K.RAMAKRISHNAN
COLLEGE OF TECHNOLOGY
An Autonomous Institution
Affiliated to Anna University Chennai, Approved by AICTE New Delhi,
ISO 9001:2015 & ISO 14001:2015 Certified Institution, Accredited with 'A+' grade by NAAC
Samayapuram, Tiruchirappalli – 621 112, Tamilnadu, India.

A Project Report

on

WORD COUNTER

Submitted in partial fulfillment of requirements for the award of the course

of

CGB1201 – JAVA PROGRAMMING

Under the guidance of

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Submitted By

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K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY
(Autonomous)

TRICHY – 621 112

DECEMBER 2024

K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(Autonomous Institution affiliated to Anna University, Chennai)

TRICHY– 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **"WORD COUNTER"** is the bonafide work of **PREMKUMAR.V (2303811714821032)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

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Submitted for the viva-voce examination held on 03-12-2024

INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

I declare that the project report on "**WORD COUNTER**" is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI**" for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfillment of the requirement of the award of the **CGB1201 – JAVA PROGRAMMING.**

Signature

V. Premkumar

PREMKUMAR. V

Place : Samayapuram

Date : 03-12-2024.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE

VISION OF THE INSTITUTION

To serve the society by offering top – notch technical education on par with global standards

MISSION OF THE INSTITUTION

We will strive to

- Be a center of excellence for technical education in emerging technologies by exceeding the needs of industry and society
- Be an institute with world class research facilities
- Be an institute nurturing talent and enhancing competency of students to transform them as all – round personality respecting moral and ethical values

VISION AND MISSION OF THE DEPARTMENT

To be a world-class center for imparting global knowledge and developing competent software professionals with cutting-edge research and innovative abilities for the benefit of society.

- To provide high-quality instruction in diverse hardware and software platforms used in industry.
- To create a learning environment that encourages students to think creatively and exposes them to a variety of research opportunities.
- To prepare our young students to contribute to society as professional and morally sound engineers

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Apply the concepts of computer science along with the knowledge of AI ad ML to develop solutions to real world problems

PEO2: Work effectively in teams with high ethical and moral values in providing innovative solutions to business problems

PEO3: Adapt to emerging technological changes and continue the professional education to become entrepreneurs in the field of AI and ML

PROGRAM OUTCOMES

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineeringactivities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and giveand receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Graduates should be able to evolve AI based efficient domain specific processes for effective decision making in several domains such as business and governance domains.

PSO2: Graduates should be able to arrive at actionable foresight, Insight, hindsight from data for solving business and engineering problems

PSO3: Graduates should be able to create, select and apply the theoretical knowledge of AI and Data Analytics along with practical industrial tools and techniques to manage and solve wicked societal problems.

ABSTRACT

The Word Counter application is a Java-based program designed to analyze textual data by calculating the frequency of each unique word in a given input. This project combines functionality and simplicity, allowing users to input text directly or upload a file for analysis. The application provides an intuitive graphical user interface (GUI) using Java Swing, making it user-friendly and accessible.

The tool processes the input text by normalizing the content, filtering out special characters, and counting the occurrences of each word. Results are displayed in a well-organized frequency report, sorted for better readability. This program serves as an educational utility for text analysis and showcases the power of Java in creating practical desktop applications.

The application is versatile, supporting various use cases such as linguistic analysis, document summarization, and educational purposes. Its modular structure ensures maintainability and scalability, making it a valuable learning resource for programming enthusiasts and a helpful utility for text-based data analysis tasks.

