ABSTRACT

Patients with mental disorders may experience multiple diagnoses simultaneously, increasing the complexity of clinical decision-making. This condition requires a computational approach capable of predicting multiple diagnoses simultaneously; therefore, multi-label classification is an appropriate solution in intelligent medical diagnosis. This study proposes an integrated multi-label classification framework by implementing the Multi-Label Naïve Bayes (MLNB) algorithm using the Binary Relevance approach to construct a diagnostic prediction model. Psychiatric medical record data are typically high-dimensional and contain overlapping symptom features, which may negatively affect classification performance. To address this challenge, this research integrates the Multilabel Feature Selection using Mutual Information and ML-ReliefF (MFS-MIRF) method into the classification process. The proposed framework applies a two-stage feature selection strategy: initial screening using Weighted Mutual Information (WMI) to eliminate irrelevant features, followed by a modified ML-ReliefF algorithm to evaluate feature importance based on neighborhood functions and their relevance to the label space. This study presents a case study based on psychiatric medical records from RSUD dr. Loekmono Hadi Kudus for the period 2023–2025, comprising 269 patient records. The results demonstrate that the feature selection process reduced the dimensionality to 10 optimal features and enhanced classification performance, indicated by a decrease in Hamming Loss from 0.0636 to 0.0591 and an increase in Subset Accuracy from 0.8545 to 0.8727. These findings highlight the effectiveness and practical relevance of the proposed approach for multi-label mental disorder diagnosis.

Keywords: Mental Disorders, Multilabel Classification, MFS-MIRF, Multilabel Naïve Bayes, Binary Relevance, Mutual Information, ML-ReliefF