AI-POWERED TEXT ANALYZER: SUMMARIZATION, EMOTION DETECTION, AND TITLE GENERATION

Mrs. S Senthamarai Selvi[1], Ms. C Deepika[2]

Assistant Professor,HOD, Department of MCA,Vivekanandha Institute of Information and Management Studies,Tiruchengode,TamilNadu,India

Student, Master of Computer Applications, Vivekanandha Institute of Information and Management Studies, Tiruchengode, Tamil Nadu, India

ABSTRACT:

This web-based application simplifies and enhances the process of text analysis by integrating cutting-edge AI models with a user-friendly interface built using Streamlit. It analyzes emotional undertones, summarizes lengthy content, and generates concise, engaging titles. The application offers a versatile tool for document summarization, sentiment understanding, and automatic title generation—saving users time and effort. By combining these features, the system provides a holistic solution for content analysis and creation, especially useful for writers, marketers, researchers, and others dealing with large volumes of text.

Keywords: Text Summarization, Emotion Detection, Title Generation, Natural Language Processing, Hugging Face, Streamlit

1.Introduction

In the digital era, vast volumes of textual data are generated daily from social media, blogs, customer feedback, and more. Extracting meaningful insights manually is inefficient and prone to error. Modern NLP models have transformed text processing by offering advanced capabilities like summarization, sentiment analysis, and content generation. This project leverages Hugging Face Transformers to automate these tasks, providing a robust, interactive, and user-friendly web application for comprehensive text analysis [1][2][3][4][5].

2. Review of Literature:

Jain, K., Sharma, A., & Patel, M. (2023) conducted a study titled "Sentiment and   Emotion Analysis of Text using Transformer Models" published in IEEE Xplore. This study explored and improved the use of BERT, RoBERTa, and GPT-based transformer models for detecting emotions and automating text summarization across different applications. The research emphasized the effectiveness of transformer models in accurately classifying sentiments and extracting summaries [2].

Narayan, U., & Kumar, D. (2024) examined the fine-tuning of DistilBERT for efficient sentiment classification. Their work demonstrated how using a fine-grained emotion dataset can help lightweight transformer models like DistilBERT deliver comparable performance to larger models while being computationally more efficient [4].

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019) introduced BERT in their paper "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding". This work laid the foundation for bidirectional transformer-based pretraining and significantly improved the performance of multiple NLP tasks [1].

Lewis, M., Liu, Y., Goyal, N., et al. (2020) developed BART, presented in "BART: Denoising Sequence-to-Sequence Pre-training for Natural Language Generation, Translation, and Comprehension." Their research emphasized BART's utility in sequence-to-sequence generation tasks, including summarization and translation, proving its efficacy in preserving semantic structure [3].

Raffel, C., Shazeer, N., Roberts, A., et al. (2020) in "Exploring the Limits of Transfer Learning with a Unified Text-to-Text Transformer" introduced the T5 model. This paper showcased how NLP tasks could be framed as text-to-text problems, which significantly simplified task-specific tuning and improved performance across diverse applications [5].

3.Existing System

Traditional text analysis systems typically rely on rule-based or shallow machine learning models. These systems often lack contextual understanding and struggle with complex tasks like multi-sentence summarization or nuanced emotion detection. They require manual effort for title generation and have limited scalability.

4.Propose System

This project proposes an AI-powered web application that integrates:

- Text Summarization using BART

- Emotion Detection using DistilRoBERTa

- Title Generation using T5

  The system is implemented using Streamlit for the frontend, Hugging Face Transformers for NLP tasks, and NLTK for text preprocessing. The application is designed to deliver fast, accurate, and intuitive results for users from various domains.

5. Methodology

- **Technologies Used:**
  - Streamlit (frontend and interaction)
  - Hugging Face Transformers (BART, DistilRoBERTa, T5)
  - NLTK (text preprocessing)
- **Process Flow:**
  - Input Text is taken from the user.
  - Preprocessing: Tokenization and cleanup using NLTK.
  - Summarization: BART generates a concise summary [3].
  - Emotion Detection: DistilRoBERTa classifies emotions like joy, sadness, anger [4].
  - Title Generation: T5 creates a short, context-aware title [5].
  - Display Output in the Streamlit interface.

6.Results and Findings

The system was tested on multiple text samples including blog posts, research abstracts, and feedback forms. The summarization output retained key information, emotion detection aligned with human interpretation, and the titles generated were contextually relevant and engaging. Feedback from users highlighted improved efficiency and enhanced content quality.

7.Output

8.Conclusions and Future Enhancements

This AI-powered text analyzer delivers an effective solution for summarizing content, detecting emotions, and generating titles. It simplifies text analysis tasks for users across various domains. In the future, enhancements could include multilingual support, deeper emotion granularity, and voice input/output functionalities. Integration with content management systems and browser extensions may further improve usability.

9. REFERENCES

[1] Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." NAACL.

[2] Jain, K., Sharma, A., & Patel, M. (2023). "Sentiment and Emotion Analysis of Text using Transformer Models." IEEE Xplore.

[3] Lewis, M., Liu, Y., Goyal, N., et al. (2020). "BART: Denoising Sequence-to-Sequence Pre-training for Natural Language Generation, Translation, and Comprehension." ACL.

[4] Narayan, U., & Kumar, D. (2024). "Fine-Tuning DistilBERT for Emotion Classification."

[5] Raffel, C., Shazeer, N., Roberts, A., et al. (2020). "Exploring the Limits of Transfer Learning with a Unified Text-to-Text Transformer."