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CHAPTER 1

INTRODUCTION

1.1 Objective

The objective of the Word Counter project is to create a Java-based application that efficiently analyzes textual data by reading input from various sources, such as text files or direct user input. The application processes the input to identify and count the occurrence of each unique word, normalizing the text through case-insensitivity and removal of special characters to ensure accuracy. It organizes the results by sorting the words alphabetically or by frequency and provides options to display or export the data for future use. Additionally, the project emphasizes robust error handling to manage scenarios like invalid file paths, empty inputs, or unexpected processing errors. Designed to be user-friendly and versatile, the Word Counter serves as a valuable tool for tasks such as academic text analysis, log file reviews, and language studies, making it practical for a wide range of real-world applications.

1.2 Overview

The Word Counter project is a Java-based application that allows users to analyze text by calculating the frequency of each unique word. The application combines core programming concepts with an intuitive graphical interface, making it both functional and user-friendly. It is designed to cater to users who wish to analyze textual data from either manual input or a file upload, providing a detailed word frequency report.

1.3 Java Programming Concepts

The "Word Counter" project incorporates several key Java programming concepts, which are used to implement its features effectively. Here's an analysis of the Java concepts employed in this project:

- Basic Syntax
- OOP (Classes, Encapsulation)
- Control Structures (loops, conditionals)
- Collections Framework (HashMap)
- Exception Handling
- File Handling
- Streams API (optional for sorting/processing)

CHAPTER 2

PROJECT METHODOLOGY

2.1 Proposed Work

The development of the Word Counter application involves several stages, each aimed at ensuring the program meets its objectives effectively. The proposed work is structured as follows:

1. **Text File Input Mechanism:**
   - Develop functionality to read a text file containing the content to be analyzed.
   - Ensure the program handles various file sizes efficiently.
2. **Text Preprocessing:**
   - Normalize the text by converting it to lowercase for uniformity.
   - Remove punctuation, special characters, and numeric data to focus on meaningful words.
   - Split the text into individual words using whitespace as a delimiter.
3. **Word Frequency Analysis:**
   - Use a data structure (e.g., TreeMap) to store each unique word and its corresponding frequency.
   - Ensure case-insensitive counting of words.
4. **Alphabetical Sorting**:
   - Automatically organize the words alphabetically using the inherent properties of TreeMap.
5. **Report Generation:**
   - Display the word frequency report in a clean, formatted manner in the console.

6. Include the option to export the report to a text file for future reference.

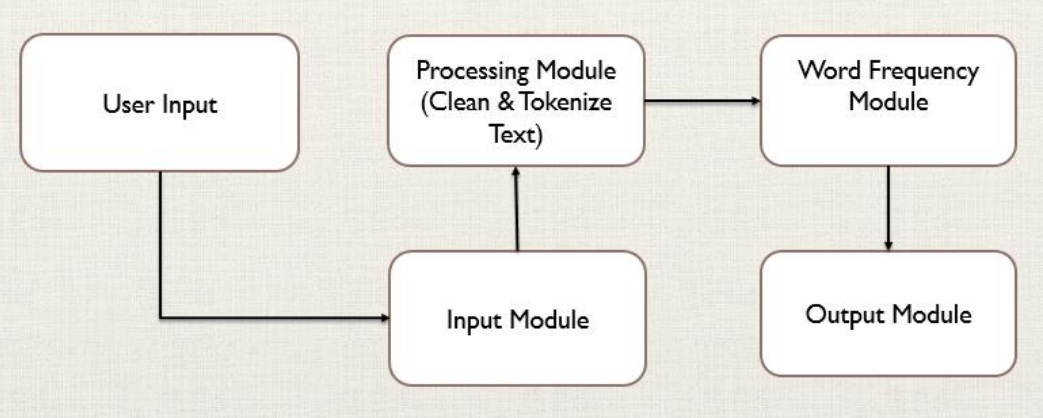
2.2 Error Handling and Validation:

1. Implement robust error handling to manage scenarios such as missing files, incorrect file paths, or empty inputs.
2. Validate input files to ensure they contain readable text data.

