"Mental Stress and Emotion Detection from Text (Chat or Journal Entries)"

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Abstract-Mental health disorders affect millions worldwide, with early detection and intervention being crucial for effective management. This study presents an AI-powered mental wellness companion that utilizes advanced natural language processing and machine learning algorithms to detect emotions from text input, assess stress levels, and provide personalized coping strategies. The system integrates zero-shot classification for comprehensive emotion detection (24 emotions), sentiment analysis, and wellness scoring to offer real-time emotional insights. By combining therapeutic journaling, progress tracking, and culturally relevant wellness tools, the platform enables proactive mental health management. The AI-driven analytics provide personalized recommendations, helping users understand their emotional patterns and develop healthier coping mechanisms. This innovative approach represents a significant advancement in digital mental health tools, offering accessible, AI-enhanced support for emotional well-being and stress management.

***Keywords*:** Emotion detection, mental stress analysis, text classification, sentiment analysis, natural language processing, transformer models, BERT, RoBERTa, real-time monitoring, AI for mental health.

I INTRODUCTION

Mental health challenges affect approximately 1 in 4 people worldwide, with anxiety and depression being leading causes of disability. Traditional mental health support often faces barriers such as stigma, accessibility, and cost. The integration of Artificial Intelligence (AI) with natural language processing has revolutionized mental health care by enabling automated emotion detection, personalized interventions, and continuous monitoring. This paper introduces an AI-powered mental wellness companion designed to detect emotions from text, assess stress levels, and provide comprehensive emotional support through personalized insights and coping strategies. The system leverages state-of-the-art AI models including Facebook's BART-large-MNLI for zero-shot emotion classification and CardiffNLP's Twitter RoBERTa for sentiment analysis. By analyzing user input across 24 distinct emotions and providing real-time feedback, the platform offers a proactive approach to mental wellness management. The integration of therapeutic journaling, progress dashboards, and culturally relevant wellness tools creates a holistic mental health support system that combines modern AI technology with evidence-based therapeutic practices. This research highlights the transformative potential of AI in democratizing mental health support and explores how machine learning algorithms can provide accessible, personalized emotional care to users worldwide.

II IDENTIFY, RESEARCH, AND COLLECT IDEA

Mental health disorders are a growing global concern, affecting hundreds of millions of people worldwide. According to the World Health Organization, approximately 264 million individuals experience depression and

284 million suffer from anxiety disorders. Early recognition of symptoms and consistent monitoring are essential for effective intervention and management. Traditional mental health care often faces obstacles such as limited accessibility, high cost, and social stigma, which can prevent individuals from seeking timely help.

Recent advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP) offer new opportunities to overcome these challenges. Modern AI techniques, particularly transformer-based architectures like BERT, RoBERTa, and BART, have revolutionized the ability to analyze textual data. These models leverage contextual understanding to detect nuanced emotions and interpret complex linguistic patterns, enabling precise identification of emotional states such as joy, sadness, fear, anger, empathy, contentment, and awe. Importantly, zero-shot learning allows these models to classify emotions without requiring extensive labeled training datasets, making them highly adaptable for real-world applications.

AI-powered mental wellness platforms can analyze text from chat messages, social media posts, or personal journal entries in real time. By detecting subtle emotional cues, these platforms can map user inputs to stress levels—such as low, medium, or high—and provide actionable insights. For example, a message expressing frustration or anxiety may trigger personalized suggestions, such as relaxation exercises, mindfulness prompts, or journaling guidance. This capability transforms unstructured text into meaningful, actionable data for mental health monitoring.

Therapeutic journaling is a well-established practice for emotional regulation and self-reflection. Integrating AI into journaling platforms enhances their effectiveness by automatically identifying emotional trends, highlighting recurring stress triggers, and offering tailored coping strategies. Users receive immediate, personalized feedback that promotes emotional awareness and proactive mental health management. Over time, these insights can help individuals recognize patterns, track progress, and develop healthier coping mechanisms.

Current research emphasizes the importance of cultural sensitivity, ethical AI deployment, and multimodal integration. For instance, emotion detection systems must account for linguistic diversity, idiomatic expressions, and cultural differences in emotional expression to provide accurate and inclusive support. Furthermore, integrating other data sources, such as voice tone analysis, facial expressions, or wearable sensor data, can provide a more holistic view of a user's mental state, allowing for even more precise interventions.

Despite their potential, AI-driven mental wellness systems face several challenges. Privacy and data security are paramount, especially when dealing with sensitive personal information. Ethical considerations, such as bias in language models and equitable access to technology, must be carefully addressed. Continuous research is required to refine algorithms, validate their clinical effectiveness, and ensure that AI tools complement rather than replace professional mental health care.

By harnessing the capabilities of AI and NLP, mental health professionals and technology developers can create scalable, accessible, and personalized mental wellness solutions. These systems not only improve the detection and management of emotional stress but also empower individuals to take a proactive role in their mental health, potentially reducing the global burden of mental disorders.

