ABSTRACT

Mental health is a crucial aspect of an individual's life, encompassing psychological, social, and emotional well-being. Mental disorders such as depression, anxiety, bipolar disorder, and schizophrenia require proper diagnosis and treatment to support individuals' quality of life. This study examines the use of the Random Forest algorithm, an ensemble learning-based machine learning method, to diagnose mental conditions. Random Forest was chosen due to its ability to enhance prediction accuracy while reducing the risk of overfitting.

This study utilized the "Mental Disorder Classification" dataset, which consists of data from 120 patients and 17 primary symptoms to diagnose five types of mental disorders. Model hyperparameters were optimized using GridSearchCV to obtain the best parameters. The Random Forest model achieved an accuracy of 91.67% on the test data, demonstrating good generalization capability without any indication of overfitting.

The evaluation results showed that Random Forest outperformed other models, such as KNN, SVM, Logistic Regression, and Naive Bayes, with average precision, recall, and F1-score of 0.9365, 0.8958, and 0.9076, respectively. The model exhibited its best performance in the "Bipolar Depressive" class, with an F1-score of 0.9412, and in the "Major Depression" class, with an F1-score of 0.9231. Although the recall for the "Normal Individual" class was lower (0.7500), the model still demonstrated balanced performance across all target classes. This study highlights the effectiveness of Random Forest in developing a machine-learning-based diagnostic system that can assist mental health professionals in making quick and accurate diagnoses, thereby improving the quality of mental health services through AI technology.

Keywords: *mental health, machine learning, random forest, disease diagnosis, ensemble learning, ai-based diagnostic systems.*