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COLLEGE OF COMPUTING AND INFORMATION SCIENCES

DEPARTMENT OF NETWORKS

BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING (YEAR 2)

RECESS TERM 2 (BSE 2301)

SYSTEM REQUIREMENTS SPECIFICATION(SRS) FOR:
CHAT ANALYSIS APPLICATION FOR NEW VISION

PROJECT MEMBERS [GROUP 3]

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SUBMITTED IN PARTIAL FULFILLMENT OF
SOFTWARE ENGINEERING RECESS PROJECT BSE 2301
4TH, JULY 2018

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1 INTRODUCTION

1.1 Purpose

This SRS document specifies requirements of chat analysis application developed to perform effective data analysis for New Vision. It covers the scope, perspective, functions, user classes and characteristics, operating environment, design and implementation constraints, intended audience, interface requirements, functional and nonfunctional requirements of chat analysis application.

1.2 Document Conventions

This SRS document is written specifically using Times New Roman as the font of the letters, line spacing of 1.5, use of bold styling to signify importance of certain statements especially titles.

1.3 Intended Audience and reading suggestions

The SRS is intended for developing team who need to keep aligned with project goals and objectives when developing the chat analysis application, Project leader who uses the system requirements specification document to acknowledge how far project developers have gone with project development, New Vision operatives who need the application to see whether or not to change communication skills when interacting with clients via chat, New Vision marketing staff who use the analyzed information to determine if to adjust the marketing strategies or not and New Vision corporate staff that makes decisions based on the analyzed data using chat analysis application.

TABLE SHOWING SUMMARY OF INTENDED AUDIENCE OF SRS AND REASONS WHY THEY ARE SUGGESTED TO READ THIS DOCUMENT.

Intended audience	**Reason for reading suggestion**
Developing team	The team will use the SRS to have guidance in developing the expected application.
Project leader	To acknowledge how far the developing team has gone with project development
New Vision operatives	They will use SRS to determine whether the application will aid them in improving their interaction with the clients or not.
Corporate staff	SRS will act as source of background knowledge on the application to be developed and how best they can use it to make better and smart decisions.

Table 1: Table showing summary of intended audience of SRS and reasons why they are suggested to read this document.

1.4 Product Scope

The chat analysis application is a data analysis tool that takes in data contained in a file as an input and outputs different forms of visualization models such as;

- A word cloud indicating the most common words within the chat content
- A bar graph indicating emotional reaction of the customers towards New Vision customer service.
- Bar graphs of the different field names against their counter parts for example a bar graph of countries versus operators or customers and many others.
- Pie charts of the different field names for example a pie chart indicating operators and the number of customers they have operated on.

Purpose

The purpose of chat analysis application is to analyze company's data with accuracy, ease and effectiveness.

Goal

The goal of chat analysis application is to specifically aim at deriving or outputting understandable models that can be used to effectively analyze sentiments exchanged between New Vision operatives and its clients, draw out results that can be interpreted to make desired decisions in the company.

Objectives

- To analyze and visualize chat content from the customers with an aim of displaying the common words within the chats that may guide the New Vision customer support department in determining the most common complaints from their customers.
- To analyze and visualize the emotional reaction of the customers towards the department's customer service.
- To visualize the most hard working or active operator among company operators, this will guide the department in performing employee morale boosting.
- To provide better decision making tools that will be used by the New Vision corporate staff in making constructive decisions towards their customer service delivery for example the application will produce bar graphs and pie charts of different fields against their counter parts from the uploaded file which can be downloaded and saved for future reference.

