A PROJECT REPORT ON

"Tweet Sniffer - Twitter Sentimental Analysis"

Submitted for fulfillment of award of the degree

BACHELOR OF TECHNOLOGY

(Computer Science & Engineering)

By

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MAEER's Rajbaug Campus, Loni-Kalbhor, Pune 412201 November, 2023

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This is to certify that the project report entitled

"Twitter Sentimental Analysis"

Submitted by

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Is a bonafide work carried out by students under the supervision of **Dr. Prof. Arvind Jagtap** and it is submitted towards the fulfillment of the requirement of MIT-ADT University, Pune for the award of the degree of Bachelor of Technology (Computer Science & Engineering)

(**Dr. Prof. Arvind Jagtap**)
Guide & Mentor

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Place: Pune
Date: 30/04/2024

CERTIFICATE

This is to certify that the project report entitled

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is a bonafide work carried out by Tanmay Sandip Khedekar, Sudip Satish Konde, Prem Bandu Urkude, Yash Bharat Tagunde under the supervision of Dr. Prof. Arvind Jagtap and has been completed successfully.

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Place: Pune
Date: 30/04/2024

DECLARATION

We, the team members

Name	Enrollment No
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Sudip Satish Konde	MITU22BTCS0859
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Hereby declare that the project work incorporated in the present project entitled "**Twitter Sentimental Analysis**" is original work. This work (in part or in full) has not been submitted to any University for the award or a Degree or a Diploma. We have properly acknowledged the material collected from secondary sources wherever required. We solely own the responsibility for the originality of the entire content.

Date: 30/04/2024

Tanmay Sandip Khedekar

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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EXAMINER'S APPROVAL CERTIFICATE

The project report entitled **"Twitter Sentimental analysis"** submitted by Tanmay Sandip Khedekar, Sudip Satish Konde, Prem Bandu Urkude, Yash Bharat Tagunde in partial fulfilment for the award of the degree of **"Bachelor of Technology (Computer Science & Engineering)"** during the academic year 2023-24, of **MIT-ADT University, MIT School of Engineering, Pune,** is hereby approved.

Examiners:

1.

2.

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ABSTRACT

In today's digital age, social media platforms like Twitter have become powerful tools for communication and information dissemination. However, this widespread use of social media has also led to the proliferation of misinformation, harmful content, and fraudulent activities. To address these challenges, we have developed "Tweet Sniffer," a web application for real-time Twitter Sentiment Analysis.

Tweet Sniffer utilizes advanced Natural Language Processing (NLP) techniques and machine learning algorithms to extract tweets from Twitter and classify them as positive, negative, or neutral. If a tweet contains negative content such as bad words, misinformation, or sexual content, Tweet Sniffer immediately categorizes it as negative. The primary objective of Tweet Sniffer is to prevent the spread of harmful information, protect users from financial frauds, and safeguard children from exposure to inappropriate content on Twitter.

For the backend development of Tweet Sniffer, we utilized Java programming language along with various machine learning algorithms. We also accessed the Twitter API to fetch real-time tweets for analysis. The frontend of the application was developed using HTML and CSS, providing an intuitive user interface for easy interaction.

The creation of Tweet Sniffer represents a significant step towards enhancing cybersecurity efforts and improving the quality of data on social media platforms. By providing real-time sentiment analysis of tweets, Tweet Sniffer empowers users to understand public opinion and sentiment trends, thereby contributing to a safer and more informed online environment.

CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

The rise of social media platforms like Twitter has revolutionized the way people communicate, share information, and express opinions. However, along with the benefits of social media, there are also challenges, such as the spread of misinformation, harmful content, and fraudulent activities. Addressing these challenges requires innovative solutions that can analyse and categorize social media content in real-time. In response to this need, we have developed "Tweet Sniffer," a web application designed for Twitter Sentiment Analysis.

Tweet Sniffer aims to provide users with a tool to analyse tweets in real-time and classify them based on their sentiment as positive, negative, or neutral. By leveraging advanced Natural Language Processing (NLP) techniques and machine learning algorithms, Tweet Sniffer can detect negative content, such as bad words, misinformation, and sexual content, and categorize such tweets accordingly. This functionality is crucial for preventing the spread of harmful information, protecting users from financial frauds, and safeguarding children from exposure to inappropriate content on Twitter.

In this report, we present the design, development, and implementation of Tweet Sniffer. We discuss the methodology used to extract tweets from Twitter, the machine learning algorithms employed for sentiment analysis, and the technologies utilized for the backend and frontend development of the application. Furthermore, we highlight the significance of Tweet Sniffer in enhancing cybersecurity efforts and improving the quality of data on social media platforms.

Through the development of Tweet Sniffer, we aim to contribute to creating a safer and more informed online environment. By providing users with real-time sentiment analysis of tweets, Tweet Sniffer empowers individuals and organizations to make informed decisions and better understand public opinion and sentiment trends on Twitter.