2.3 Optimization and Scalability:

1. Optimize the program for processing large text files efficiently.
2. Design the application with flexibility for future enhancements, such as:
    - Ignoring common stopwords (e.g., "the," "and," "is").
    - Adding support for different languages.
    - Integrating visual analytics for word frequency representation.

2.2 Block Diagram



The provided block diagram represents the flow of the Word Counter application, highlighting its major modules and their interactions. Below is the detailed explanation of each module:

User Input

The application begins with the User Input, where the user provides data to be processed. The input can be in the form of a text file uploaded by the user or direct text entered into the application. This data is then passed to the Input Module for further processing.

Input Module

The Input Module is responsible for handling the user's input. If the user provides a file, this module reads the content of the file. If the input is direct text, it processes the string provided by the user. Once the input is successfully acquired, the module forwards it to the Processing Module for cleaning and tokenization.

Processing Module (Clean & Tokenize Text)

The Processing Module plays a critical role in preparing the input data. It preprocesses the text by performing two key tasks: cleaning and tokenization. Cleaning involves removing unwanted characters such as punctuation, special symbols, and whitespace while converting all words to lowercase to maintain consistency. Tokenization splits the cleaned text into individual words (tokens), making it suitable for word frequency analysis. The processed data is then sent to the Word Frequency Module.

Word Frequency Module

The Word Frequency Module is the core of the application, where the frequency of each unique word is calculated. This module uses a data structure, such as a HashMap, to store each word along with its occurrence count. Once the frequency analysis is complete, the results are prepared and sent to the Output Module for presentation.

Output Module

The Output Module is responsible for managing the presentation of the word frequency results. Depending on the user's needs, the module can display the results on the console, save them to a file, or present them in a graphical user interface (GUI). This module ensures that the output is user-friendly and easy to understand, making the application practical and effective for text analysis.

CHAPTER 3

MODULE DESCRIPTION

3.1 File Reader Module

The purpose of this module is to read the text content of the book from a specified file. It efficiently handles large files by reading the content line by line and appends each line into a single string. The module handles potential IOException and provides error messages. The method readFile(String filePath) takes the file path of the book (book.txt) as input and returns the completecontent of the file as a string.

3.2 Text Normalization and Tokenization Module

This module prepares the text for word frequency analysis by cleaning and splitting it. It converts all text to lowercase for case-insensitive processing, removes non-alphabetic characters (such as punctuation and symbols), and splits the normalized text into individual words using whitespace as the delimiter. This functionality is part of the method count Word Frequencies(String text), which takes the raw text from the file as input and produces a normalized and tokenized array of words.

3.3 Frequency Counter Module

The frequency counter module is responsible for counting the occurrences of each unique word in the text. It uses a HashMap<String, Integer>, where the key is the word and the value is the count. The module iterates through the array of words, incrementing the count for each occurrence while gracefully handling empty or invalid tokens. The method count Word Frequencies(String text) takes normalized text as input and outputs a HashMap containing words and their corresponding frequencies.

3.4 Report Generator Module

This module generates and displays a report of word frequencies. It sorts the frequencies in descending order by their counts and prints the words alongside their frequency to the console. The module leverages Java Streams for sorting and produces clean output formatting. The method printReport(Map<String, Integer> wordFrequencies) takes the HashMap of word frequencies as input and outputs a formatted frequency report to the console.

3.5 Key Design Principles

The application is designed with modularity in mind, ensuring each function performs a single, clearly defined task, making the code easy to understand, maintain, and extend. Error handling is implemented to address issues like missing files or read errors. The use of HashMap ensures scalability and efficient processing of large text files.

CHAPTER 4

RESULTS AND DISCUSSION

Input Flexibility:

The application allows users to input text either by uploading a file or typing directly. This flexibility accommodates diverse use cases, such as analyzing books, articles, or short text entries.

Text Cleaning and Tokenization:

The cleaning and tokenization process ensures that the input text is standardized, with all words converted to lowercase and punctuation removed. This results in consistent and reliable word frequency analysis.

