

BATCH No:MI2001

**FAKE REVIEW DETECTION SYSTEM USING
MACHINE LEARNING**

*Minor project-II report submitted
in partial fulfillment of the requirement for award of the degree of*

**Bachelor of Technology
in
Computer Science & Engineering**

By

LALITHKUMAR D	(22UEAD0029)	(VTU23275)
BHARGAV REDDY M	(22UEAD0032)	(VTU22827)
SANGEETH B	(22UEAD0056)	(VTU23041)

*Under the guidance of
Dr.Ms. N.KRISHNAMMAL,ME,PhD,
ASSISTANT PROFESSOR*



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SCHOOL OF COMPUTING**

**VEL TECH RANGARAJAN DR. SAGUNTHALA R&D INSTITUTE OF
SCIENCE AND TECHNOLOGY**

(Deemed to be University Estd u/s 3 of UGC Act, 1956)

**Accredited by NAAC with A++ Grade
CHENNAI 600 062, TAMILNADU, INDIA**

May, 2025

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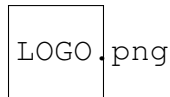
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CERTIFICATE

It is certified that the work contained in the project report titled "PROJECT-TITLE (FAKE REVIEW DETECTION SYSTEM USING MACHINE LEARNING)" by "LALITHKUMAR D (22UEAD0029), BHARGAV REDDY M (22UEAD0032), SANGEETH B (22UEAD0056)" has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

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May, 2025

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Signature of the Dean

Dr. S P. Chokkalingam

Professor & Dean

School of Computing

Vel Tech Rangarajan Dr. Sagunthala R&D

Institute of Science and Technology

May, 2025

DECLARATION

We declare that this written submission represents my ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date: / /

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(STUDENT NAME3(SANGEETH B)

Date: / /

APPROVAL SHEET

This project report entitled (PROJECT TITLE (REVIEW DETECTION SYSTEM USING MACHINE LEARNING)) by (LALITHKUMAR D (22UEAD0029), (BHARGAV REDDY M (22UEAD0032), (SANGEETH B (22UEAD0056) is approved for the degree of B.Tech in Computer Science & Engineering.

Examiners

Supervisor

Dr.Ms. N.KRISHNAMMAL,ME,PhD,

Date: / /

Place:

ACKNOWLEDGEMENT

We express our deepest gratitude to our **Honorable Founder Chancellor and President Col. Prof. Dr. R. RANGARAJAN B.E. (Electrical), B.E. (Mechanical), M.S (Automobile), D.Sc., and Foundress President Dr. R. SAGUNTHALA RANGARAJAN M.B.B.S.** Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, for her blessings.

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We thank our department faculty, supporting staff and friends for their help and guidance to complete this project.

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ABSTRACT

In the era of digital communication, user-generated reviews play a crucial role in shaping consumer behavior and business strategies. However, the massive volume of online reviews makes manual analysis impractical and time-consuming. This project presents a Review Detection System using Machine Learning to automate the process of understanding and classifying user reviews based on their sentiment. Leveraging natural language processing (NLP) techniques, the system preprocesses textual data to extract meaningful features and applies supervised machine learning algorithms to classify reviews as positive, negative, or neutral. The model is trained and evaluated using a publicly available dataset of online product reviews. Experimental results demonstrate that the proposed system achieves high accuracy and efficiency, making it a valuable tool for businesses to gauge customer satisfaction and improve decision-making. This project highlights the power of machine learning in transforming raw textual data into actionable insights.

Keywords: Include minimum 10 keywords

Machine Learning, Sentiment Analysis, Natural Language Processing (NLP), Text Classification, Review Detection, Supervised Learning, Opinion Mining, Review Polarity, Data Preprocessing, Feature Extraction, Classification Algorithms.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANN	Artificial Neural Network
API	Application Programming Interface
CPU	Central Processing Unit
CSV	Comma-Separated Values
DT	Decision Tree
F1-Score	F1 Score (Harmonic Mean of Precision and Recall)
GUI	Graphical User Interface
HTML	HyperText Markup Language
LR	Logistic Regression
ML	Machine Learning
NLTK	Natural Language Toolkit
NLP	Natural Language Processing
RAM	Random Access Memory
SVM	Support Vector Machine

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Chapter 1

INTRODUCTION

1.1 Introduction

In today's digital age, the internet serves as a platform where consumers freely express their opinions and experiences regarding products, services, and brands. Online reviews have become a vital source of information for potential customers and a critical feedback channel for businesses. However, with the rapid growth of e-commerce platforms and social media, the volume of user-generated content has increased exponentially, making manual review analysis both inefficient and impractical.

To address this challenge, machine learning and natural language processing (NLP) offer powerful tools for automating the process of review analysis. By applying intelligent algorithms to textual data, these technologies can detect patterns, sentiments, and insights from large volumes of user feedback with high accuracy and efficiency.