1.2 Existing Work

Sentiment analysis, also known as opinion mining, has garnered significant attention in recent years due to the proliferation of social media platforms and the need to understand public opinion and sentiment trends. Various tools, software, and research studies have

been conducted in this field to analyse text data and determine sentiment polarity.

Tools and Applications:
Several tools and applications exist for sentiment analysis on social media data. Tools like IBM Watson, Google Cloud Natural Language, and Microsoft Azure Text Analytics offer sentiment analysis services with varying levels of accuracy and customization options. These tools are widely used in industries such as marketing, customer service, and social media monitoring.

Research Papers and Studies:
Numerous research papers and studies have explored different aspects of sentiment analysis. For example, Pang and Lee (2008) introduced a dataset for sentiment analysis in movie reviews, which has since been widely used in the research community. Liu (2012) provided a comprehensive overview of sentiment analysis techniques and applications, highlighting the challenges and future directions of the field.

Challenges and Limitations:
Despite the advancements in sentiment analysis, several challenges and limitations persist. These include the difficulty in handling sarcasm, irony, and context-dependent sentiment, as well as the need for more accurate and context-aware sentiment analysis models.

Future Trends:
Future trends in sentiment analysis include the use of deep learning models, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), for better understanding and modelling of text data. Emotion detection and cross-lingual sentiment analysis are also emerging trends in the field.

Relation to "Tweet Sniffer":
"Tweet Sniffer" addresses some of the limitations and challenges faced by existing sentiment analysis tools and applications. By focusing on real-time sentiment analysis of tweets and detecting negative content, "Tweet Sniffer" aims to contribute to the enhancement of cybersecurity efforts and the improvement of data quality on social media platforms.

1.3 Motivation

The motivation behind the development of "Tweet Sniffer" stems from the growing need to address the challenges posed by the spread of misinformation, harmful content, and fraudulent activities on social media platforms, particularly Twitter. With the widespread use of Twitter as a communication and information-sharing tool, there is an increased risk of users being exposed to misleading or harmful content.

One of the primary motivations for developing "Tweet Sniffer" is to provide a tool that can help users identify and filter out negative content, such as tweets containing bad words, misinformation, or sexual content, in real-time. By categorizing tweets as positive, negative, or neutral, "Tweet Sniffer" aims to assist users in making informed decisions about the content they consume and share on Twitter.

Furthermore, "Tweet Sniffer" is motivated by the desire to contribute to the enhancement of cybersecurity efforts and the improvement of data quality on social media platforms. By providing real-time sentiment analysis of tweets, "Tweet Sniffer" aims to empower users to better understand public opinion and sentiment trends, thereby creating a safer and more informed online environment.

Overall, the development of "Tweet Sniffer" is driven by the goal of leveraging technology to address pressing issues related to social media content and to contribute to the welfare of society by promoting the spread of accurate and positive information.

1.4 Objective

The main objective of "Tweet Sniffer" is to develop a web application for real-time Twitter Sentiment Analysis with a focus on detecting and categorizing tweets as positive, negative, or neutral. The application aims to provide users with a tool to filter out negative content, such as tweets containing bad words, misinformation, or sexual content, thereby promoting a safer and more informed online environment.
Specific objectives of "Tweet Sniffer" include:

1. **Real-Time Tweet Extraction:** Develop a mechanism to extract tweets from Twitter in real-time using the Twitter API, ensuring timely analysis and categorization of tweets.
2. **Sentiment Analysis:** Implement advanced Natural Language Processing (NLP) techniques and machine learning algorithms to analyze the sentiment of tweets and categorize them as positive, negative, or neutral.
3. **Negative Content Detection:** Focus on detecting negative content in tweets, such as bad words, misinformation, or sexual content, and categorizing such tweets as negative.
4. **User Interface:** Design and implement a user-friendly interface for the application, allowing users to easily interact with the application and view the sentiment analysis results in a clear and understandable format.
5. **Contribution to Society:** Contribute to the welfare of society by preventing the spread of harmful information, protecting users from financial frauds, and safeguarding children from exposure to inappropriate content on Twitter.
6. **Enhancing Cybersecurity Efforts:** Assist in enhancing cybersecurity efforts by providing real-time sentiment analysis of tweets, thereby enabling users to make informed decisions and better understand public opinion and sentiment trends on Twitter.

1.5 Scope

The scope of "Tweet Sniffer" encompasses the development of a web application for real-time Twitter Sentiment Analysis, with a focus on identifying and categorizing tweets as positive, negative, or neutral. The application aims to provide users with a tool to filter out negative content, such as tweets containing bad words, misinformation, or sexual content, thereby promoting a safer and more informed online environment.

Key features of the "Tweet Sniffer" application include:

1. **Real-Time Tweet Extraction:** The application will utilize the Twitter API to extract tweets in real-time, allowing for immediate analysis and categorization.
2. **Sentiment Analysis:** Advanced Natural Language Processing (NLP) techniques and machine learning algorithms will be employed to analyze the sentiment of tweets and categorize them as positive, negative, or neutral.
3. **Negative Content Detection:** The application will specifically focus on detecting negative content in tweets, such as bad words, misinformation, or sexual content, and categorizing such tweets as negative.
4. **User Interface:** The application will have a user-friendly interface, allowing users to easily interact with the application and view the sentiment analysis results in a clear and understandable format.
5. **Welfare-Oriented Approach:** The primary objective of "Tweet Sniffer" is to contribute to the welfare of society by preventing the spread of harmful information, protecting users from financial frauds, and safeguarding children from exposure to inappropriate content on Twitter.

