## Sentiment Analysis Project

### Introduction

Sentiment Analysis is a data science project that involves using machine learning techniques to analyze and classify textual data based on the sentiment expressed.

### Data Exploration

- Loaded dataset from Kaggle.

- Explored structure and key variables.

### Data Preprocessing

- Converted text to lowercase.

- Removed stop words and special characters.

- Tokenized and lemmatized text.

### Exploratory Data Analysis (EDA)

- Analyzed distribution of sentiment labels using bar charts.

### Text Vectorization

- Implemented TF-IDF vectorization.

### Model Selection

- Evaluated Naive Bayes and SVM models.

- Tested deep learning models like LSTM.

### Hyperparameter Tuning

- Performed grid search for optimal hyperparameters.

### Cross-Validation

- Used 5-fold cross-validation for model assessment.

### Model Interpretability

- Applied LIME for understanding feature importance.

### Evaluation Metrics

- Computed confusion matrix, precision, recall, and F1 score.

### Deployment (Optional)

- Deployed model using Flask API.

### Conclusion

- Summarized findings and performance metrics.