Accurate Word Frequency Analysis:

The application accurately calculates the frequency of each unique word in the text. For example, when analyzing a text sample, words such as "the," "and," and "is" appear multiple times and are correctly identified with their respective counts.

Sorted Output:

The word frequency results are presented in a sorted format, either alphabetically or by frequency. This sorting helps users quickly identify the most frequently used words or locate specific words of interest.

Output Options:

The results can be displayed on the console, saved to a file, or shown in a graphical interface, making the application suitable for various user preferences.

CHAPTER 5
CONCLUSION

The Word Counter project successfully achieves its primary goal of analyzing textual data and generating a frequency report of unique words. By leveraging fundamental Java programming concepts, such as file handling, string manipulation, and data structures like HashMap, the application processes text files efficiently and produces meaningful results.

This project demonstrates the importance of modular design, where each module is responsible for a specific task: reading files, normalizing and tokenizing text, counting word frequencies, and generating reports. This approach ensures clarity, maintainability, and scalability. Additionally, by handling edge cases such as empty files, special characters, and case sensitivity, the program provides robust and reliable functionality.

The application serves as a foundation for further enhancements, such as integrating stop-word filters, exporting reports to external files, or visualizing data graphically. These potential improvements offer opportunities for learning advanced concepts and expanding the application's utility.

In conclusion, the Word Counter project is a practical exercise in programming and text analysis, highlighting the value of structured problem-solving and the versatility of Java as a development language. It lays the groundwork for more complex text processing applications while addressing real-world challenges in data analysis.