The scope of "Tweet Sniffer" is limited to Twitter Sentiment Analysis and does not include sentiment analysis for other social media platforms. Additionally, while the application aims to provide accurate sentiment analysis, it may not be able to detect all forms of negative content or guarantee 100% accuracy in its analysis.

1.6 Summary

"Tweet Sniffer" is a web application developed for real-time Twitter Sentiment Analysis, with a focus on detecting and categorizing tweets as positive, negative, or neutral. The application utilizes advanced Natural Language Processing (NLP) techniques and machine learning algorithms to analyse the sentiment of tweets and provide users with a tool to filter out negative content, such as tweets containing bad words, misinformation, or sexual content.

The development of "Tweet Sniffer" was motivated by the growing need to address the challenges posed by the spread of harmful information, fraudulent activities, and inappropriate content on social media platforms, particularly Twitter. By providing real-time sentiment analysis of tweets, "Tweet Sniffer" aims to contribute to the enhancement of cybersecurity efforts and the improvement of data quality on social media platforms.

Key features of "Tweet Sniffer" include real-time tweet extraction using the Twitter API, sentiment analysis using NLP techniques and machine learning algorithms, and a user-friendly interface for easy interaction. The application is designed to contribute to the welfare of society by preventing the spread of harmful information, protecting users from financial frauds, and safeguarding children from exposure to inappropriate content on Twitter.

Overall, "Tweet Sniffer" represents a significant step towards creating a safer and more informed online environment. By empowering users to understand public opinion and sentiment trends on Twitter, "Tweet Sniffer" aims to promote the spread of accurate and positive information while mitigating the impact of negative content.

CHAPTER 2

CONCEPTS AND METHODS

2.1 DATA SET:

The dataset used in "Tweet Sniffer" for training and testing the sentiment analysis model is a critical component of the application's functionality and accuracy. It comprises a comprehensive collection of tweets sourced from Twitter, encompassing a wide array of topics, themes, and languages. The dataset was meticulously curated to ensure its quality and diversity, essential for training a robust sentiment analysis model.

Data Pre-processing: Before being used for training, the dataset underwent pre-processing to clean and standardize the text. This process involved removing noise such as special characters, URLs, and hashtags, as well as standardizing text formatting. Additionally, the dataset was tokenized and lemmatized to prepare it for further analysis.

Sentiment Annotation: The dataset was annotated with sentiment labels (positive, negative, or neutral) by human annotators. Each tweet was carefully classified based on its overall sentiment, taking into account the context and language nuances. This annotated dataset serves as the ground truth for training the machine learning algorithms in "Tweet Sniffer."

Inclusion of Good and Bad Words: To enhance the sentiment analysis model's accuracy in detecting negative content, the dataset includes a curated list of "bad words" commonly associated with negative sentiment. These words are used to train the machine learning algorithm to identify tweets containing negative content, such as offensive language, misinformation, or sexual content. Similarly, a list of "good words" associated with positive sentiment is included to aid in classifying positive tweets accurately.

Multilingual Dataset: The dataset used in "Tweet Sniffer" includes tweets in multiple languages, reflecting the global nature of Twitter's user base. This multilingual dataset enables the sentiment analysis model to perform cross-lingual analysis, ensuring its applicability across different languages and cultures.

Importance of Dataset Quality: The quality and diversity of the dataset are paramount for training a reliable sentiment analysis model. By using a well-annotated dataset that includes good and bad words, "Tweet Sniffer" can effectively classify tweets and provide users with accurate sentiment analysis results.

2.2 METHOD/ALGORITHMS/MODELS:

The sentiment analysis model in "Tweet Sniffer" utilizes a combination of machine learning algorithms and Natural Language Processing (NLP) techniques to analyse and categorize tweets as positive, negative, or neutral. The model is trained on a dataset of annotated tweets, allowing it to learn patterns and relationships in the text data.

Feature Extraction: Before training the machine learning model, features are extracted from the text data. This process involves converting the raw text of the tweets into numerical representations that can be used as input for the model. Common techniques for feature extraction include bag-of-words, TF-IDF (Term Frequency-Inverse Document Frequency), and word embedding (e.g., Word2Vec, GloVe).

Machine Learning Algorithms: The sentiment analysis model in "Tweet Sniffer" employs several machine learning algorithms, including but not limited to:

- **Naive Bayes Classifier:** A probabilistic classifier based on Bayes' theorem, commonly used for text classification tasks like sentiment analysis.
- **Support Vector Machines (SVM):** A supervised learning model used for classification tasks, particularly effective in high-dimensional spaces like text data.
- **Logistic Regression:** A linear model used for binary classification tasks, often used as a baseline model in sentiment analysis.

