

# Requirements and Design Specification Document

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<Twitter Sentiment Analysis Web>

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**Software Engineering**

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## Definition of Terms, Acronyms and Abbreviations

*This section should provide the definitions of all terms, acronyms, and abbreviations required to interpret the terms used in the document properly.*

Term	Description
Twitter Sentiment Analysis Web	A web application designed to analyze the sentiment of tweets from the Twitter platform, providing information on whether a tweet's sentiment is positive, negative, or neutral.
User Interface (UI)	The visual and interactive part of the application that allows users to interact with the system, providing input and receiving output.
API	By using some API's we scrape data and then use it for train and test the data.
NLTK	Acronym for Natural Language Toolkit, a popular Python library used for natural language processing tasks such as sentiment analysis.
Sentiment Analysis	The process of determining the emotional tone (positive, negative, or neutral) of a piece of text, such as a tweet or review.
Browser	A software application used to access and view web pages on the internet.

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## 1. Introduction

*The Twitter Sentiment Analysis project aims to develop a robust sentiment analysis system capable of analyzing tweets from Twitter in real-time. This proposal outlines the purpose, scope, definitions, acronyms, and an overview of the Twitter Sentiment Analysis project.*

### 1.1 Purpose

*The purpose of this project is to create a sophisticated sentiment analysis tool that can accurately determine the sentiment (positive, negative, or neutral) of tweets posted on Twitter. The system will provide valuable insights into public opinions, brand perception, and emerging trends.*

### 1.2 Scope

*This project focuses on designing and implementing the sentiment analysis system for Twitter. The system will process a stream of tweets, analyze their sentiments, and present meaningful results to users. The project includes the development of the core sentiment analysis algorithms, integration with Twitter's API, and a user-friendly interface for accessing sentiment analysis results.*

### 1.3 Definitions, Acronyms, and Abbreviations

- *Sentiment Analysis: The process of determining the emotional tone or sentiment expressed in a piece of text.*
- *API: Application Programming Interface, allowing interaction with external services or data sources.*
- *User Interface: The graphical interface through which users interact with the sentiment analysis system.*

### 1.4 References

- I. <https://www.analyticsvidhya.com/blog/2021/06/twitter-sentiment-analysis-a-nlp-use-case-for-beginners/>
- II. Sir Umer Ramzan([umer.ramzan@gift.edu.pk](mailto:umer.ramzan@gift.edu.pk)).

### 1.5 Overview

*The remainder of this proposal outlines the overall description of the sentiment analysis system, specific requirements, functionality, usability, reliability, performance, supportability, design constraints, interfaces, licensing, legal considerations, and applicable standards.*

## 2. Overall Description

*The sentiment analysis system will analyze tweets from Twitter, determine their sentiment, and present the results to users. It provides insights for businesses, researchers, and individuals to understand public sentiment.*

- *product perspective*

*The sentiment analysis system integrates with Twitter's API to collect tweets. It processes the data using advanced sentiment analysis algorithms and presents the results through a user interface.*

- *product functions*
  - *Collect real-time tweets from Twitter.*
  - *Analyze the sentiment of tweets using state-of-the-art algorithms.*
  - *Present sentiment analysis results to users.*

- *user characteristics*
  - *Businesses looking to understand customer sentiments.*
  - *Researchers analyzing social trends.*
  - *Individuals interested in monitoring public opinion.*
- *constraints*
  - *Real-time processing for timely insights.*
- *assumptions and dependencies*
  - *The availability and reliability of Twitter's API.*
  - *Access to computing resources for processing and hosting the sentiment analysis system.*
- *requirements subsets*
  - *Real-time processing subset.*
  - *Accuracy and reliability subset.*

### **3. Specific Requirements**

The following sections detail the specific requirements for the Twitter Sentiment Analysis system:

#### **3.1 Functionality**

*The sentiment analysis system shall:*

- *Collect tweets in real-time from Twitter's API.*
- *Perform sentiment analysis on each tweet, classifying them as positive, negative, or neutral.*
- *Provide an easy-to-use web-based user interface for users to input queries and view sentiment analysis results.*

*Data Collection:*

*The system shall retrieve a continuous stream of tweets from Twitter's API based on user-defined queries.*

*Sentiment Analysis Algorithms:*

*The system shall use advanced natural language processing algorithms to accurately determine the sentiment of tweets.*

*Real-Time Processing:*

*The system shall process incoming tweets in real-time to provide timely sentiment analysis results.*

#### **3.2 Usability**

*The sentiment analysis system shall be user-friendly, allowing users to:*

- *Input queries for specific topics, hashtags, or keywords.*
- *Visualize sentiment analysis results through intuitive graphical representations.*

### 3.3 Reliability

*The sentiment analysis system shall:*

- *Be available and responsive for users at all times.*
- *Provide accurate sentiment analysis results with a high level of confidence.*