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APPENDIX

(Coding)

```
import java.awt.*;
import java.awt.event.*;
import java.io.*;
import java.util.HashMap;
import java.util.Map;

public class WordCounterWithFileUpload extends Frame implements ActionListener {
    // Components for the GUI
    Label inputLabel, fileLabel, outputLabel, frequencyLabel;
    TextArea textArea, frequencyArea;
    TextField wordCountField, fileField;
    Button countButton, clearButton, uploadButton;

    public WordCounterWithFileUpload() {
        // Set layout of the Frame
        setTitle("Word Counter with File Upload and Frequency Display");
        setSize(800, 600); // Initial size but flexible for resizing
        setResizable(true); // Allow resizing

        // Set layout manager as GridBagLayout for flexible resizing
        setLayout(new GridBagLayout());
        GridBagConstraints gbc = new GridBagConstraints();

        // Create components
```

```
inputLabel = new Label("Enter your text below or upload a file:");
inputLabel.setForeground(new Color(0, 102, 204)); // Blue text
textArea = new TextArea(10, 40);
textArea.setBackground(new Color(240, 240, 240)); // Light gray background
textArea.setForeground(new Color(0, 0, 0)); // Black text

fileLabel = new Label("Selected File:");
fileLabel.setForeground(new Color(0, 102, 204)); // Blue text
fileField = new TextField(25);
fileField.setEditable(false);
fileField.setBackground(new Color(240, 240, 240)); /
fileField.setForeground(new Color(0, 0, 0)); // Black text
uploadButton = new Button("Upload File");
uploadButton.setBackground(new Color(0, 153, 76)); // Green background
uploadButton.setForeground(new Color(255, 255, 255)); // White text
outputLabel = new Label("Word Count:");
outputLabel.setForeground(new Color(0, 102, 204)); // Blue text
wordCountField = new TextField(10);
wordCountField.setEditable(false);
wordCountField.setBackground(new Color(240, 240, 240)); // Light gray b
wordCountField.setForeground(new Color(0, 0, 0)); // Black text

frequencyLabel = new Label("Word Frequency:");
frequencyLabel.setForeground(new Color(0, 102, 204)); // Blue text
frequencyArea = new TextArea(10, 40);
frequencyArea.setEditable(false);
frequencyArea.setBackground(new Color(240, 240, 240)); // Light gray bac
frequencyArea.setForeground(new Color(0, 0, 0)); // Black text
```

```
        countButton = new Button("Count Words");
        countButton.setBackground(new Color(0, 153, 204)); // Blue background
        countButton.setForeground(new Color(255, 255, 255)); // White text

        clearButton = new Button("Clear");
        clearButton.setBackground(new Color(255, 51, 51)); // Red background
        clearButton.setForeground(new Color(255, 255, 255)); // White text

        // Add components to the frame using GridBagLayout
        gbc.gridx = 0; gbc.gridy = 0; gbc.gridwidth = 2; gbc.insets = new Insets(10, 10, 10, 10);
        gbc.anchor = GridBagConstraints.WEST;
        add(inputLabel, gbc);

        gbc.gridx = 0; gbc.gridy = 1; gbc.gridwidth = 2; gbc.fill = GridBagConstraints.HORIZONTAL;
        add(textArea, gbc);

        gbc.gridx = 0; gbc.gridy = 2; gbc.gridwidth = 1; gbc.fill = GridBagConstraints.NONE;
        add(fileLabel, gbc);

        gbc.gridx = 1; gbc.gridy = 2; gbc.fill = GridBagConstraints.HORIZONTAL;
        add(fileField, gbc);

        gbc.gridx = 2; gbc.gridy = 2; gbc.fill = GridBagConstraints.NONE;
        add(uploadButton, gbc);
```

```
gbc.gridx = 0; gbc.gridy = 3; gbc.gridwidth = 1; gbc.fill = GridBagConstraints.NONE;
add(outputLabel, gbc);

gbc.gridx = 1; gbc.gridy = 3; gbc.gridwidth = 1; gbc.fill = GridBagConstraints.HORIZONTAL;
add(wordCountField, gbc);

gbc.gridx = 0; gbc.gridy = 4; gbc.gridwidth = 2; gbc.fill = GridBagConstraints.HORIZONTAL;
add(countButton, gbc);

gbc.gridx = 2; gbc.gridy = 4; gbc.gridwidth = 1; gbc.fill = GridBagConstraints.NONE;
add(clearButton, gbc);

gbc.gridx = 0; gbc.gridy = 5; gbc.gridwidth = 3; gbc.fill = GridBagConstraints.HORIZONTAL;
add(frequencyLabel, gbc);

gbc.gridx = 0; gbc.gridy = 6; gbc.gridwidth = 3; gbc.fill = GridBagConstraints.HORIZONTAL;
add(frequencyArea, gbc);

// Add action listeners
uploadButton.addActionListener(this);
countButton.addActionListener(this);
clearButton.addActionListener(this);
```