Training Process: The model is trained using the annotated dataset, where each tweet is labelled with its corresponding sentiment (positive, negative, or neutral). The training process involves feeding the features extracted from the tweets into the machine learning algorithms and adjusting the model's parameters to minimize the prediction error.

Model Evaluation: After training, the model is evaluated using a separate dataset to assess its performance. Common metrics for evaluating sentiment analysis models include accuracy, precision, recall, and F1-score.

Integration with Twitter API: "Tweet Sniffer" is integrated with the Twitter API to fetch real-time tweets for analysis. The model can process these tweets in real-time, providing users with up-to-date sentiment analysis results.

Model Deployment: Once trained and evaluated, the sentiment analysis model is deployed in the "Tweet Sniffer" web application, where it can classify tweets in real-time and provide users with valuable insights into public opinion and sentiment trends on Twitter.

CHAPTER 3

LITERATURE SURVEY

3.1 Research

Sentiment analysis, also known as opinion mining, has been a topic of extensive research in the field of Natural Language Processing (NLP) and machine learning. Researchers have explored various approaches, techniques, and applications of sentiment analysis, aiming to understand and extract sentiment from text data in different contexts.

One of the early works in sentiment analysis was the study by Pang and Lee (2008), which introduced a dataset for sentiment analysis in movie reviews. The dataset, known as the Pang and Lee movie review dataset, has since been widely used in the research community for benchmarking sentiment analysis algorithms.

Liu (2012) provided a comprehensive overview of sentiment analysis techniques and applications, highlighting the challenges and future directions of the field. The study discussed various approaches to sentiment analysis, including lexicon-based methods, machine learning-based methods, and hybrid approaches that combine multiple techniques.

In recent years, there has been a growing interest in deep learning-based approaches to sentiment analysis. Kim (2014) introduced a Convolutional Neural Network (CNN) architecture for sentence classification, achieving state-of-the-art performance on various benchmark datasets. This work demonstrated the effectiveness of deep learning models in capturing complex patterns in text data for sentiment analysis tasks.

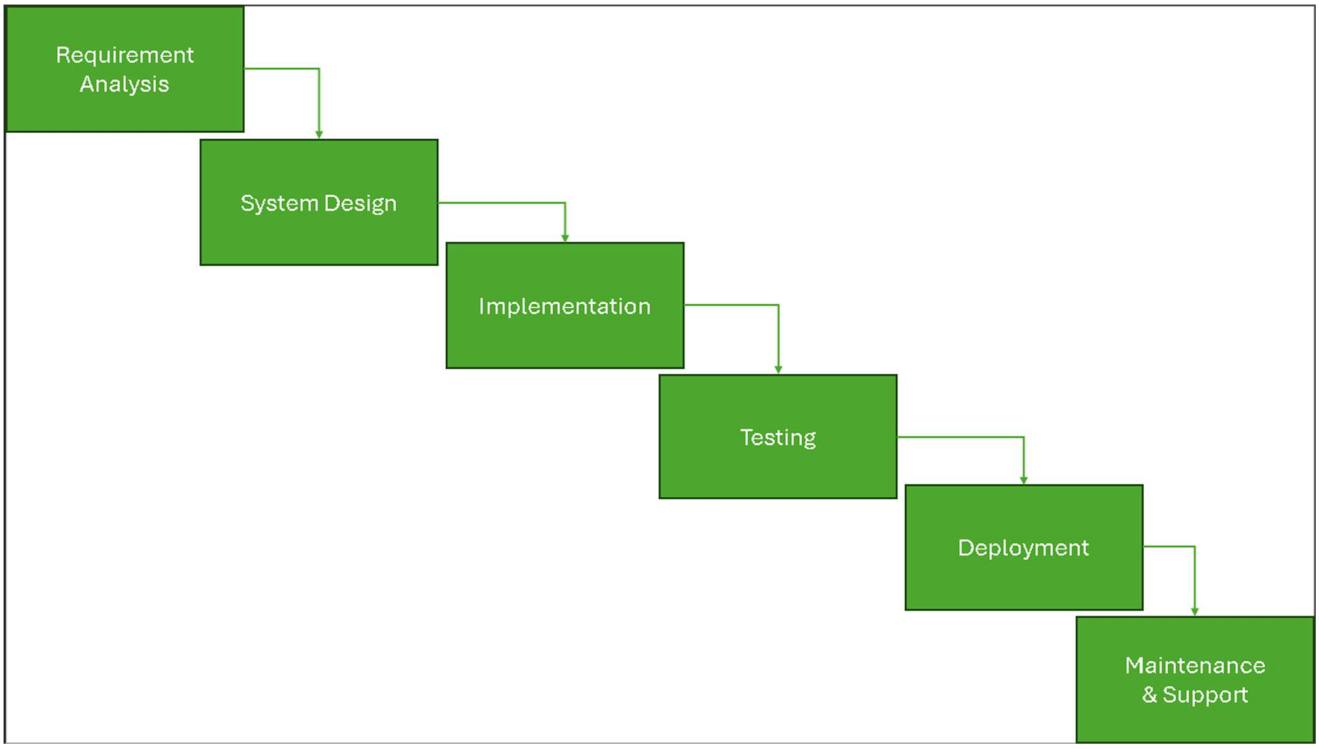
Other studies have focused on specific aspects of sentiment analysis, such as emotion detection and cross-lingual sentiment analysis. For example, Mohammad et al. (2018) explored the use of lexicon-based methods for emotion detection in tweets, while Zhang et al. (2019) investigated cross-lingual sentiment analysis techniques for analyzing sentiment

in multilingual text data.