*Availability:*

*The system shall aim for a minimum uptime of 99.9%, ensuring continuous availability for users.*

*Accuracy:*

*The sentiment analysis system shall achieve a minimum accuracy rate of 90% in classifying tweet sentiments.*

### 3.4 Performance

*The sentiment analysis system shall demonstrate excellent performance:*

- *Response time for sentiment analysis requests shall be less than 500 milliseconds.*
- *The system shall handle a minimum of 1,000 tweets per minute.*
- *Capacity to support simultaneous user requests.*

### 3.5 Supportability

*The sentiment analysis system shall be easy to maintain and support:*

- *Follow coding standards for clean and maintainable code.*
- *Provide access to maintenance tools and logs for system administrators.*

### 3.6 Design Constraints

*The sentiment analysis system shall:*

- *Be implemented using Python and relevant NLP libraries.*
- *Interface with Twitter's API for data collection.*

### 3.7 On-line User Documentation and Help System Requirements

*The sentiment analysis system shall include online documentation to assist users in accessing and understanding the system's capabilities.*

### 3.8 Purchased Components

*No purchased components are required for the core functionality of the sentiment analysis system.*

### 3.9 Interfaces

*Here is interfaces:*

*User Interfaces*

*Home Page: A simple and intuitive interface where users can input a Twitter handle or search term for sentiment analysis.*

*Analysis Result Page: Display the sentiment analysis results, such as positive, negative, or neutral sentiment.*

### Hardware Interfaces

No specific hardware interfaces are typically required for a web-based Twitter sentiment analysis application.

### Software Interfaces

*Sentiment Analysis Library/API: Utilize a sentiment analysis library or API (e.g., NLTK, TextBlob, VADER) to analyze the sentiment of the fetched tweets.*

*Web page: Deploy the application on a web page to serve the web page to users.*

### Communications Interfaces

Enter Tweet on web page and get Sentiment of the Tweet.

### 3.10 Licensing Requirements

The sentiment analysis system shall adhere to all relevant licensing terms, ensuring compliance with Twitter's API usage policies.

### 3.11 Legal, Copyright, and Other Notices

The sentiment analysis system shall include appropriate legal disclaimers, copyright notices, and compliance statements.

### 3.12 Applicable Standards

The sentiment analysis system shall adhere to industry-standard best practices for natural language processing and web-based user interfaces.

## 4. System Architecture

*The sentiment analysis system architecture will include components for data collection, sentiment analysis, and user interface. A diagrammatic representation will be provided to illustrate the system's flow and components.*