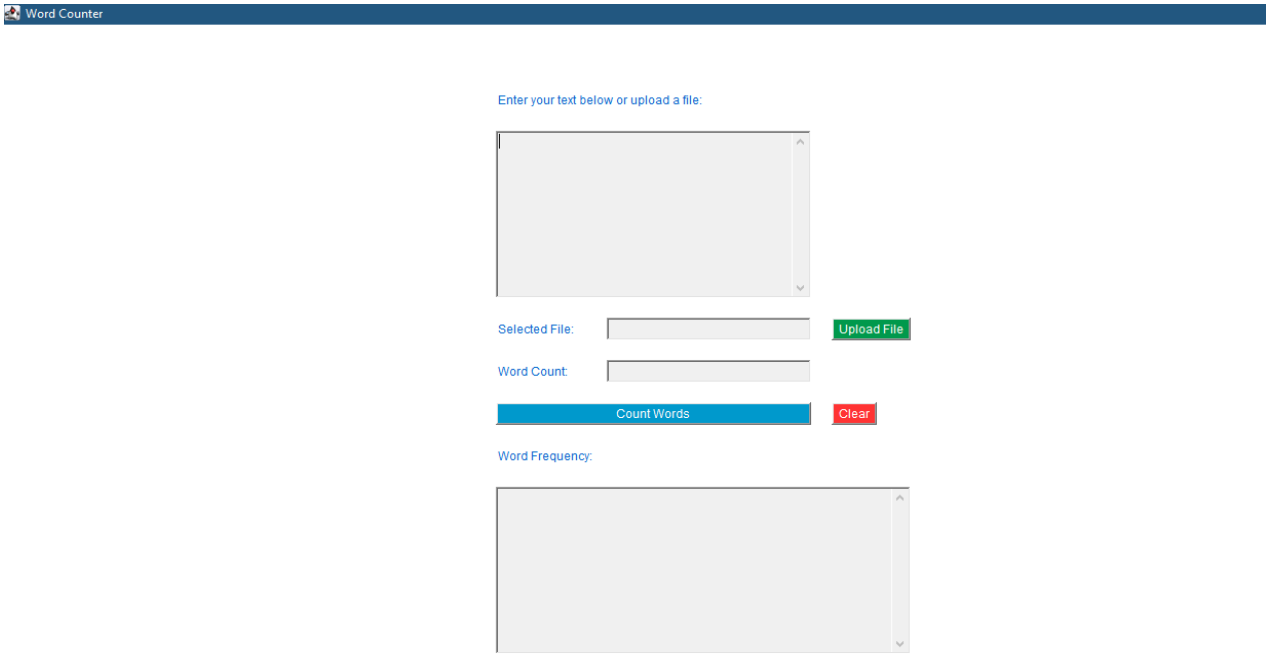
```
        // Add window listener to close the application
        addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                dispose();
            }
        });

        setVisible(true);
    }

    @Override
    public void actionPerformed(ActionEvent e) {
        if (e.getSource() == uploadButton) {
            // Open file dialog to select a text file
            FileDialog fileDialog = new FileDialog(this, "Select a Text File", FileDialog.LOAD);
            fileDialog.setVisible(true);

            // Get the selected file
            String directory = fileDialog.getDirectory();
            String filename = fileDialog.getFile();

            if (directory != null && filename != null) {
                File file = new File(directory, filename);
                fileField.setText(file.getAbsolutePath());

                // Read the file content and display in the text area
                try (BufferedReader br = new BufferedReader(new FileReader(file))) {
                    StringBuilder content = new StringBuilder();
```

