Sentiment Analysis Using Flask and RoBERTa

A Comprehensive Project Overview

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Brief overview of sentiment analysis

- **Sentiment Analysis**, also known as opinion mining, is a natural language processing (NLP) technique used to determine the emotional tone behind a body of text. It is a common text classification task that assigns predefined categories (such as positive, negative, or neutral) to text data.

Tools and Libraries

- **NLTK**: Natural Language Toolkit, a suite of libraries and programs for symbolic and statistical NLP.
- **VADER**: Valence Aware Dictionary and sEntiment Reasoner, a lexicon and rule-based sentiment analysis tool.
- **TextBlob**: Simplified text processing, providing a consistent API for diving into common NLP tasks.
- **Transformers**: Hugging Face library providing pre-trained models for NLP tasks, including sentiment analysis.

Project Objectives

- **Understand Customer Sentiment**:
- **Objective**: To gauge customer satisfaction and dissatisfaction through the analysis of reviews, feedback, and comments.
- **Outcome**: Identify trends in customer opinions, pinpoint areas of product improvement, and enhance customer service.
- **Improve Product or Service Quality**:
- **Objective**: To use sentiment analysis insights to refine products or services based on customer feedback.
- **Outcome**: Increased customer satisfaction and loyalty through targeted improvements and innovations.
- **Monitor Brand Reputation**:
- **Objective**: To track and analyze public sentiment about a brand across various platforms (social media, forums, blogs).

- **Outcome**: Timely identification of potential PR crises, improved brand management, and strategic communication adjustments.
- **Market Research and Competitive Analysis**:
- **Objective**: To understand market trends and compare sentiment towards competitors.
- **Outcome**: Strategic insights for market positioning, product differentiation, and identifying gaps in the market.
- **Automate Feedback Analysis**:
- **Objective**: To develop an automated system for real-time sentiment analysis of incoming feedback.
- **Outcome**: Efficient processing of large volumes of text data, timely insights, and reduced manual workload.
- **Political and Social Analysis**:
- **Objective**: To analyze public opinion on political issues, policies, or events.
- **Outcome**: Insights into voter behavior, public opinion trends, and effective policy-making.
- **Enhance Marketing Strategies**:
- **Objective**: To refine marketing campaigns and strategies based on sentiment analysis of audience reactions.
- **Outcome**: More effective marketing efforts, higher engagement rates, and better ROI on marketing spend.

Live demo of the application

Sentiment Analysis

Enter your text:

love

Predict Sentiment

Sentiment:
positive
Probabilities:

- 0: 0.0854
- 1: 0.3659
- 2: 0.5487

Sentiment Analysis

Enter your text:

joy

Predict Sentiment

Sentiment:
neutral
Probabilities:

- 0: 0.1537
- 1: 0.4924
- 2: 0.3539

```
<script>
    document.getElementById('sentimentForm').addEventListener('submit', async functi
        event.preventDefault();
        const form = event.target;
        const formData = new FormData(form);
        try {
            const response = await fetch('/predict', {
                method: 'POST',
                body: formData
            });
            if (!response.ok) {
                throw new Error('Network response was not ok');
            }
            const data = await response.json();
            displayResult(data);
        } catch (error) {
            console.error('Error:', error);
            displayError('Failed to predict sentiment.');
        }
    });

    function displayResult(data) {
        document.getElementById('sentimentResult').textContent = data.sentiment;
        const probabilitiesList = document.getElementById('probabilitiesResult');
        probabilitiesList.innerHTML = '';
        data.probs.forEach((prob, index) => {
            const listItem = document.createElement('li');
            listItem.textContent = `${index}: ${prob.toFixed(4)}`;
            probabilitiesList.appendChild(listItem);
        });
        document.getElementById('resultSection').style.display = 'block';
    }
```

Key code snippets from index.html.

```
OneDrive\Desktop\.vscode\project

            ayResult(data) {
                getElementById('sentimentResult').textContent = data.sentiment;
                const probabilitiesList = document.getElementById('probabilitiesResult');
                probabilitiesList.innerHTML = '';
                data.probs.forEach((prob, index) => {
                    const listItem = document.createElement('li');
                    listItem.textContent = `${index}: ${prob.toFixed(4)}`;
                    probabilitiesList.appendChild(listItem);
                });
                document.getElementById('resultSection').style.display = 'block';
            }

            function displayError(message) {
                const errorElement = document.createElement('p');
                errorElement.textContent = message;
                errorElement.classList.add('error');
                document.getElementById('resultSection').appendChild(errorElement);
                document.getElementById('resultSection').style.display = 'block';
            }
        </script>
    </body>
    </html>
```

conclusion

Sentiment analysis is a powerful and versatile tool that can significantly enhance various aspects of business operations, customer relations, and strategic decision-making. By leveraging the capabilities of natural language processing and machine learning, sentiment analysis enables organizations to gain deep insights into the opinions and emotions expressed in textual data

Thank you