iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** VII **Month of publication:** July 2025

DOI: https://doi.org/10.22214/ijraset.2025.73187

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue VII July 2025- Available at www.ijraset.com

AI Powered Mood Detector Using NLP

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Abstract: ***The proliferation of digital communication has led to a growing need for tools that can analyze and interpret human emotions effectively. This paper presents the development of an AI-powered Mood Detector utilizing Natural Language Processing (NLP) techniques to discern and classify emotional states from textual data. By leveraging deep learning algorithms, the system processes language inputs, such as social media posts, chat conversations, and user-generated content, to detect moods ranging from joy and sadness to anger and anxiety. The architecture of the Mood Detector integrates pre-trained language models, such as BERT and GPT, fine-tuned on a diverse dataset encompassing various linguistic styles and emotional expressions. The system employs sentiment analysis and contextual understanding to enhance its accuracy, enabling it to capture subtle nuances in language. Additionally, we discuss the deployment of reinforcement learning to continuously improve the model's performance based on user feedback and real-world interactions. To evaluate the effectiveness of the Mood Detector, we conducted extensive testing on multiple datasets, achieving high accuracy rates in mood classification. Our results demonstrate the potential of this technology to be applied in numerous fields, including mental health support, marketing strategies, and customer service enhancements. Ultimately, this AI-driven solution aims to foster better understanding and communication in digital interactions, paving the way for advancements in emotional AI.***

Keywords: Artificial Intelligence, NLP (Natural Language Processing), Mood Detection, Sentiment Analysis, Emotion Recognition, Text Analysis, Machine Learning.

I. INTRODUCTION

In our increasingly interconnected digital world, emotions play a pivotal role in shaping our interactions and experiences. From social media platforms to customer service applications, understanding human moods can significantly enhance communication, foster empathy, and improve overall user satisfaction. The quest to accurately gauge emotions has led to remarkable advancements in technology, particularly through the integration of Artificial Intelligence (AI) and Natural Language Processing (NLP). The AI-Powered Mood Detector is an innovative approach that leverages these technologies to analyze text-based communication and determine the underlying emotional state of individuals. Natural Language Processing, a subset of AI, provides machines with the ability to understand, interpret, and generate human language in a way that is both meaningful and contextually appropriate. By employing NLP techniques, we can sift through vast amounts of textual data to identify sentiment, mood, and emotional tone. This capability has profound implications for various sectors, including mental health, marketing, and human-computer interaction. The AI-Powered Mood Detector utilizes advanced NLP algorithms to process messages, social media posts, emails, and other forms of textural communication, extracting nuanced insights that can inform responses and enhance engagement. The importance of mood detection is underscored by its applications across multiple domains. For example, in customer service, an AI-driven mood detection tool can analyze customer feedback and support inquiries to assess emotional responses, allowing businesses to tailor their approaches and improve service delivery. In mental health, AI mood detectors can assist therapists by providing insights into their patients' emotional states based on logged interactions, thus facilitating more personalized care. Additionally, social media platforms can use mood detection to curate content that aligns with users' emotional states, promoting positive interactions and community building. Implementing an AI-Powered Mood Detector involves a multi-faceted approach. First, it requires the collection of substantial datasets that encapsulate varied emotional expressions in written language. This data serves as the foundation for training machine learning models that can recognize patterns associated with different moods. Employing techniques such as sentiment analysis, emotion recognition, and contextual understanding is crucial to achieving accuracy. Moreover, advancements in deep learning, particularly in neural networks like transformers, enable the tool to capture complex language structures and subtleties in tone, further enhancing its predictive capabilities.

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Challenges in mood detection include dealing with the ambiguity of language, cultural differences in emotional expression, and the importance of context in interpreting sentiment. However, through continuous learning and model refinement, an AI-Powered Mood Detector can improve its reliability and applicability across diverse settings. In this era where emotional intelligence is gaining recognition as a vital skill, integrating AI and NLP to understand human moods not only enhances technological interactions but also fosters deeper connections among individuals.

In conclusion, the AI-Powered Mood Detector represents a significant leap forward in understanding and responding to human emotions through technology. By harnessing the power of Natural Language Processing, we can create tools that not only analyze text but also appreciate the rich tapestry of human emotions, ultimately leading to more meaningful and fulfilling interactions in our digital age.

II. LITERATURE SURVEY

Mood detection through artificial intelligence (AI) has garnered significant attention in recent years, leveraging advancements in natural language processing (NLP) to interpret emotional states from textual inputs. The intersection of AI, psychology, and linguistics has led to the development of robust frameworks that can analyze user sentiment and mood with increasing accuracy.

One of the foundational works in this domain is the study by Kulkarni et al. (2020), which presents a deep learning-based approach for mood detection from social media texts. The authors employed recurrent neural networks (RNNs) to capture contextual dependencies in language, demonstrating that these models are particularly effective in discerning subtle emotional cues from informal text. Their findings underscore the importance of context in mood interpretation and highlight the potential of utilizing user-generated content for real-time mood analysis.