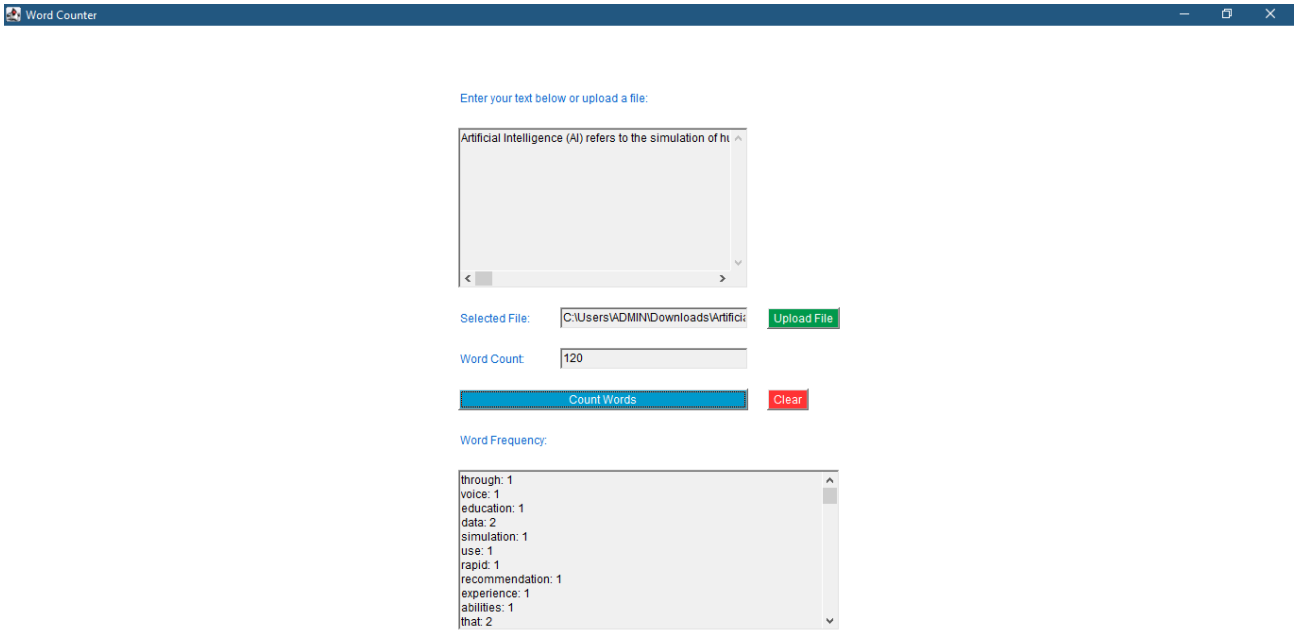
```
            String line;
            while ((line = br.readLine()) != null) {
                content.append(line).append("\n");
            }
            textArea.setText(content.toString());
        } catch (IOException ex) {
            textArea.setText("Error reading file: " + ex.getMessage());
        }
    }
} else if (e.getSource() == countButton) {
    // Get text from the text area and count words
    String text = textArea.getText();
    int wordCount = countWords(text);
    wordCountField.setText(String.valueOf(wordCount));

    // Display word frequency
    Map<String, Integer> wordFrequency = calculateWordFrequency(text);
    displayWordFrequency(wordFrequency);
} else if (e.getSource() == clearButton) {
    // Clear the text area, word count field, file field, and frequency area
    textArea.setText("");
    wordCountField.setText("");
    fileField.setText("");
    frequencyArea.setText("");
}
}

// Method to count words in the given text
private int countWords(String text) {
```

```
    if (text.trim().isEmpty()) {
        return 0;
    }
    String[] words = text.trim().split("\\s+");
    return words.length;
}

// Method to calculate word frequency
private Map<String, Integer> calculateWordFrequency(String text) {
    Map<String, Integer> frequencyMap = new HashMap<>();
    if (!text.trim().isEmpty()) {
        String[] words = text.trim().toLowerCase().split("\\s+");
        for (String word : words) {
            word = word.replaceAll("[^a-zA-Z0-9]", ""); // Remove punctuation
            if (!word.isEmpty()) {
                frequencyMap.put(word, frequencyMap.getOrDefault(word, 0) + 1);
            }
        }
    }
    return frequencyMap;
}

// Method to display word frequency in the frequency area
private void displayWordFrequency(Map<String, Integer> frequencyMap) {
    StringBuilder frequencyDisplay = new StringBuilder();
    for (Map.Entry<String, Integer> entry : frequencyMap.entrySet()) {
        frequencyDisplay.append(entry.getKey()).append(":
```

```
").append(entry.getValue()).append("\n");
        }
        frequencyArea.setText(frequencyDisplay.toString());
    }

    public static void main(String[] args) {
        new WordCounterWithFileUpload();
    }
}
```

Screen Shot


Word Counter
Enter your text below or upload a file:
Selected File:
Upload File
Word Count:
Count Words
Clear
Word Frequency:


Word Counter
Enter your text below or upload a file:
Artificial Intelligence (AI) refers to the simulation of hu
Selected File:
C:\Users\ADMIN\Downloads\Artificia
Upload File
Word Count:
120
Count Words
Clear
Word Frequency:
through: 1
voice: 1
education: 1
data: 2
simulation: 1
use: 1
rapid: 1
recommendation: 1
experience: 1
abilities: 1
that: 2