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A Comparative Study of Machine Learning Algorithms in Detecting Mental Health Disorders through Social Media Text Analysis

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Abstract: *Mental health disorders such as depression, anxiety, and stress represent some of the most significant health challenges of the modern era. Traditional methods of diagnosis, while accurate, are often limited in scale, resource-intensive, and inaccessible to many individuals. In recent years, the rise of social media has created new opportunities for observing mental health patterns through digital footprints. At the same time, machine learning (ML) has emerged as a powerful tool for analyzing large amounts of unstructured text. This study presents a comparative analysis of machine learning algorithms applied to the detection of mental health disorders through social media text analysis.*

A systematic review of twelve recent and peer-reviewed studies was conducted, examining the use of classical algorithms, ensemble methods, deep learning, and transformer-based models. The findings reveal a clear trend: while classical ML methods such as Naive Bayes and Support Vector Machines provide interpretability and stable baselines, they are limited in accuracy. Ensemble models like Random Forest improve robustness, while deep learning approaches, particularly LSTMs, achieve higher accuracy by capturing sequential language patterns. The most recent transformer models, including BERT and MentalBERT, consistently outperform other approaches, achieving accuracy above 90% but raising concerns about interpretability and resource demands.

The study concludes that no single model provides a complete solution. Future progress requires hybrid models, multilingual datasets, explainable AI, and ethical guidelines to ensure that machine learning applications in mental health are both accurate and socially responsible.

Keywords: Machine Learning, Mental Health Detection, Social Media Text Analysis, Deep Learning, Transformer Models, Natural Language Processing, Explainable AI, Ethical AI

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