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A Comparative Review of Machine Learning-Based Depression Detection: Analyzing Emotional Patterns in Social Media for Early Intervention

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Abstract: *Mental health disorders such as depression and anorexia affect millions globally, posing significant challenges for timely detection and intervention. With the rapid growth of social media usage, analyzing user- generated content has emerged as a promising approach for early identification of such conditions. This study presents a machine learning-based framework that leverages emotional patterns expressed in social media posts to detect signs of depression and anorexia. By introducing both static and dynamic emotional representations—where static features capture fine- grained sub-emotions derived from clustering word embeddings, and dynamic features model emotional variability over time—the system enhances the interpretability and accuracy of mental health predictions. The proposed model is evaluated using two benchmark datasets, showing that the fusion of both representations achieves state-of-the-art performance, matching or surpassing existing methods in depression detection and closely trailing the best approach in anorexia detection. Additionally, a user-friendly online social networking module, integrated with emotion detection and graphical monitoring capabilities, demonstrates the practical applicability of the system in real-world scenarios. This work underscores the potential of emotion-driven analysis in computational mental health and paves the way for more interpretable, scalable, and accessible early intervention tools.*

Keywords: Depression Detection, Anorexia Prediction, Emotion Analysis, Social Media Mining, Machine Learning

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