Benefits

- One of the major advantages of the chat analysis application is that it does not require any user intervention as it runs in the background once the file has been input. It learns user sentiment only from imported text messages in the file which the user inputs. The application can then determine the user sentiment – emotion and intensity with which users chat with the New Vision operatives through outputting different forms of visualization models.
- Chat analysis application improves customer service in a way that negative sentiments aired out by clients are sieved out and analyzed by New Vision operatives who address them in order to keep their clients loyal to their products and services.
- Chat analysis application increases sales revenue. Having been able to effectively analyze information exchanged between clients and operatives enables responsible company authorities to attend to clients' requests and align them with their products and services which eventually attracts more clients implying that more sales will be generated.
- Chat analysis application enables in adjusting marketing strategy. Analyzing data with effectiveness using chat analysis application enables New Vision marketers to attain better insights on how they can attract clients' attention to purchase their products.
- Chat analysis application facilitates effective decision making process. The application outputs easily understandable visualization models that can be used to deduce important decisions in the company.

2. OVERALL DESCRIPTION

2.1 Product Perspective

Chat analysis application whose requirements are specified in this document reflects the practicality of data science in R. Chat analysis application is a follow-on member application of data science with R.

2.2 Product Functions

- Chat analysis application must let the user input a file containing data that is to be analyzed.
- Chat analysis application must transform tidy data to clean data before it is visualized.
- Chat analysis application must be able to clearly output visualization models for the user to effectively analyze them.
- Chat analysis application must be able to communicate with hardware platform for example printer machines in order to print out manual papers containing the visualized data.
- Chat analysis application should let the user determine the emotional reaction of customers towards customer service.
- The management of New Vision should be able to use the application to identify the most hardworking operator among its operators.
- The chat analysis application should determine the rate of how New Vision operatives respond to its customers.

A DIAGRAM SHOWING FUNCTIONS OR MODULES OF CHAT ANALYSIS APP

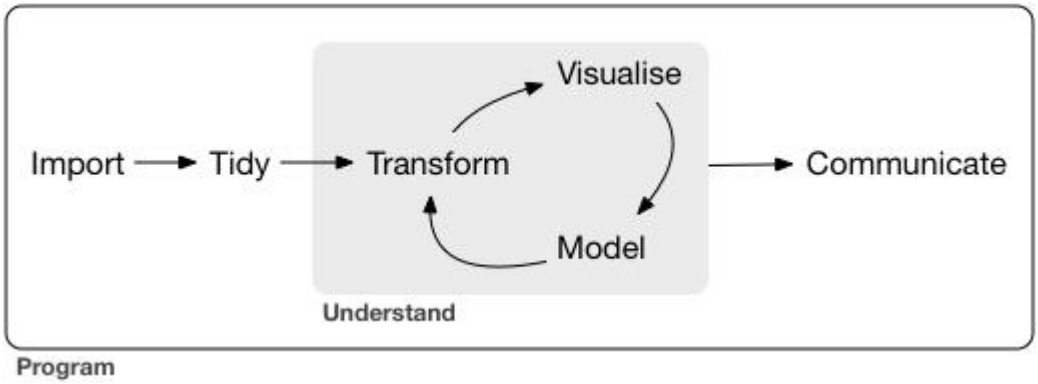

Fig.1 A diagram showing functions or modules of chat analysis application and how they relate with each other