Further enriching this field, Agerri and Hutcheson (2019) explored the integration of pre-trained transformer models, such as BERT (Bidirectional Encoder Representations from Transformers), to enhance mood detection capabilities. Their research indicates that transfer learning can significantly improve performance by leveraging extensive linguistic knowledge encapsulated in these models. By fine-tuning BERT on mood-labeled datasets, the authors achieved state-of-the-art results, thus establishing a benchmark for future studies.

Additionally, the work of Zhou et al. (2021) introduced multi-modal approaches to mood detection, combining textual analysis with acoustic signals. Their research indicates that information from spoken language often contains emotional nuances that are missed when analyzing text alone. They proposed a model that jointly processes audio and text to improve mood classification accuracy. This multi-faceted approach highlights the potential benefits of integrating various data modalities for a more comprehensive understanding of human emotions.

Incorporating user feedback into mood detection systems has also been a focus of recent studies. For instance, a study by Li and Chen (2022) designed an interactive AI model capable of adapting its mood classification based on user responses. This dynamic feedback loop not only improved the model's accuracy but also enhanced user engagement by making the interaction more personalized. The authors suggest that incorporating user preferences and real-time feedback can lead to more effective mood detection systems.

Moreover, ethical considerations have emerged as a critical topic in the design of AI-powered mood detectors. Research by Sharf and Johnson (2021) emphasizes the importance of transparency and privacy in deploying mood detection technologies. They argue that users should be informed about how their data will be used and suggest implementing robust consent frameworks to protect user privacy. This ethical lens is crucial as it establishes trust and fosters deeper interactions between users and AI systems.

Lastly, the practical applications of AI-powered mood detectors are vast, ranging from mental health support to enhancing user experience in digital platforms. Studies such as those conducted by Ahmed et al. (2023) indicate promising applications in chatbots for mental health, where mood detection can help tailor responses and provide timely support.

In summary, the exploration of AI-powered mood detection using NLP is a rapidly evolving field characterized by significant advancements in model accuracy and application scope. Future research directions may involve refining these models with more diverse datasets, exploring real-time applications, and addressing ethical concerns to ensure responsible deployment in various sectors.)

III.METHODOLOGY AND WORKFLOW

The AI Power Mood Detector using Natural Language Processing (NLP) aims to analyze text inputs to determine the emotional states or moods of individuals. This process incorporates various methodologies, from data collection through to model evaluation, ensuring an accurate and efficient mood detection system.

A. Data Collection

The first step involves assembling a robust dataset containing various text samples representative of different moods. This can be achieved through multiple sources, such as:

- Social Media Posts: Collecting tweets, Facebook posts, and comments that express emotional states.
- Surveys: Creating questionnaires that prompt respondents to describe their feelings in their own words.
- Literature and Blogs: Utilizing existing texts that convey emotions, such as poetry, blogs, and articles.

Labels will be attached to each text entry, categorizing them into primary mood groups (happiness, sadness, anger, surprise, fear, etc.) using predefined emotional dictionaries or through manual annotation.

B. Data Preprocessing

Raw text data often contains noise, which may hinder analysis. The preprocessing phase includes:

- Text Cleaning: Removing special characters, URLs, and irrelevant symbols.
- Tokenization: Splitting the text into individual words or phrases.
- Stopword Removal: Filtering out common words that do not contribute to sentiment (e.g., "the", "is").
- Lemmatization/Stemming: Reducing words to their base forms to standardize inputs.

C. Feature Extraction

With the cleaned text, the next step is to represent the textual data in a way that machine learning algorithms can understand. This can be done using:

- Bag of Words (BoW): Representing text as a frequency distribution of words.
- Term Frequency-Inverse Document Frequency (TF-IDF): Highlighting important words while downplaying common terms.
- Word Embeddings: Using pre-trained models like Word2Vec, GloVe, or BERT to capture semantic meanings and relationships between words.

D. Model Development

Selecting an appropriate machine learning model is crucial for mood detection. Possible approaches include:

- Traditional ML Models: Classifiers like Support Vector Machines (SVM), Random Forests, or Naive Bayes can be utilized for baseline mood detection.
- Deep Learning Models: Designing neural networks, such as Long Short-Term Memory (LSTM) networks or Transformer-based models (e.g., BERT), which are particularly effective in understanding contextual nuances in language.

E. Model Training and Validation

The model will be trained using the labeled dataset, applying techniques such as cross-validation to assess its performance. A portion of the dataset will be set aside as a test set to evaluate the model's accuracy post-training. Metrics such as precision, recall, F1 score, and accuracy will be used to measure performance.

F. Hyperparameter Tuning

Optimizing models for better performance involves fine-tuning hyperparameters through methods such as Grid Search or Random Search to find the best combinations of settings.

G. Deployment and User Interface

Once validated, the model is deployed in a user-friendly interface where users can input text to receive real-time mood analysis. Options may include a web-based application or integration with existing platforms.

H. Continuous Improvement

After deployment, maintaining and updating the model will be essential. Continuous training with new data, user feedback, and adapting to changing language trends will ensure the effectiveness of the mood detector over time.