This project focuses on developing a Review Detection System using machine learning techniques to classify user reviews based on their sentiment polarity—positive, negative, or neutral. The system involves data preprocessing, feature extraction using techniques such as TF-IDF, and model training using supervised learning algorithms like Logistic Regression, Naive Bayes, and Support Vector Machines. The goal is to build an efficient and scalable system that can assist businesses in understanding customer feedback, identifying trends, and making data-driven decisions. Through experimentation and evaluation, the project demonstrates the potential of machine learning in automating and enhancing the review analysis process.

1.2 Aim of the project

The aim of this project is to develop an intelligent Review Detection System using Machine Learning that can automatically analyze and classify user-generated reviews based on their sentiment. By leveraging natural language processing techniques and supervised learning algorithms, the system is designed to detect whether a review is positive, negative, or neutral, thereby enabling businesses and users to gain meaningful insights from large volumes of textual data in an efficient and accurate manner.

1.3 Project Domain

The domain of this project lies within the broad field of Artificial Intelligence (AI), with a specific focus on Machine Learning (ML) and Natural Language Processing (NLP). These subfields are essential for enabling machines to learn from data and understand human language, respectively. The project also aligns with the area of Text Analytics, which involves extracting meaningful information from unstructured text data.

The core application of this project is Sentiment Analysis, a technique used to identify and extract subjective information from text. This process helps determine whether the sentiment expressed in a review is positive, negative, or neutral. Sentiment analysis is widely applied in industries such as e-commerce, digital marketing, and customer relationship management, where understanding user opinions is critical for decision-making.

By leveraging NLP techniques like tokenization, stemming, and vectorization (e.g., TF-IDF), along with supervised machine learning algorithms such as Logistic Regression, Naive Bayes, and Support Vector Machines (SVM), the system effectively classifies review data. The project demonstrates how advanced computational techniques can transform vast amounts of textual data into actionable insights. Overall, this project sits at the intersection of AI and linguistics, contributing to the growing field of intelligent systems that can interpret, learn from, and respond to human language.

1.4 Scope of the Project

The scope of this project involves the design, development, and implementation of a Review Detection System using Machine Learning that can automatically analyze and classify textual reviews into sentiment categories—positive, negative, or neutral. The project focuses on transforming large volumes of unstructured user-generated content into structured data that can be used for deriving meaningful business insights.

This system leverages techniques from Natural Language Processing (NLP) to preprocess and extract features from text, and applies supervised machine learning algorithms to build predictive models. The preprocessing steps include data cleaning, tokenization, stopword removal, stemming/lemmatization, and feature extraction using techniques such as TF-IDF (Term Frequency-Inverse Document Frequency). The classification models are trained and evaluated using well-known algorithms like Naive Bayes, Logistic Regression, and Support Vector Machines (SVM).

The project is applicable in various real-world domains such as e-commerce, hotel and restaurant reviews, mobile app feedback, movie reviews, and social media monitoring. Businesses can use this system to automatically assess customer satisfaction, track public opinion, and identify areas of improvement. While the primary focus is on English-language text data, the architecture is modular enough to allow for future extensions, including support for multilingual sentiment detection and real-time analysis through web or mobile platforms.

The scope does not cover deep learning-based techniques such as LSTM or BERT due to time and resource constraints, but such methods are acknowledged as potential enhancements. Additionally, the system currently handles text-based input and does not process multimedia reviews such as voice or video.

Chapter 2

LITERATURE REVIEW

2.1 Literature Review

The task of understanding and classifying human opinions has gained considerable attention in recent years, especially with the exponential growth of user-generated content on platforms such as Amazon, Yelp, and IMDb. Sentiment analysis, also known as opinion mining, is a field within Natural Language Processing (NLP) that deals with identifying and categorizing sentiments expressed in text.

Early works in sentiment analysis primarily relied on rule-based or lexicon-based approaches, where dictionaries of positive and negative words were used to score sentiment polarity. While simple and interpretable, these methods often failed to handle complex sentence structures, sarcasm, and context sensitivity. With the rise of machine learning (ML), researchers began applying supervised learning algorithms for sentiment classification. Pang et al. (2002) were among the first to use ML for movie review classification using algorithms like Naive Bayes, Support Vector Machines (SVM), and Maximum Entropy. Their work demonstrated that ML approaches significantly outperform traditional rule-based methods.

Recent research has also examined the use of deep learning techniques such as Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM), and transformer-based models like BERT, which offer higher accuracy by capturing contextual word embeddings. However, these models require large datasets and high computational resources, limiting their use in small- to mid-scale projects. In this project, a classical ML-based approach is used due to its simplicity, interpretability, and effectiveness for moderate datasets. The system builds upon proven techniques in the field and adapts them for scalable, real-world applications in review sentiment classification.

2.2 Gap Identification

[1] K. Hashi et al, In the healthcare industry, machine learning methods are routinely employed to forecast deadly illnesses. The goal of this study was to create and compare the performance of a standard system and a suggested system that predicts heart disease using the Logistic regression, K-nearest neighbour, Support vector machine, Decision tree, and Random Forest classification models. The suggested system aided in tuning the hyperparameters of the five specified classification algorithms utilising the grid search technique. The main study topic is the performance of the heart disease prediction system. It is possible to improve the performance of prediction models by using the hyperparameter tuning model.