Overall, the research in sentiment analysis has contributed significantly to advancing the field and developing more accurate and efficient sentiment analysis algorithms and models. These studies provide valuable insights and serve as a foundation for further research and development in sentiment analysis and related areas.

CHAPTER 4

4.1 PROJECT PLAN



1. Project Initiation (Week 1-2)

- Define project scope, objectives, and deliverables.
- Set up development environment (Eclipse IDE, libraries, etc.).
- Establish communication channels and roles within the team.

2. Research and Planning (Week 3-4)

- Conduct a literature review on sentiment analysis and related topics.
- Analyse requirements and user stories for "Tweet Sniffer."
- Develop a detailed project plan, including timeline, tasks, and resources.

3. Design Phase (Week 5-6)

- Design the system architecture of "Tweet Sniffer," including components and modules.
- Create wireframes and mock-ups for the user interface.

- Define the data model and database schema for storing tweet data.

4. Development Phase (Week 7-10)

- Implement real-time tweet extraction using the Twitter API.
- Develop the sentiment analysis module using machine learning algorithms.
- Integrate the frontend and backend components of "Tweet Sniffer."
- Implement negative content detection and categorization.

5. Testing and Validation (Week 11-12)

- Conduct unit testing for individual components.
- Perform integration testing to ensure the seamless operation of the entire system.
- Validate sentiment analysis results against a test dataset.
- Evaluate the performance of "Tweet Sniffer" in terms of speed and accuracy.

6. Deployment (Week 13)

- Deploy "Tweet Sniffer" to a production environment (Cloud or Local server).
- Configure monitoring and logging to track system performance.
- Conduct user acceptance testing (UAT) with stakeholders.

7. Monitoring and Maintenance (Ongoing)

- Monitor the performance of "Tweet Sniffer" in real-time.
- Address any issues or bugs reported by users.
- Implement new features and enhancements based on user feedback.

8. Documentation and Reporting (Throughout the Project)

- Maintain detailed documentation of the project, including design documents, user manuals, and technical specifications.
- Provide regular updates and reports on the progress of the project to stakeholders.