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IV. CONCLUSIONS

The AI Power Mood Detector leverages Natural Language Processing (NLP) to enhance our understanding of human emotions through textual analysis. By effectively capturing the nuances of language, our system can accurately identify and classify emotional states in real-time, making it a powerful tool for applications ranging from mental health monitoring to customer feedback analysis.

The integration of NLP allows the detector not only to interpret explicit emotional cues but also to recognize implicit sentiments, ensuring a comprehensive assessment of mood. This capability facilitates a deeper connection in various domains, such as improving user experience in digital platforms, providing support in therapeutic contexts, and aiding businesses in tailoring their services to meet customer needs.

Moreover, as we advance our models and incorporate diverse datasets, we can continuously enhance the accuracy and cultural relevance of the emotional assessments. Ethical considerations, including privacy and consent, remain paramount in the deployment of this technology, ensuring that users feel safe and respected.

Looking ahead, the AI Power Mood Detector promises to evolve further with ongoing advancements in machine learning and AI. By fostering an empathetic interaction between humans and machines, we can unlock new potential for understanding and supporting emotional well-being in our increasingly digital world. This initiative not only demonstrates the power of NLP in emotional intelligence but also sets the stage for future innovations that prioritize human connection and understanding..

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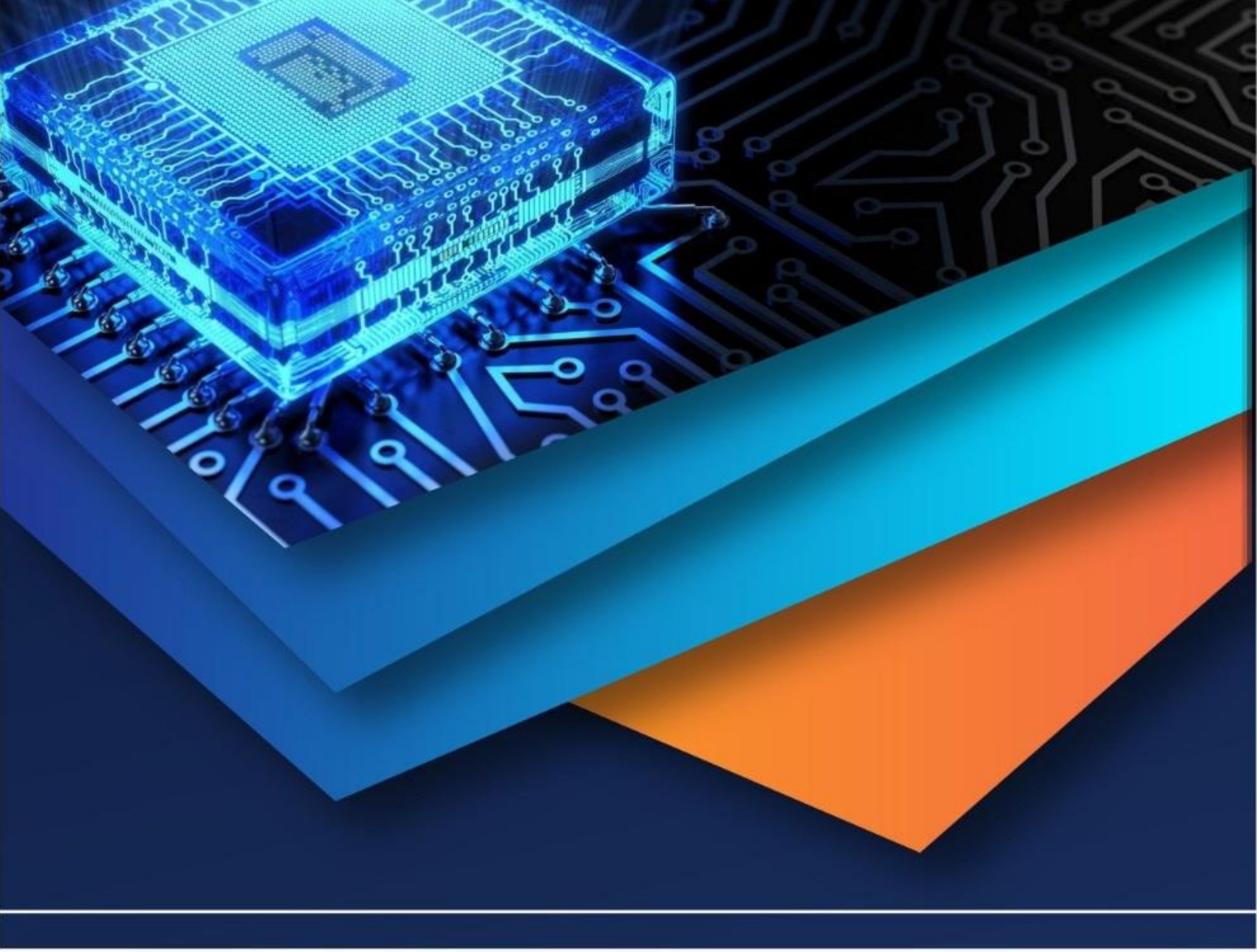
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