Chapter 3

PROJECT DESCRIPTION

3.1 Existing System

In recent years, several sentiment analysis and review classification systems have been developed to analyze user feedback and extract valuable insights. Most of these systems rely on either rule-based techniques or machine learning models trained on large-scale datasets. Traditional systems use lexicon-based approaches where a predefined set of positive and negative words is matched with user input to determine sentiment polarity. While these systems are simple and easy to implement, they often lack the ability to understand context, sarcasm, or complex sentence structures, leading to inaccurate sentiment classification.

Modern systems leverage advanced machine learning and deep learning models such as Naive Bayes, Support Vector Machines (SVM), Long Short-Term Memory (LSTM), and BERT. Although these models have shown high accuracy in sentiment classification, they also come with significant drawbacks. Many of these systems require large volumes of labeled data, high processing power, and extensive training time. Additionally, deep learning models often function as “black boxes,” offering little interpretability for end-users. They are also difficult to fine-tune for domain-specific content, and most of them classify reviews only as positive or negative, ignoring neutral or mixed sentiments. Furthermore, many of these systems are not scalable or customizable, and cannot be easily integrated into small businesses or academic projects with limited resources.

3.2 Problem statement

With the rapid growth of e-commerce, social media, and online platforms, user-generated reviews have become a vital source of information for consumers and businesses alike. However, the vast amount of textual data generated every day

makes manual analysis impossible, leading to the need for automated systems that can efficiently analyze sentiments within these reviews. Traditional sentiment analysis systems, particularly rule-based and lexicon-based approaches, struggle to capture the nuances of natural language such as sarcasm, context, and implicit sentiment. Meanwhile, many modern systems rely on deep learning models that, while accurate, require large datasets, high computational resources, and are often difficult to interpret. Furthermore, many existing systems only classify reviews as either positive or negative, ignoring neutral sentiments, which are equally important for a balanced analysis.

The proposed system aims to address these challenges by developing a lightweight, efficient, and interpretable Review Detection System using Machine Learning. Unlike resource-intensive deep learning models, this system utilizes classical supervised learning algorithms such as Naive Bayes, Logistic Regression, and Support Vector Machines, combined with NLP techniques like TF-IDF for feature extraction. These methods offer high accuracy, fast processing, and lower computational requirements—making the system suitable for both academic and real-world business applications. Additionally, the proposed system is designed to classify reviews into positive, negative, and neutral categories, offering a more comprehensive sentiment analysis. The model is easily trainable, scalable, and can be customized for specific domains or datasets. These advantages make the proposed system an ideal solution for organizations seeking practical and reliable sentiment detection tools without the complexity and overhead of deep learning-based alternatives.

3.3 System Specification

3.3.1 Hardware Specification

- Processor (CPU): Intel Core i5 (11th Gen or higher) / AMD Ryzen 5 (5000 series or higher)
- Storage: 512 GB SSD (Solid State Drive) recommended for faster read/write speeds and loading datasets
- RAM (Memory): Minimum 8 GB DDR4 (16 GB recommended for faster processing during model training)

- Graphics Card (Optional): NVIDIA GeForce GTX 1650 or higher (only required if extending to deep learning models in the future)
- Operating System: Windows 10/11 (64-bit) or Ubuntu 20.04 LTS or later (Linux preferred for Python and ML tools)
- Internet Connectivity: Required for downloading datasets, libraries, and deploying cloud-based features (if any)

3.3.2 Software Specification

- Operating System: Windows 11 (64-bit) / Ubuntu 22.04 LTS or later
- Programming Language: Python 3.10 or higher (Widely used for ML and NLP projects with extensive library support)
- Integrated Development Environment (IDE):
VS Code (Visual Studio Code)
Jupyter Notebook / JupyterLab (Popular for writing, debugging, and visualizing Python code)
- Libraries and Frameworks:
NumPy (v1.26+) – for numerical computing
Pandas (v2.1+) – for data manipulation and analysis
Scikit-learn (v1.4+) – for machine learning algorithms
NLTK (v3.8+) or spaCy (v3.7+) – for natural language processing
Matplotlib (v3.8+) and Seaborn (v0.13+) – for data visualization
Joblib – for model serialization
XGBoost (optional) – for advanced gradient boosting models
- Data Storage:
CSV files / Excel (.xlsx) files
SQLite (for lightweight database integration, if required)
- Version Control (Optional but Recommended):
Git with GitHub / GitLab (For tracking code versions and team collaboration)

3.3.3 Standards and Policies

Software Development Standards

The Review Detection System is developed using Python, and all code follows the PEP 8 style guide to maintain clarity, readability, and consistency across the project. The software design adheres to modular programming principles, separating each component—such as data preprocessing, model training, evaluation, and deployment—into clearly defined modules. Version control is implemented using Git, with a well-structured branching strategy for development, testing, and production, along with properly documented commit histories to ensure traceability and collaboration.

