

# A Comprehensive Depression Identification Strategy for Medical Students Using Psychometric, Computational, and Clinical Methods

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## **Abstract:**

Post-COVID-19 public health has witnessed a significant rise in depression, anxiety, suicidal ideation, and other mental health disorders. Although machine learning (ML) techniques and sentiment analysis have been widely applied to detect depressive symptoms from social media, major gaps remain in misclassification, limited clinical validation, and cultural bias. This study proposes a Human-in-the-Loop (HITL) integrative framework combining the Patient Health Questionnaire-9 (PHQ-9), sentiment analysis of social media text, and psychiatrist-led clinical interviews to enhance depression detection accuracy. Data were collected from 29 medical students at Universiti Sains Islam Malaysia (USIM), whose social media posts were analyzed. Statistical analyses including chi-square test, Fisher's exact test, multinomial logistic regression, agreement analysis, and confusion matrix were applied. Results show significant disagreement between automated sentiment detection and clinical interviews ( $\chi^2 = 33.908$ ,  $p = 0.00001$ ), demonstrating that AI-based detection alone is insufficient. The findings emphasize the necessity of clinical validation and HITL integration for reliable depression detection.

## **Keywords:**

Clinical Interviews, Depression Detection, Human-in-the-Loop, Machine Learning, PHQ-9, Sentiment Analysis.