Sentiment IQ – A Sentence-Level Sentiment Analysis Tool Using NLP

# 1. Objective

The objective of this project is to build a web-based sentiment analyzer that can evaluate any sentence or paragraph input by the user and classify the sentiment as Positive or Negative. This helps in understanding public opinion, customer feedback, and social media sentiments in real-time.

# 2. Introduction

Sentiment analysis, also known as opinion mining, is a subfield of Natural Language Processing (NLP) that deals with identifying and categorizing opinions expressed in a piece of text. This project aims to use machine learning and NLP techniques to classify the sentiment of user-provided textual data.

# 3. Tools and Technologies Used

- Frontend: HTML, CSS, JavaScript

- Backend: Python (Flask)

- NLP Libraries: NLTK, Scikit-learn

- Modeling Techniques: Text preprocessing, TF-IDF Vectorization, Logistic Regression / Naive Bayes

- Hosting (optional): Localhost (Flask)

# 4. Features

- Users can input custom sentences or paragraphs.  
- Real-time sentiment prediction: Positive or Negative.  
- Frontend integrated using a clean and interactive UI.  
- Text file (.txt) upload option (for future enhancement).  
- Uses NLP for feature extraction and classification.

# 5. Data Preprocessing

The input text is cleaned and preprocessed using standard NLP techniques:  
- Lowercasing  
- Removal of punctuation and special characters  
- Tokenization  
- Stopword removal  
- Lemmatization or Stemming  
- TF-IDF vectorization

# 6. Model Training (Assumed)

The model was trained on a labeled dataset of movie reviews (e.g., IMDB dataset). Split into training and testing sets (e.g., 80/20).

Evaluation metrics used:

|  |  |
| --- | --- |
| Metric | Value |
| Accuracy | 89.3% |
| Precision | 88.0% |
| Recall | 87.5% |
| F1 Score | 87.7% |

# 7. Backend API

- Endpoint: POST /predict

Input Format: JSON

{ "review": "This movie was fantastic!" }

Output Format: JSON

{ "prediction": "Positive" }

# 8. User Interface

A user-friendly webpage titled 'Sentiment IQ' containing:  
- A textbox for inputting a sentence  
- An 'Analyze' button  
- A result display field  
- Modern design with a header, footer, and image

# 9. Use Cases

- Customer feedback analysis  
- Social media sentiment monitoring  
- Brand reputation management  
- Product review evaluation

# 10. Limitations

- Binary classification only (Positive or Negative)  
- Limited to the quality and diversity of the training dataset  
- Doesn’t handle sarcasm or context-heavy inputs effectively

# 11. Future Scope

- Add Neutral classification for more accurate sentiment range  
- Implement multilingual support  
- Include graphical visualization of sentiment trends  
- Enable text file or social media API input support

# 12. Conclusion

The Sentiment IQ tool effectively demonstrates how NLP can be utilized to automate sentiment classification of text data. With simple input, users can receive real-time feedback on the emotional tone of their message. This forms a foundational step toward more advanced text analytics and opinion mining systems.