CONTEXT 0 DIAGRAM SHOWING FUNCTIONALITY OF NEW VISION CHAT ANALYSIS APPLICATION

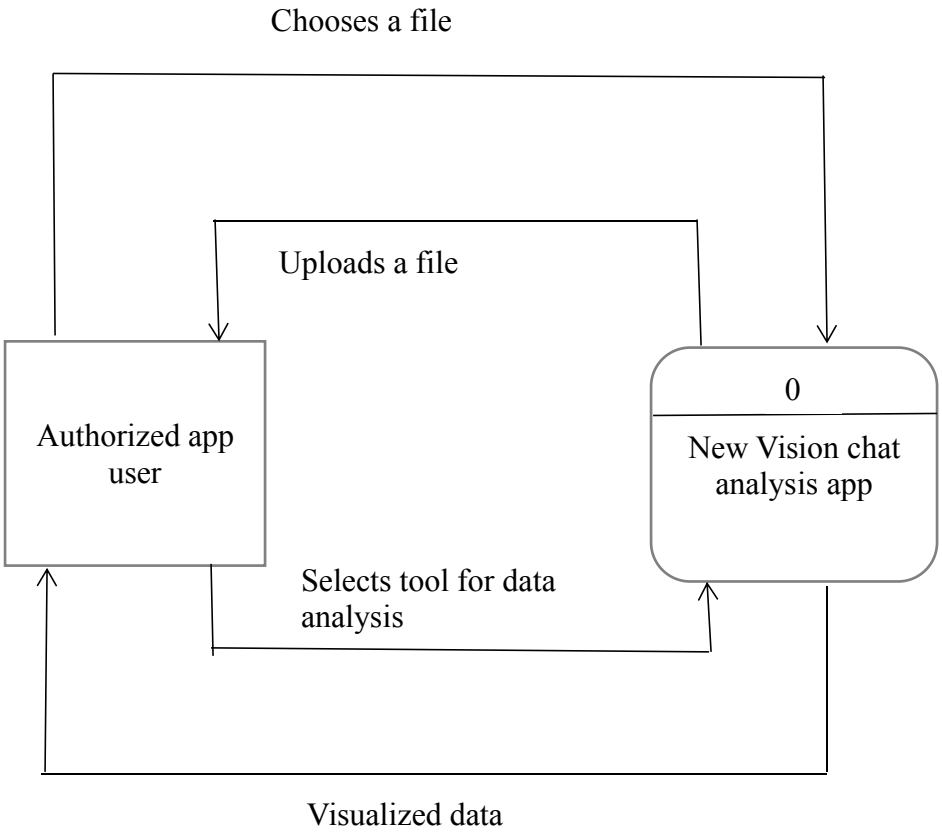

Fig 2.0 Context 0 diagram showing functionality of New Vision chat analysis application