## 5. Use Cases

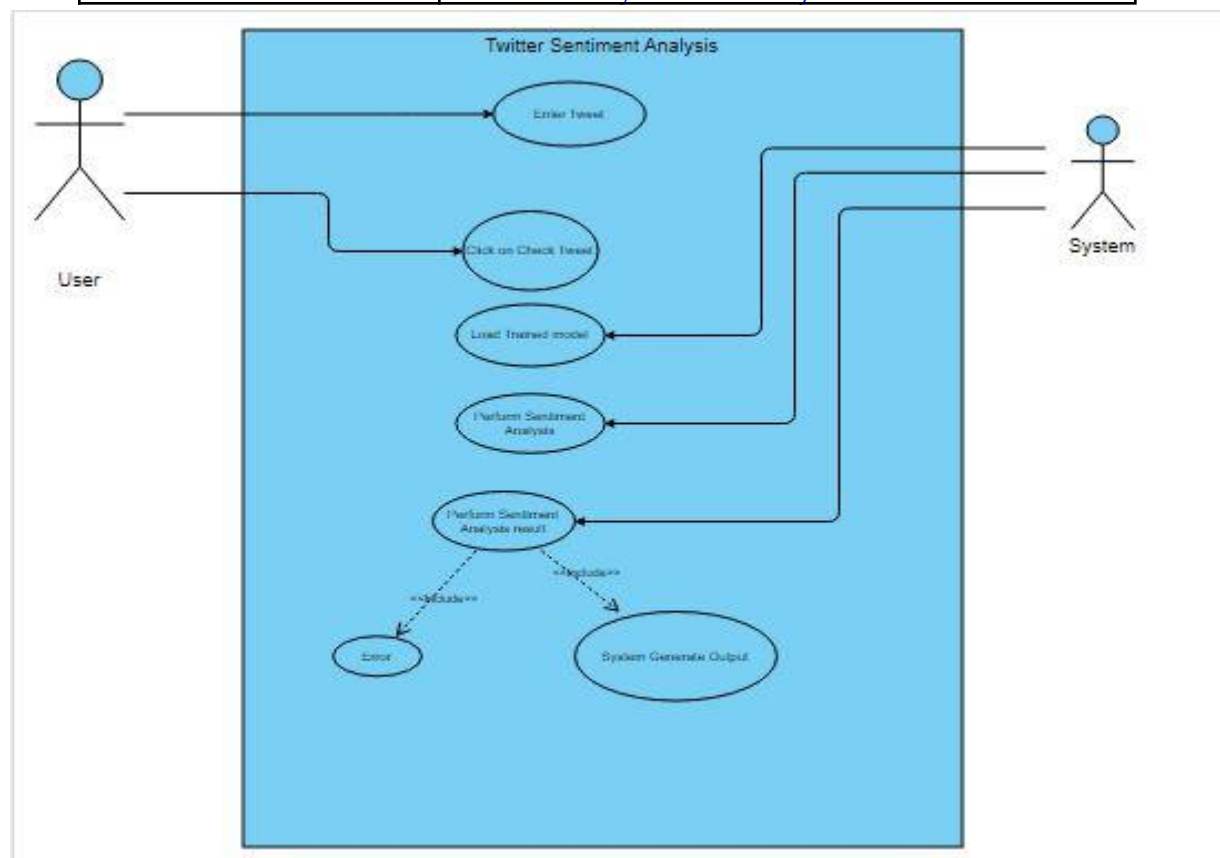
### 5.1 Use Case Diagram

### 5.2 Use Case Description

*Each Use Case has a description, which describes the functionality that will be built in the proposed system. The template for Use Case description is given below:*

<Sentiment Analysis Web Application>		
Actors: <User and System>		
Feature: <Sentiment Analysis>		
Use case Id:	Twitter Sentiment Analysis	
Pre-condition:	<The sentiment analysis model is trained and saved as a .joblib file. The web application is up and running.. >	
Scenarios		
Step#	Action	Software Reaction
1	User opens the Sentiment Analysis web application.	The System provides a text input field and a "Check" button.
2	User enters a tweet into the input field.	
3	User clicks the "Check" button.	The System processes the input tweet using the pre-trained sentiment analysis model.
4		The System classifies the tweet as either "Positive " "Negative " or "Neutral "

5		The System selects an appropriate emoji (e.g., 😊 for Positive, 😞 for Negative, 😐 for Neutral).
6		The System displays the sentiment classification and the selected emoji to the User.
<b>Alternate Scenarios:</b>		
<b>1a: If the User enters an empty tweet or an invalid input.</b>		
<b>2a: The System displays an error message and prompts the User to enter a valid tweet.</b>		
<b>Post Conditions</b>		
<b>Step#</b>	<b>Description</b>	
1	The user receives feedback on the sentiment of the input tweet.	
2	The user can continue to use the web application for sentiment analysis of other tweets.	
<b>Use Case Cross referenced</b>		< None >
<b>User Interface reference</b>		The web interface should include a text input field, a "Check" button, and a 2 <sup>nd</sup> window to display the Entered Tweet, Sentiment classification and emoji.





## 6. Detailed System Design

- *Sequence Diagram*  
*Include a sequence diagram depicting the flow of actions and interactions within the system. This diagram should illustrate how different components of your sentiment analysis system interact with each other.*
- *Parameter List*  
*Provide a parameter list for each significant method or function involved in the sequence diagram. Specify the inputs and outputs for each method/function.*
- *Collaboration Visualization*  
*Include a visual representation (e.g., UML class diagram) to show how objects or modules collaborate to achieve specific tasks or functions within your system.*

## 7. Research and Development

### *Background Research*

*This project already Exist But we Used Data those we scrape run time from twitter and apply sentiment according to polarity.*

### *Additional Research*

*We Research on many Natural Language Processing Techniques and many deep learning Models to find best for this Sentiment analysis.*

## 8. Learning Outcomes

*In Learning Outcome We learn how to make Documentation of any project Before Starting. We also learn how to integrate our model into website. and how to find the best model for this Sentiment analysis Project.*

## 9. Practical Applications

*Twitter Sentiment Analysis has practical applications in brand reputation management, market research, customer support, political analysis, financial predictions, healthcare tracking, tourism planning, and more, enabling real-time insights and informed decision-making across industries.*

## 10. Supporting Information

*Supporting information in a System Requirements Specification (SRS) or Detailed System Design (DS) documentation includes elements that enhance the usability and comprehensibility of the document. Here are the key components of supporting information:*

- ➔ *Table of Contents: A table of contents provides a structured outline of the document's sections, making it easier for readers to navigate and locate specific information within the document.*
- ➔ *Index: An index is a comprehensive list of keywords or topics along with page references. It allows users to quickly find specific information or terms throughout the document.*
- ➔ *Appendices: Appendices are additional sections or documents that supplement the main content of the SRS/DS. They may include:*
- ➔ *Use-Case Storyboards: Visual representations of use-case scenarios that help stakeholders better understand system functionality.*

- *User-Interface Prototypes: Mock-ups or designs of the user interface to illustrate how the system will look and function.*