Machine Learning Practices

The system uses well-established machine learning standards to build a robust and accurate model. Techniques such as k-fold cross-validation, confusion matrix evaluation, and precision-recall analysis are used to assess the model's performance and generalization ability. Additionally, the use of random seed initialization ensures that results are reproducible across different environments. The training data undergoes normalization and balancing to reduce class imbalance and model bias, enhancing both fairness and performance.

Data Privacy and Security

Data privacy is a core concern in this project. All datasets are anonymized, and any personally identifiable information (PII) is excluded to protect user confidentiality. The processed data and trained models are stored in secure directories with restricted access to prevent unauthorized usage. Furthermore, the project follows local and global data protection regulations such as the General Data Protection Regulation (GDPR), where applicable.

Ethical Use Policy

The system is designed for academic, research, and analytical purposes only. It is not intended for use in applications that may cause harm, such as unauthorized surveillance, biased decision-making, or content manipulation. The insights provided by the model are meant to supplement human judgment, not replace it. Transparency and accountability are maintained throughout the project's lifecycle to ensure ethical standards are upheld.

Chapter 4

METHODOLOGY

4.1 Proposed System

4.2 General Architecture

Description

4.3 Design Phase

4.3.1 Data Flow Diagram

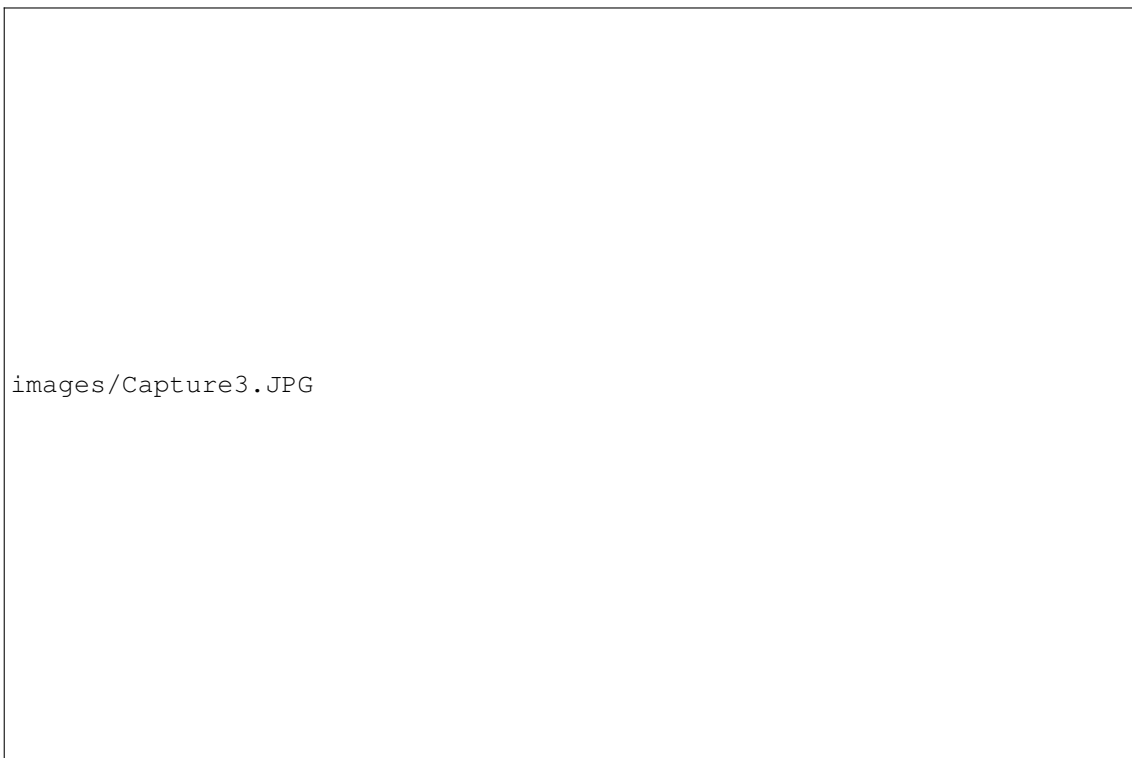


Figure 4.2: **Fig. Name**

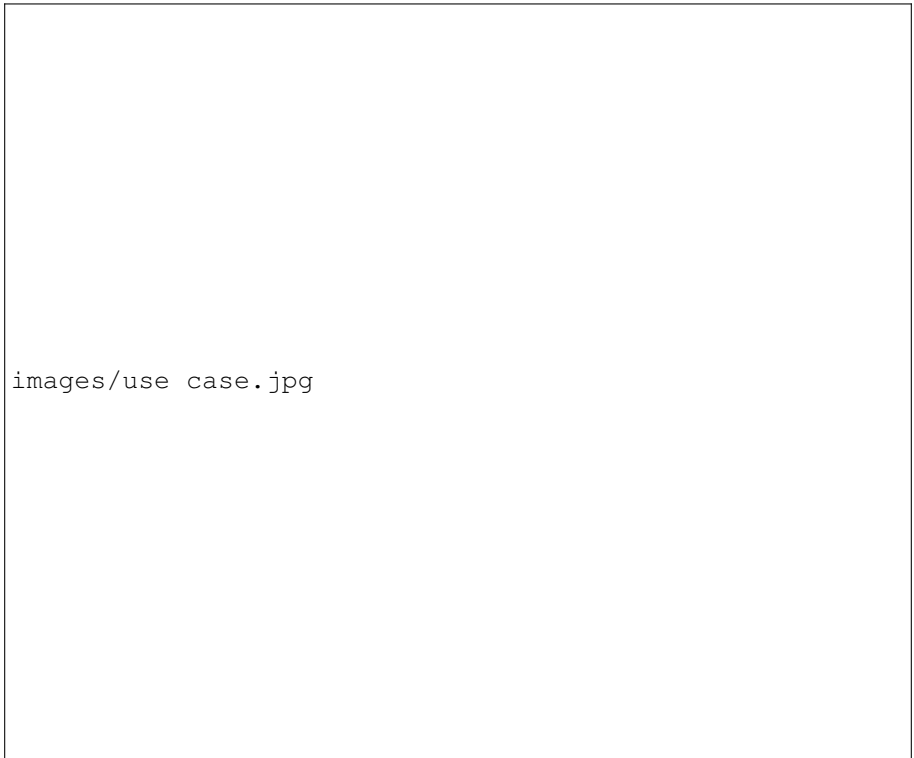
Description



images/Capture1.JPG

Figure 4.1: **Fig. Name**

4.3.2 Use Case Diagram



images/use case.jpg

Figure 4.3: **Fig. Name**

Description

4.3.3 Class Diagram



Figure 4.4: **Fig. Name**

Description

4.3.4 Sequence Diagram

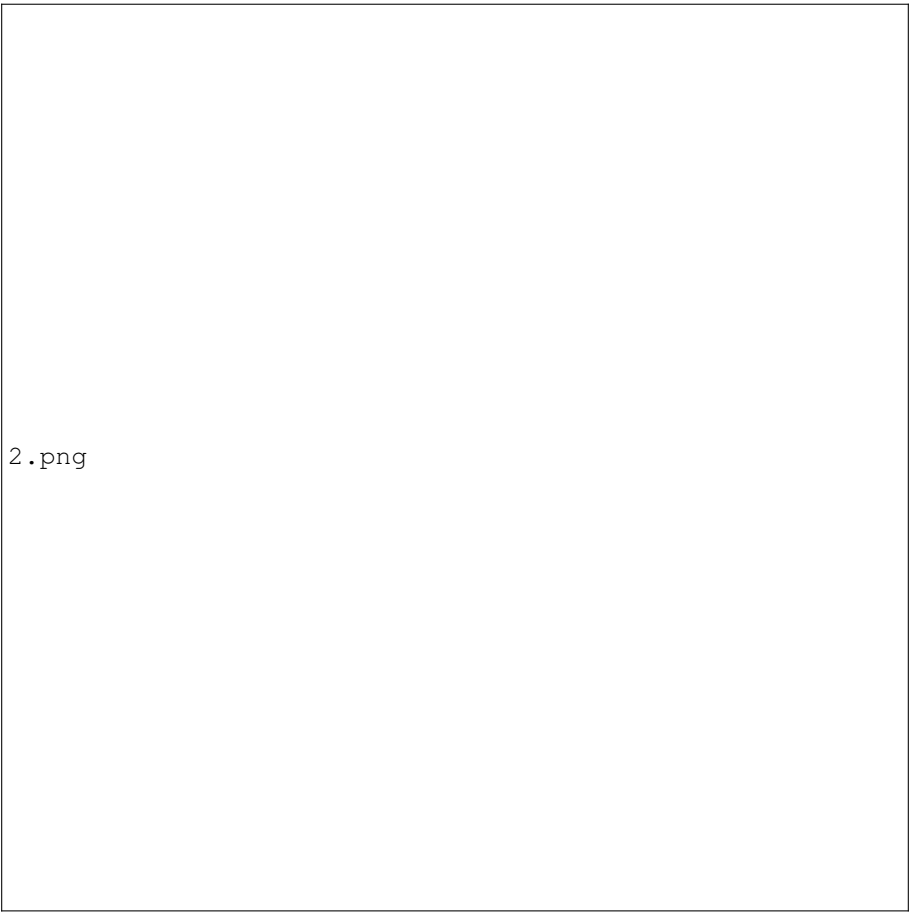


Figure 4.5: **Fig. Name**

Description

4.3.5 Collaboration diagram

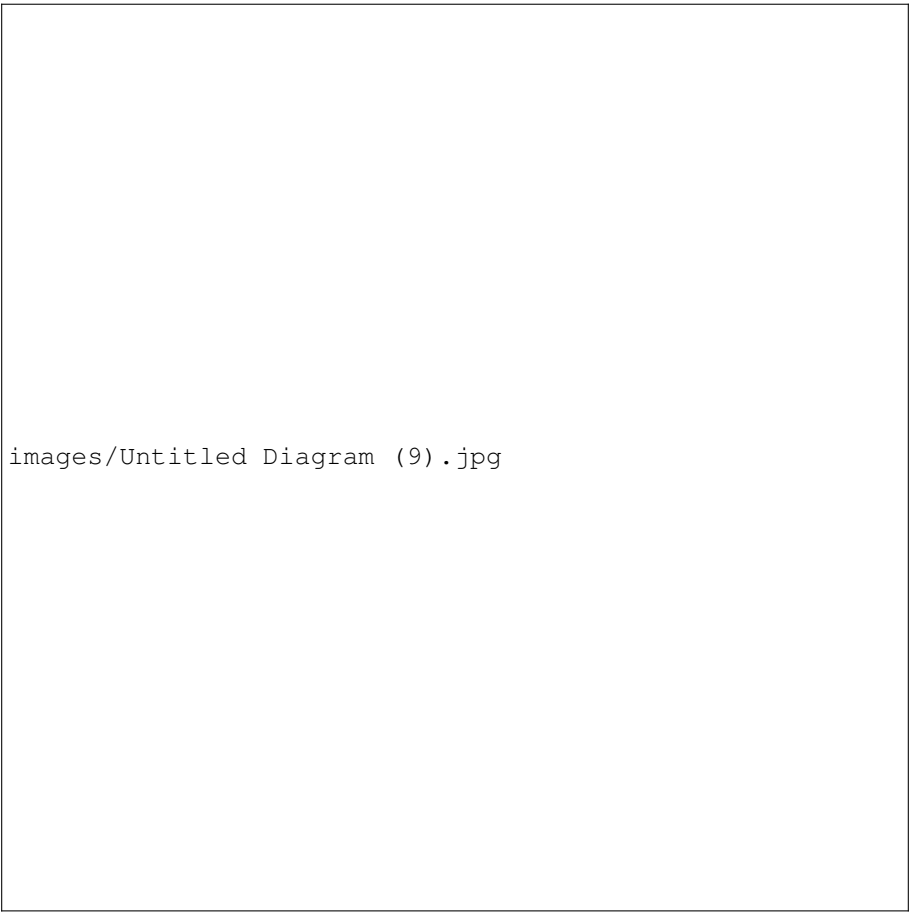


Figure 4.6: **Fig. Name**

Description

4.3.6 Activity Diagram



Figure 4.7: **Fig. Name**

4.4 Algorithm & Pseudo Code

4.4.1 Algorithm

4.4.2 Pseudo Code

4.4.3 Data Set / Generation of Data (Description only)

4.5 Module Description

4.5.1 Module1

Describe module with Title

4.5.2 Module2

Describe module with Title

4.5.3 Module3

Describe module with Title

Chapter 5

IMPLEMENTATION AND TESTING

5.1 Input and Output

5.1.1 Input Design

5.1.2 Output Design

5.2 Testing

5.3 Types of Testing

5.3.1 Unit testing

Input

Test result

5.3.2 Integration testing

Input

Test result

5.3.3 System testing

Input

Test Result

5.3.4 Test Result

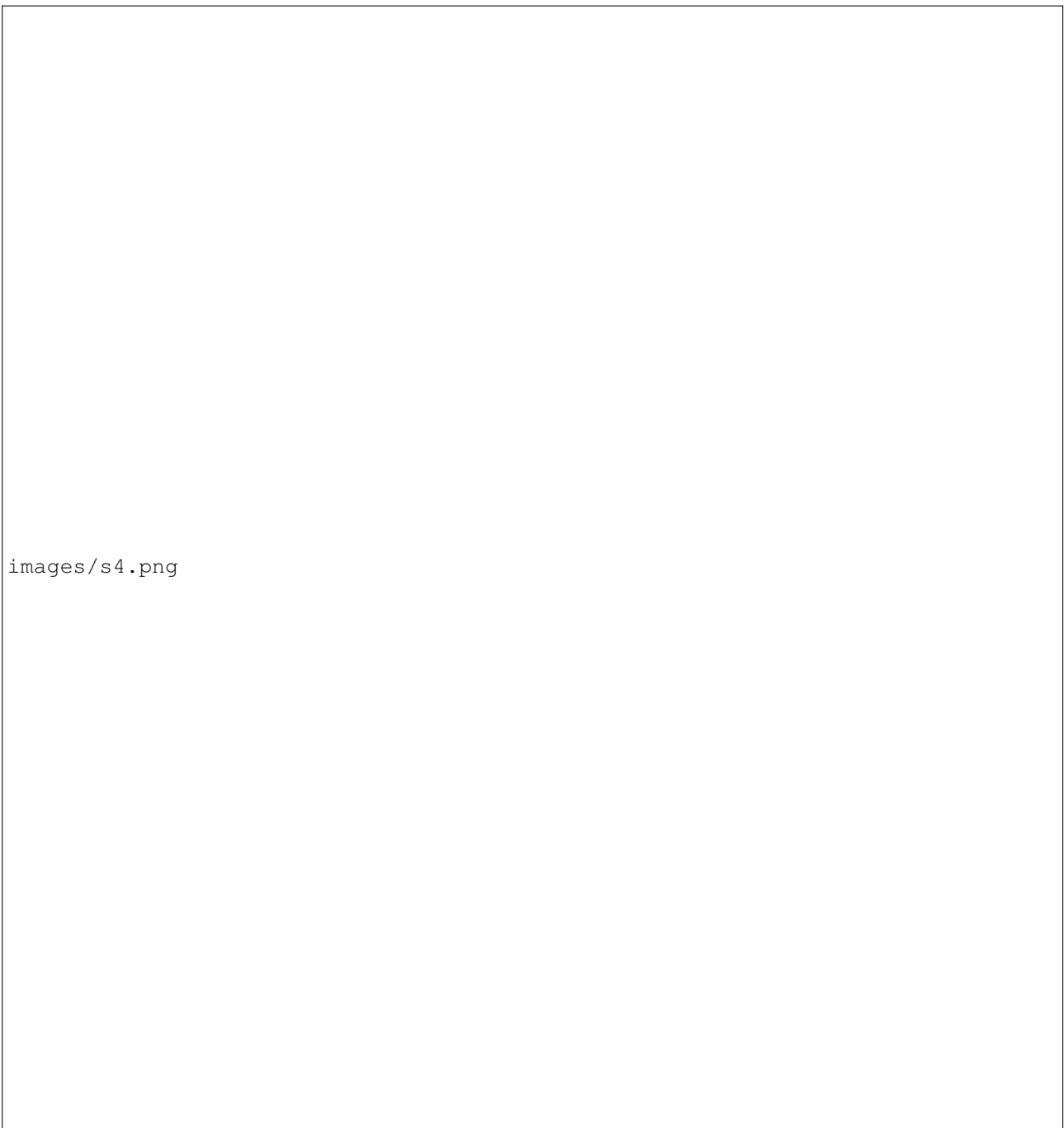


Figure 5.1: **Test Image**

Chapter 6

RESULTS AND DISCUSSIONS

6.1 Efficiency of the Proposed System

Sample attached