III. STUDIES AND FINDINGS

A. AI-Driven Emotion Detection

Emotion detection forms the core of AI mental health interventions. Modern transformer-based models, such as BERT, RoBERTa, and BART, have demonstrated the ability to capture subtle linguistic cues and contextual

nuances in text. Zero-shot learning further enhances these systems by enabling classification of complex emotions without extensive labeled datasets.

Recent studies indicate that AI models can accurately identify a wide range of emotions, including happiness, sadness, fear, anger, surprise, contentment, empathy, and awe. Research comparing AI-driven models to traditional self-report surveys and rule-based systems found that AI models achieve higher accuracy in emotion recognition, often exceeding **85%** across diverse textual inputs and languages. These models are particularly effective in detecting complex and mixed emotional states that are difficult for humans or traditional systems to quantify.

For example, AI systems analyzing journal entries or chat messages can detect subtle shifts in emotional tone over time, providing early indicators of stress, anxiety, or depressive tendencies. This real-time insight enables proactive mental health support, helping individuals address issues before they escalate.

B. AI-Based Stress Assessment

Stress monitoring is another critical application of AI in mental wellness. Natural Language Processing (NLP) algorithms analyze patterns in sentence structure, word choice, sentiment polarity, and emotional intensity to estimate stress levels. These assessments often categorize stress as low, medium, or high, allowing users to receive personalized interventions.

Studies have shown that AI-driven stress detection can reach **accuracy levels above 80%**, outperforming traditional survey-based methods. Combining emotion detection with stress assessment enables more nuanced understanding of mental states. For instance, repetitive expressions of frustration or anxiety in written text can be mapped to a high-stress level, triggering immediate coping suggestions such as mindfulness exercises or guided journaling prompts.

AI models have also been integrated with mobile applications and web platforms to provide **continuous stress tracking**. This approach allows users to visualize trends over time, identify triggers, and take preventive measures. Research demonstrates that continuous monitoring enhances self-awareness and improves long-term emotional regulation.

C. Therapeutic Journaling with AI Insights

Therapeutic journaling is a well-established intervention for emotional self-regulation. By integrating AI, journaling platforms can automatically analyze textual content to identify patterns in mood, highlight recurring stressors, and provide personalized coping strategies.

Recent studies report that AI-enhanced journaling increases user engagement by **50–60%** compared to traditional journaling methods. Personalized feedback—such as identifying a recurring negative thought or recommending relaxation exercises—helps users gain insight into their emotional patterns. Longitudinal research suggests that consistent use of AI-assisted journaling can reduce symptoms of anxiety and depression and improve emotional resilience over time.

D. Comprehensive Mental Wellness Platforms

AI-driven mental wellness systems are evolving beyond individual tools, combining emotion detection, stress assessment, journaling, and personalized interventions into **holistic platforms**. Meta-analyses indicate that such integrated platforms lead to higher user satisfaction and improved mental health outcomes compared to isolated tools.

Cultural adaptation is a key factor in the success of these platforms. Research shows that incorporating region-specific coping strategies, mindfulness practices, and culturally relevant prompts significantly improves engagement. For example, integrating local wellness practices like yoga, pranayama, or culturally resonant journaling exercises can enhance the effectiveness of AI-powered mental health interventions.

Moreover, data visualization and analytics tools in these platforms help users track progress, identify emotional triggers, and plan preventive strategies. Long-term monitoring has been associated with improved emotional self-regulation, better stress management, and overall mental well-being.

IV FUTURE ENHANCEMENT

1. **Multimodal Emotion Detection**

   Combine text analysis with voice, facial expressions, and physiological signals for more accurate emotional assessment.

2. **Personalized AI Recommendations**

   Use reinforcement learning to adapt coping strategies based on user responses and behavior patterns.

3. **Cross-Cultural and Multilingual Support**

   Expand language coverage and incorporate culturally relevant mental health practices.

4. **Integration with Professionals**

   Enable collaboration with licensed therapists through referrals and shared progress tracking.

5. **Wearable and IoT Connectivity**

   Use wearable devices for continuous monitoring of stress-related physiological data and provide real-time interventions.

6. **Predictive Analytics**

   Apply machine learning to detect patterns and offer early warnings for potential mental health crises.

V CONCLUSION

AI-powered emotion detection and stress management systems are transforming mental health care by providing personalized and accessible support for emotional well-being. Studies show that transformer-based models can accurately identify a wide range of emotional states, while stress assessment algorithms offer actionable insights for monitoring mental health. Integrating AI with therapeutic journaling enhances self-awareness and delivers tailored coping strategies. Comprehensive platforms that combine emotion detection, stress evaluation, and culturally sensitive tools improve user engagement and overall mental wellness. Despite these advances, challenges remain in safeguarding

privacy, minimizing algorithmic bias, and ensuring ethical AI deployment. Future developments should emphasize multimodal analysis, cross-cultural adaptability, and collaboration with professional mental health providers. By harnessing AI and advanced analytics, mental health support can become more proactive, personalized, and effective, ultimately promoting emotional resilience and reducing the global impact of mental health disorders.

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