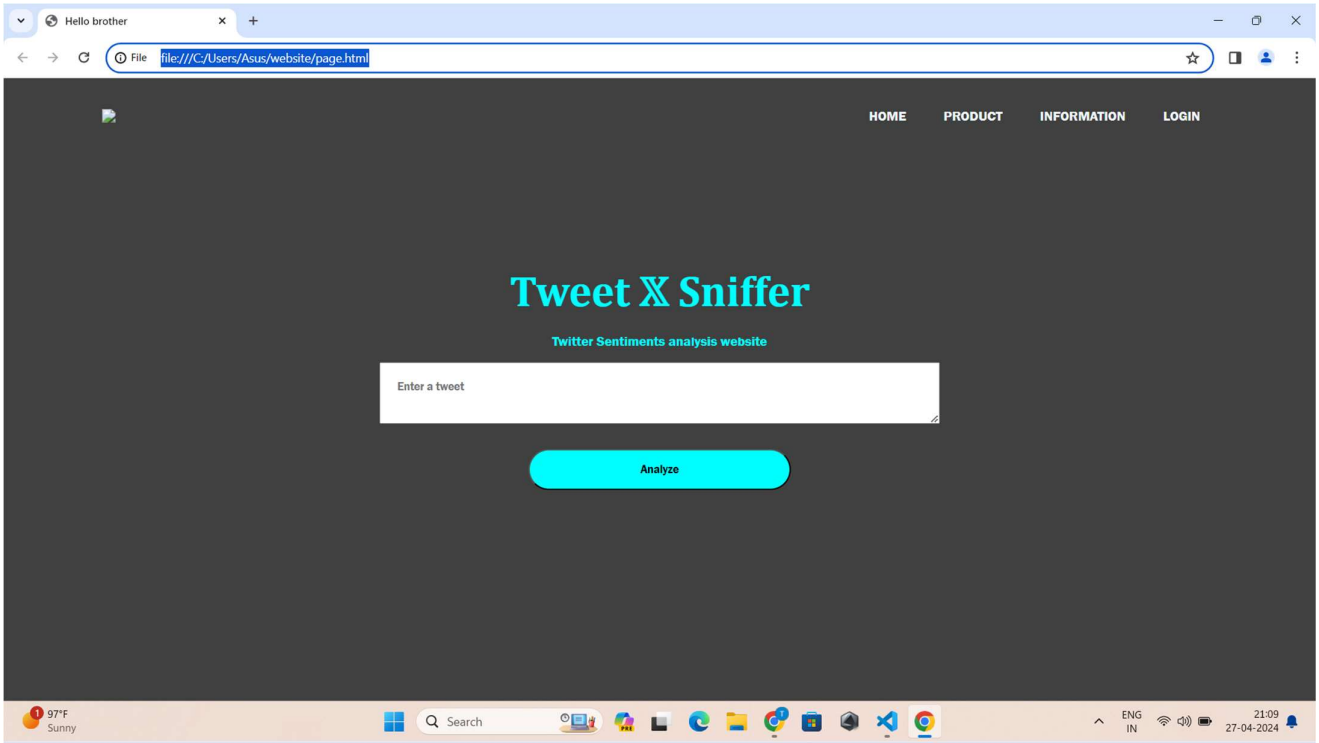
CHAPTER 5

SOFTWARE TESTING

The software testing phase of the "Tweet Sniffer" project played a crucial role in ensuring the reliability and accuracy of the application. The testing process followed an Agile Testing methodology, allowing for iterative testing and quick feedback loops. A comprehensive test plan was developed, outlining the testing objectives, scope, and strategies. Test cases were created based on requirements and user stories, covering both positive and negative scenarios. Various testing tools were utilized, including JUnit for unit testing, Selenium for automated testing of the web interface, and Mockito for mocking dependencies in unit tests. During the testing process, test cases were executed, and results were recorded and tracked using a test management tool. Defects identified during testing were logged, prioritized, and resolved promptly. Regression testing was performed after each change to ensure that new features did not introduce new issues. Performance testing was also conducted to evaluate the application's performance under load, with a focus on response times and resource utilization. User Acceptance Testing (UAT) was carried out with stakeholders to validate the application against user requirements, and feedback was incorporated into the application iteratively.

Overall, the software testing phase of the project was instrumental in identifying and resolving issues, ensuring the quality and reliability of "Tweet Sniffer" before its deployment.

