Emotion Detection using Natural Language Processing and Streamlit

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Abstract

Emotion recognition from textual data is a key Natural Language Processing (NLP) area with extensive applications in mental health, customer care, and human-computer interaction. This research paper delivers the design and development of an Emotion Detector Web Application with Python, NLP practices, and Streamlit. The project aims to categorize human emotions from text into six categories: Happy, Sad, Angry, Fear, Surprise, and Neutral. The system being proposed makes use of text pre-processing, tokenization, and a pre-trained machine learning model in order to analyze the input and identify emotional tone. The interface is easy to use and provides an interactive real-time experience. The paper also includes results from different user inputs and mentions the practical applications and future improvements of the system.

Key Words: Emotion Detection, Natural Language Processing, Streamlit, Sentiment Analysis, Text Classification, Python.

1. INTRODUCTION

Human sentiment is a crucial aspect of communication and behavior. As the volume of text-based data on the internet increases, emotion identification from user-generated content is necessary. Emotion detection allows machines to recognize human emotions from text and react more suitably. Our project uses Natural Language Processing (NLP) and Streamlit to design an accessible emotion detector that can be easily deployed and utilized by non-experts.

2. SYSTEM ARCHITECTURE AND IMPLEMENTATION

2.1 System Architecture

The emotion detector system has three key components: - Text Preprocessing: The input text is preprocessed with methods such as punctuation stripping, lowercasing, and stop-word removal. - Feature Extraction: We tokenize and utilize Bag of Words/TF-IDF features. - Model Prediction: We use a pre-trained machine learning model (Multinomial Naive Bayes) trained on labeled emotion data for classification.

2.2 Tools and Technologies

· Programming Language: Python

· Framework: Streamlit for frontend and app deployment • Libraries Used: nltk, scikit-learn, matplotlib, collections

· Model Used: Naive Bayes (Trained on standard emotion dataset)

2.3 User Interface

Streamlit is used to create the frontend, which provides: - User emotion input text box - Emotion prediction in real time - Pie

chart display of emotion confidence score

3. KEY FEATURES

- Real-time Emotion Detection
- Multi-emotion classification (Happy, Sad, Angry, Fear, Surprise, Neutral) • Text-based input interface
- Pie chart visualization for confidence score • Lightweight and browser-deployable interface
- No need for GPU or heavy backend
- Integration ready for social/chat platforms

4. RESULTS AND DISCUSSIONS

The system was tested with several real-life examples and operated smoothly in emotion classification. Some sample inputs and system predictions are listed below:

Input Text Predicted Emotion
I am feeling so happy today Happy
This is the worst day ever Angry
I'm scared of the result Fear

The emotion distribution for multiple inputs was also shown using a pie chart, enhancing user experience.

5. CONCLUSION

The suggested emotion detection system illustrates the ability of NLP methods to correctly perceive human emotion from text. The live interface created with Streamlit improves convenience and usability. In the future, we would like to increase accuracy with deep learning models such as LSTM or BERT and add support for multi-language input. Integration with voice recognition and chatbot systems is another area for improvement.

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