SHOULD BE MINIMUM TWO PARAGRAPHS -WITH MINIMUM 150 WORDS

The proposed system is based on the Random forest Algorithm that creates many decision trees. Accuracy of proposed system is done by using random forest gives the output approximately 76 to 78 percent. Random forest implements many decision trees and also gives the most accurate output when compared to the decision tree. Random Forest algorithm is used in the two phases. Firstly, the RF algorithm extracts subsamples from the original samples by using the bootstrap resampling method and creates the decision trees for each testing sample and then the algorithm classifies the decision trees and implements a vote with the help of the largest vote of the classification as a final result of the classification. The random Forest algorithm always includes some of the steps as follows: Selecting the training dataset: Using the bootstrap random sampling method we can derive the K training sets from the original dataset properties using the size of all training set the same as that of original training dataset. Building the random forest algorithm: Creating a classification regression tree each of the bootstrap training set will generate the K decision trees to form a random forest model, uses the trees that are not pruned. Looking at the growth of the tree, this approach is not chosen the best feature as the internal nodes for the branches but rather the branching process is a random selection of all the trees gives the best features.

6.2 Comparison of Existing and Proposed System

Sample attached

Existing system:(Decision tree)

In the Existing system, we implemented a decision tree algorithm that predicts whether to grant the loan or not. When using a decision tree model, it gives the training dataset the accuracy keeps improving with splits. We can easily overfit the dataset and doesn't know when it crossed the line unless we are using the cross validation. The advantages of the decision tree are model is very easy to interpret we can know that the variables and the value of the variable is used to split the data. But the accuracy of decision tree in existing system gives less accurate output that is less when compared to proposed system.

Proposed system:(Random forest algorithm)

Random forest algorithm generates more trees when compared to the decision tree and other algorithms. We can specify the number of trees we want in the forest and also we also can specify maximum of features to be used in the each of the tree. But, we cannot control the randomness of the forest in which the feature is a part of the algorithm. Accuracy keeps increasing as we increase the number of trees but it becomes static at one certain point. Unlike the decision tree it won't create more biased and decreases variance. Proposed system is implemented using the Random forest algorithm so that the accuracy is more when compared to the existing system.

```
1 write your code here
2 main code
```