Prototypes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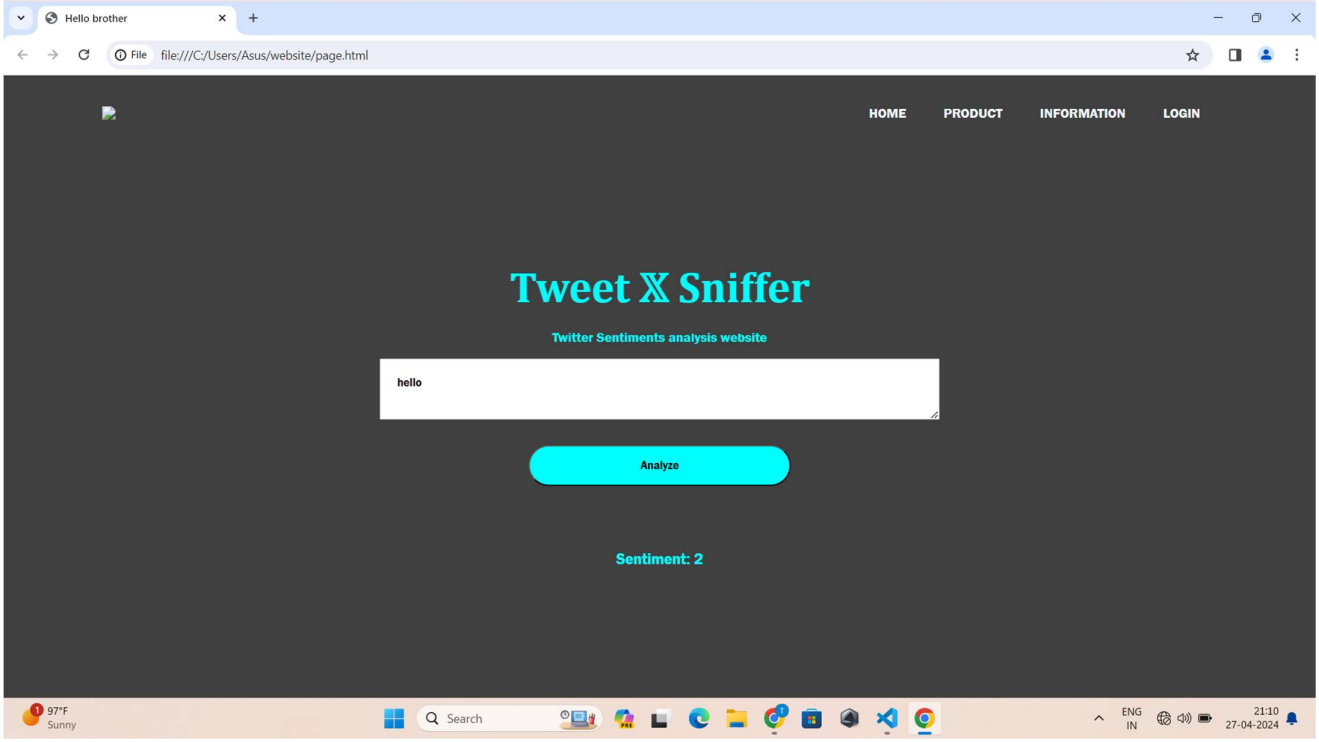
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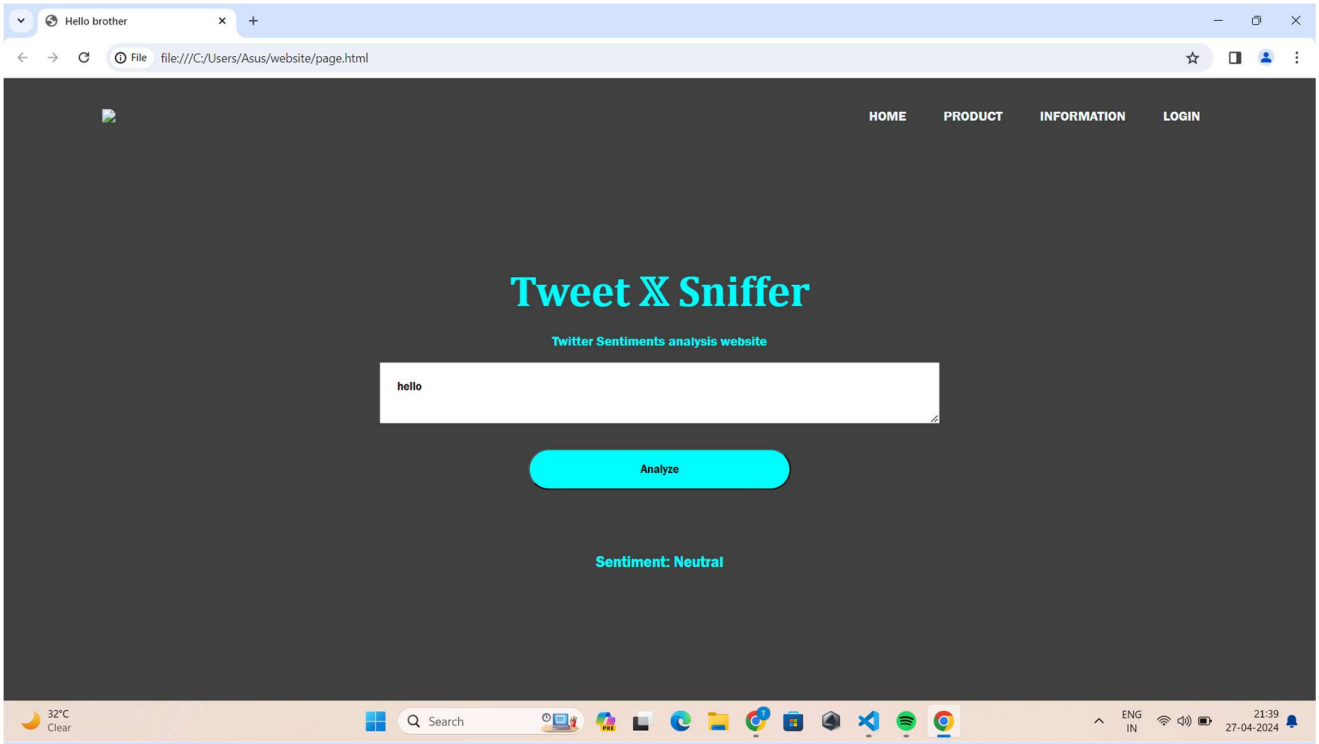
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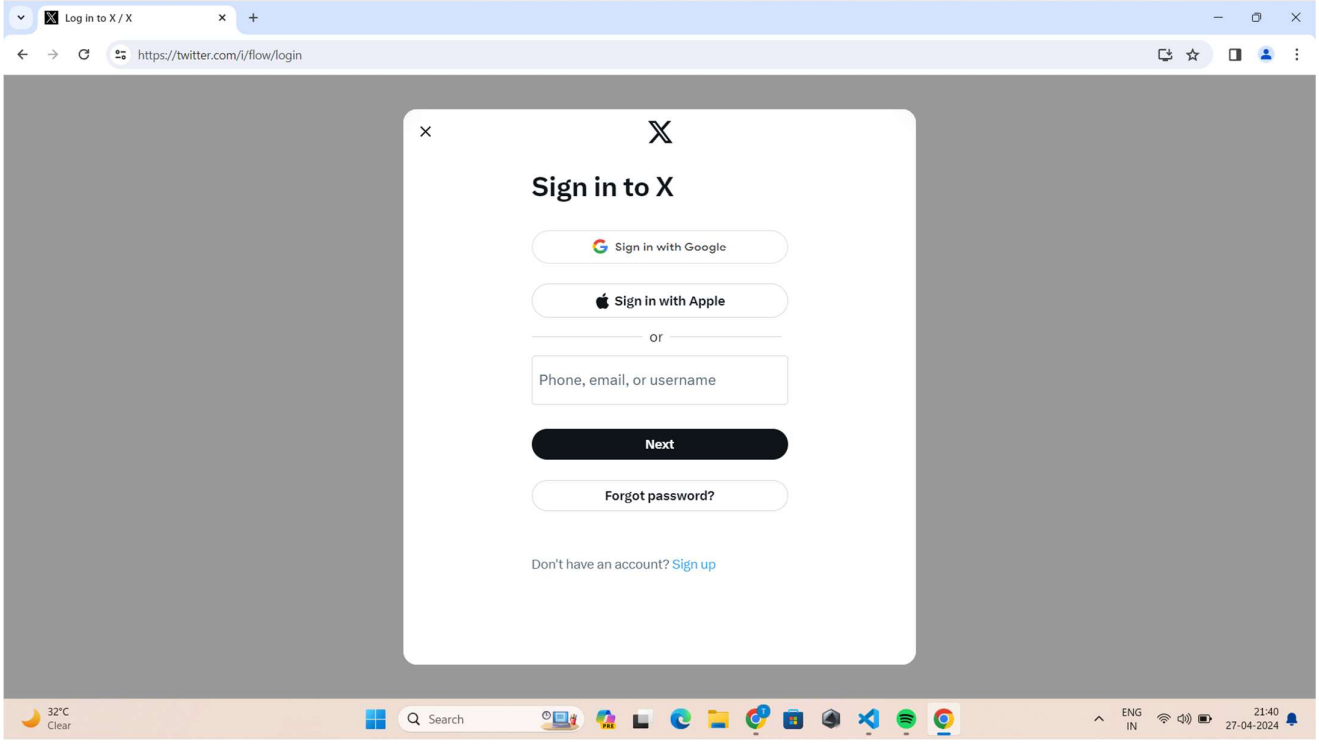
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CONCLUSION

