neural Network (CNN). We also considered the five-machine learning algorithm titled: Decision Tree (C4.5), Naïve Bayesian (NB), Support Vector Machine (SVM), K-Nearest Neighbors (KNN) Algorithm and XGBoost (eXtreme Gradient Boosting) on the Breast Cancer Wisconsin Diagnostic dataset. We have carried out the process of evaluating and comparing classifiers involving selecting appropriate metrics to evaluate classifier performance and selecting an appropriate tool to quantify this performance. The main purpose of the study is predicting and diagnosis breast cancer, applying the mentioned algorithms and also discovering of the most effective with respect to confusion matrix, accuracy and precision. It is realized that CNN outperformed all other classifiers and achieved the highest accuracy (0.982456). The work is implemented in the Anaconda environment based on Python programming language.

Keywords : breast cancer, multi-layer perceptron, Naïve Bayesian, SVM, decision tree, convolutional neural network, XGBoost, KNN

Conference Title : ICCVIP 2023 : International Conference on Computer Vision and Image Processing

Conference Location : Rome, Italy

Conference Dates : October 09-10, 2023