- **github link: https://github.com/deepak4663/phase2project-Deepak.git**
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- **TOPIC : DECODING EMOTIONS THROUGH SENTIMENT ANALYSIS OF SOCIAL MEDIA CONVERSATIONS**

- **Problem Statement**

Sentiment Analysis aims to determine the emotional tone behind a series of words, often used to understand the attitudes, opinions, or emotions expressed within online reviews, social media, and more. The goal of this project is to build a robust model that can accurately classify text as positive, negative, or neutral based on its sentiment.

- **Project Objectives**

• Develop a machine learning model that accurately predicts the sentiment of text data.

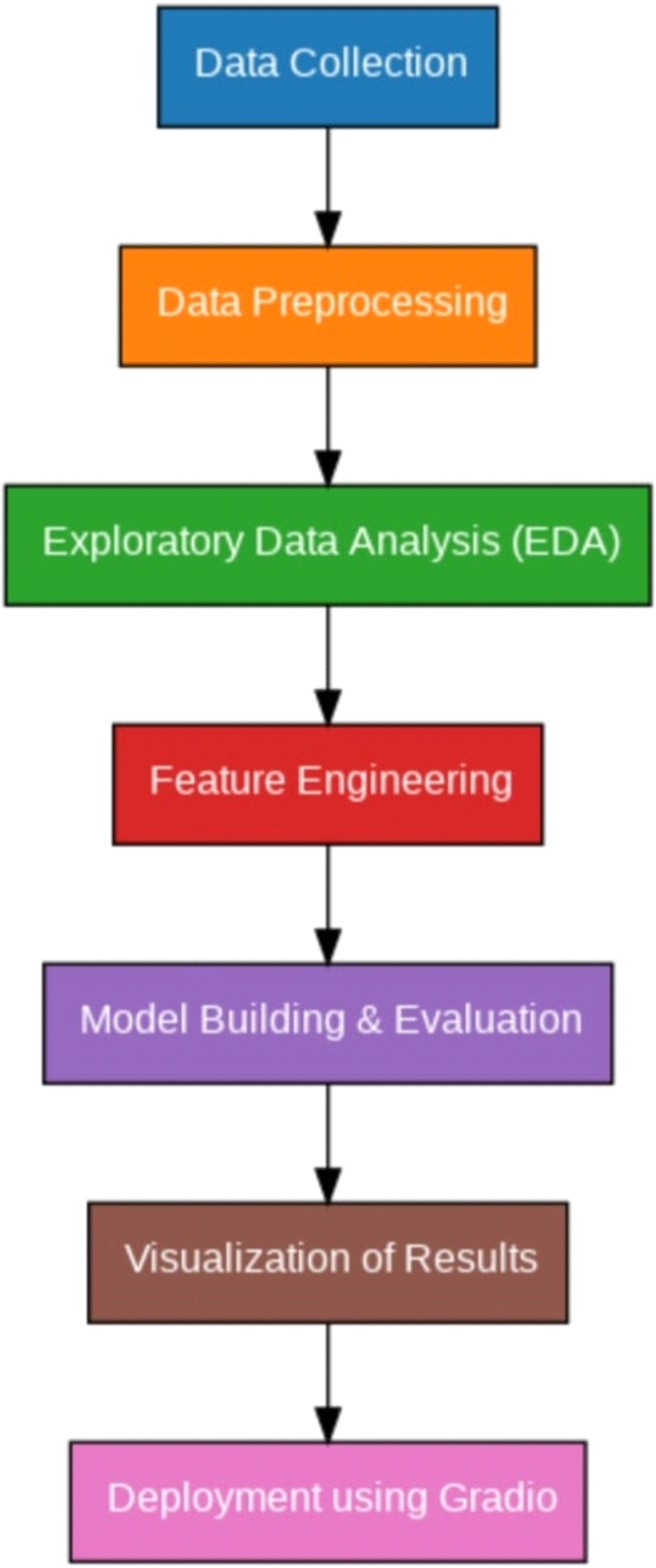
• Identify the most influential features that impact sentiment classification.

• Provide insights into how linguistic patterns and word usage reflect sentiment.

• Ensure model interpretability and usability in real-world applications like social media monitoring, brand analysis, and feedback systems.

- **Flowchart of the Project Workflow**

3. Flowchart of the Project Workflow



- Data Collection
- Data Preprocessing (Tokenization, Stop-word Removal, Stemming)
- Exploratory Data Analysis (EDA)
- Feature Engineering (TF-IDF, Word Embeddings)
- Model Building (Logistic Regression, SVM, Neural Networks)
- Model Evaluation (Accuracy, Precision, Recall, F1-Score)
- Deployment and Testing
- **Data Description**

• Dataset Name: Sentiment140 Dataset

• Source: Kaggle

• Type of Data: Textual data

• Records and Features: 1.6 million tweets with attributes such as tweet content, sentiment label, and user information.

• Target Variable: Sentiment (0 = Negative, 2 = Neutral, 4 = Positive)

• Static or Dynamic: Static dataset for initial training, dynamic updates possible through API.

• Dataset link :https://www.kaggle.com/search?q=sentiment+analysis

• Dataset :https://www.kaggle.com/datasets/abhi8923shriv/sentiment-analysis-dataset?utm_source=chatgpt.com

- **Data Preprocessing**

• Removed URLs, mentions, and special characters.

• Handled missing values and duplicates.

• Tokenized tweets into individual words.

• Performed lemmatization and stop-word removal.

• Applied TF-IDF and Word2Vec for vector representation.

- **Exploratory Data Analysis (EDA)**

• Visualized sentiment distribution with bar plots.

• Analyzed word frequency for positive and negative sentiments.

• Explored hashtag sentiment correlations.

- **Feature Engineering**

• Extracted key features like:

  • N-grams (bi-grams and tri-grams)

  • Part of Speech (POS) tagging

  • Sentiment lexicon features

  • Topic modeling with LDA

• Applied dimensionality reduction techniques (PCA, LSA).

- **Model Building**

• Algorithms Used:

  • Logistic Regression: Baseline model for interpretability.

  • Support Vector Machine (SVM): Captures non-linear patterns.

  • LSTM (Long Short-Term Memory): For sequential text analysis.

• Train-Test Split:

  • 80% training, 20% testing

• Evaluation Metrics:

  • Accuracy, Precision, Recall, F1-Score

  • Confusion Matrix to visualize classification performance.

• **Visualization of Results & Model Insights**

• Displayed confusion matrices for model comparison.

• Feature importance analysis for interpretability.

• Visualized model performance over epochs for neural networks.

• **Tools and Technologies Used**

• Programming Language: Python 3

• Notebook Environment: Jupyter Notebook / Google Colab

• Key Libraries:

  • pandas, numpy for data handling

  • matplotlib, seaborn, plotly for visualizations

  • scikit-learn, TensorFlow, Keras for modeling

• **Team Members and Contributions**

• **C. Annamalai:** Data Collection and Cleaning

• **P. Arunachalam:** Exploratory Data Analysis (EDA), Feature Engineering

• **T. Deepakraj:** Model Development, Documentation, and Reporting