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A  
Project Report  
  
On  
“Twitter Sentiment Analysis”

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# 1. INTRODUCTION

In today's digital age, platforms like Twitter are powerful tools for expressing public sentiment in real-time. Twitter Sentiment Analysis is an AI-based tool that detects emotions—positive, negative, or neutral—from tweets. This project explores Natural Language Processing (NLP) and Machine Learning to interpret the public mood and trends.  
  
Our goal was to create a web-based application using Python and Streamlit that allows users to input a tweet and instantly get the sentiment result. By training a machine learning model on a dataset of labeled tweets, the system can classify new inputs and visualize the result with clarity.  
  
This project introduces students to core AI concepts while delivering a simple, accessible platform for data science exploration.

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# 2. OBJECTIVES

- To build a real-time sentiment analysis system using NLP.  
- To allow user input via a web interface built with Streamlit.  
- To classify text into Positive, Negative, or Neutral sentiments.  
- To understand and apply data cleaning, preprocessing, and ML classification.  
- To gain experience in deploying Python-based machine learning tools.

# 3. SOFTWARE AND HARDWARE REQUIREMENTS

🖥 Software Requirements:  
- Python 3.9+  
- Libraries: Streamlit, NLTK, pandas, scikit-learn, Matplotlib  
- Jupyter/VS Code for development  
- Dataset: Pre-labeled Twitter sentiment dataset  
- Git (for version control)

💻 Hardware Requirements:  
- 4GB RAM minimum  
- Internet connection for deployment  
- Web browser (Chrome/Firefox)  
- Laptop/Desktop

# 4. METHODOLOGY

The system architecture includes:  
1. Data Collection: Tweets with sentiment labels from datasets.  
2. Preprocessing: Remove special characters, stop words, and perform tokenization.  
3. NLP Modeling: TF-IDF for vectorization and a classifier (Logistic Regression) for prediction.  
4. Model Training: Train on historical labeled data.  
5. Interface: Streamlit app that takes input and shows results visually.

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# 5. IMPLEMENTATION DETAILS

- Streamlit is used for developing the interface.  
- scikit-learn is used to train a sentiment classification model.  
- NLTK handles text cleaning and preprocessing.  
- The app takes input from a user and classifies it in real-time.  
- Output includes probability and classification result.

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# 6. TESTING

- Tested on Chrome and Firefox.  
- Verified NLP pipeline for various tweet types.  
- Evaluated accuracy using test data.  
- Confirmed app runs smoothly on multiple devices.

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# 7. RESULTS

- The trained model achieved good accuracy on test data.  
- Real-time tweet analysis works efficiently.  
- Streamlit interface provides a user-friendly experience.  
- Sample inputs confirmed correct classification into sentiment classes.

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# 8. CONCLUSION

The Twitter Sentiment Analysis project demonstrates how machine learning and NLP can be integrated into a web-based application to deliver practical insights. By enabling users to understand tweet sentiments instantly, the app serves as an educational tool for beginners in AI.  
  
Future upgrades can include:  
- Support for multilingual sentiment analysis  
- Live tweet analysis via Twitter API  
- Enhanced visualization and data export features