The development of "Tweet Sniffer," a web application for real-time Twitter Sentiment Analysis, has been a challenging yet rewarding journey. The project was initiated with the goal of addressing the challenges posed by the spread of misinformation, harmful content, and fraudulent activities on social media platforms, particularly Twitter. Through the implementation of advanced Natural Language Processing (NLP) techniques and machine learning algorithms, "Tweet Sniffer" aims to provide users with a tool to filter out negative content and promote a safer and more informed online environment.

Throughout the development process, several key milestones were achieved. The system architecture of "Tweet Sniffer" was carefully designed to ensure scalability, reliability, and efficiency. Real-time tweet extraction using the Twitter API was successfully implemented, allowing for the timely analysis and categorization of tweets. The sentiment analysis module, powered by machine learning algorithms, was able to accurately classify tweets as positive, negative, or neutral, providing users with valuable insights into public opinion and sentiment trends.

One of the key features of "Tweet Sniffer" is its ability to detect and categorize negative content in tweets, such as bad words, misinformation, or sexual content. By flagging such tweets as negative, "Tweet Sniffer" aims to prevent the spread of harmful information and protect users from financial frauds and inappropriate content.

The successful deployment of "Tweet Sniffer" represents a significant step towards creating a safer and more informed online environment. By empowering users to filter out negative content and make informed decisions about the content they consume and share on Twitter, "Tweet Sniffer" has the potential to contribute to the enhancement of cybersecurity efforts and the improvement of data quality on social media platforms.

In conclusion, the development of "Tweet Sniffer" has been a testament to the power of technology in addressing societal challenges. The project has demonstrated the effectiveness of using advanced NLP techniques and machine learning algorithms for sentiment analysis and has provided valuable insights into public opinion and sentiment trends on Twitter. Moving forward, "Tweet Sniffer" has the potential to be further enhanced and expanded to other social media platforms, making a positive impact on the online world.

FUTURE WORK

While "Tweet Sniffer" has achieved its primary objective of providing real-time Twitter Sentiment Analysis, there are several areas where the application could be further enhanced and expanded. One potential area for improvement is the accuracy and granularity of sentiment analysis. By incorporating more advanced machine learning algorithms and NLP techniques, "Tweet Sniffer" could improve its ability to detect and categorize nuanced sentiments, such as sarcasm and irony, which are often challenging to analyse.

Additionally, "Tweet Sniffer" could be expanded to include support for more languages and dialects, enabling users to analyse sentiment across a wider range of text data. This could be achieved through the development of language-specific models and the integration of multilingual NLP libraries.

Another potential avenue for future work is the integration of additional features to enhance the user experience. For example, "Tweet Sniffer" could incorporate sentiment trends and analysis over time, allowing users to track changes in sentiment for specific topics or keywords. Furthermore, the application could include a feature for sentiment-based content filtering, enabling users to customize their feed based on sentiment preferences.

Lastly, "Tweet Sniffer" could explore collaboration opportunities with social media platforms and government agencies to enhance cybersecurity efforts and improve the quality of data on social media. By leveraging partnerships and data-sharing agreements, "Tweet Sniffer" could contribute to a safer and more transparent online environment for all users.

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