Output

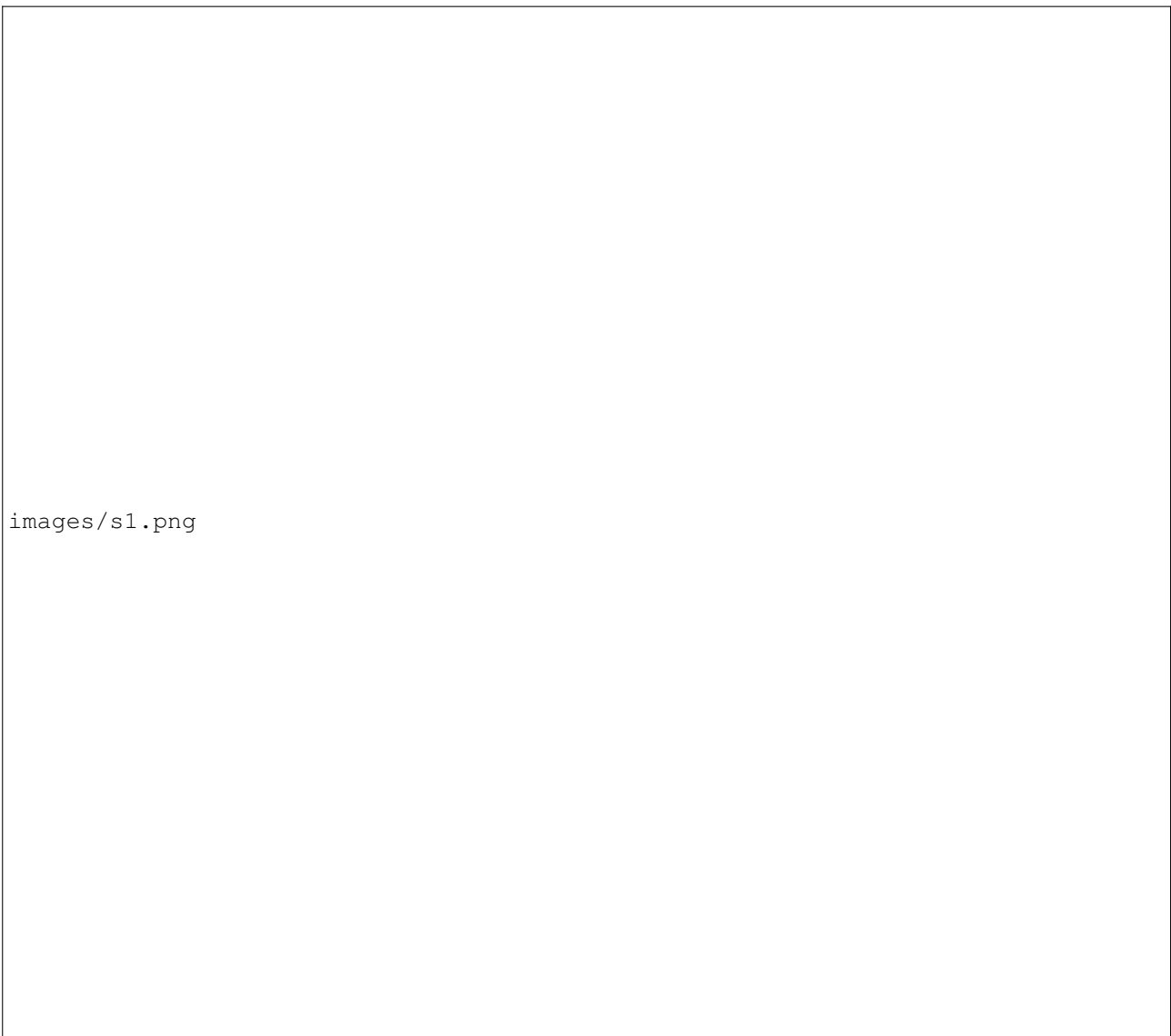


Figure 6.1: **Output 1**

images/s4.png

Figure 6.2: **Output 2**

Chapter 7

CONCLUSION AND FUTURE ENHANCEMENTS

7.1 Conclusion

SHOULD BE MINIMUM TWO PARAGRAPHS -WITH MINIMUM 150 WORDS

7.2 Future Enhancements

SHOULD BE MINIMUM TWO PARAGRAPHS -WITH MINIMUM 150 WORDS

Chapter 8

PLAGIARISM REPORT

ATTACH ONLY SUMMARY PAGE OF PLAGIARISM REPORT

Appendices

Appendix A

Complete Data / Sample Data / Sample Source Code / etc

The contents...

References

- [1] Pamela Soares; Raphael Saraiva; Iago Fernandes; Antônio Neto; Jerffeson Souza(2022).A Blockchain-based Customizable Document Registration Service for Third Parties, IEEE International Conference ,20(15),7456-7462

FORMAT:Author(s)name.Title, Journal name, Volume, Issue, Pageno.Year

Note References should be taken from recent years and dont include Conference papers

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- Each chapter should minimum contain 3 pages
- Draw the notation of diagrams properly
- Every paragraph should be started with one tab space
- Literature review should be properly cited and described with content related to project
- All the diagrams should be properly described and dont include general information of any diagram
- All diagrams,figures should be numbered according to the chapter number
- Test cases should be written with test input and test output
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