LEVEL 1 DFD SHOWING FUNCTIONALITY OF CHAT ANALYSIS APPLICATION

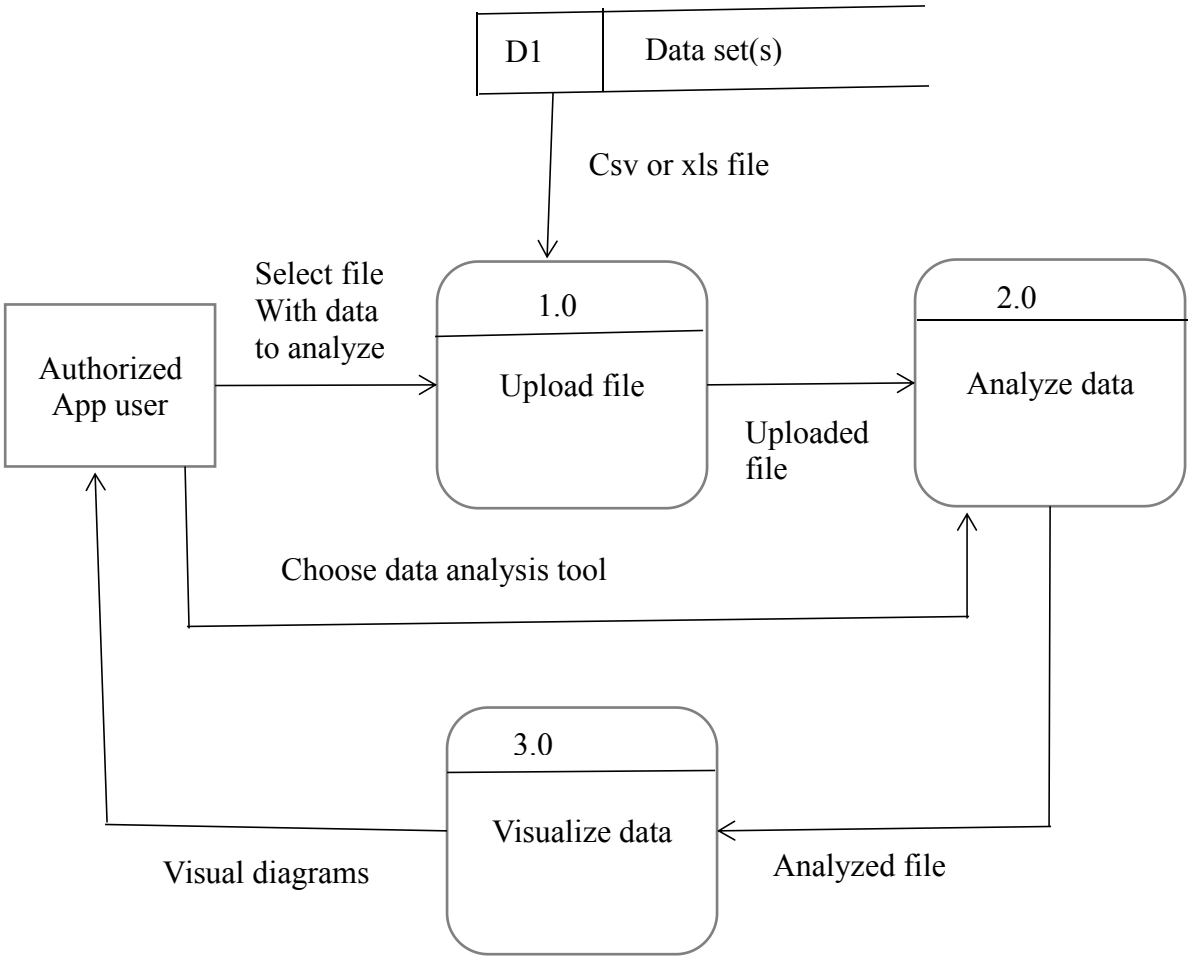

Fig 3.0 LEVEL 1 DFD

2.3 User Classes and Characteristics

There are two types of users that will interact with the application: New Vision operatives at the customer support department who constantly interact with clients via online chat, and the management of New Vision that is the corporate staff. Each of these two categories of users has different use of the application.

- The New Vision operatives at the customer support department use the chat analysis application to determine how best they can change their communication skills to have effective interaction with the clients.
- The corporate staff will manage the overall chat analysis application such that there is correct analysis of data or information to guide them in making better decisions regarding their customer service delivery as well as the whole company.

2.4 Operating Environment

Chat analysis application will operate on both Windows and UNIX operating systems. To be specific, chat analysis application will operate on Windows versions 7, 8 and 10 and UNIX systems like Lint Mint versions prior 18.1, all Ubuntu versions and Kali Linux as well.

2.5 Design and Implementation Constraints

- **Implementation constraints**

For any person to use chat analysis application,he or she must first log in for reasons concerning data security of the company.
The extracted chat content normally consists of limited contextual information that makes it difficult for data analysts to understand the actual semantics of the information exchanged between the two parties that is New Vision operatives and clients unless prior knowledge is used during analysis.So for effectiveness of data analysis, prior knowledge must be used.

- **Data set constraints**

The data set to be uploaded should a csv or xls file.

- **OS environment constraints**

The chat analysis application will be operate in windows 7,8 and 10 and UNIX systems like Linux Mint,Ubuntu and Kali Linux prior all versions.

- **Data analysis constraints**

For a data set to be analyzed, it will have to first be uploaded, and the application will only analyze the data included in the uploaded data set. Chat analysis application will only visualize the data within a visual diagram that the user has requested that is he/she has clicked on.

2.6 User Documentation

The users of chat analysis application will be provided with the installation guide to assist them in better understanding of the functionality of the application.

2.7 Assumptions and Dependencies

- **Sentiment analysis**

Sentiment analysis of short texts such as single sentences is challenging because of the limited contextual information that they normally contain, so far this limitation the small text content is combined with prior knowledge and use of more than just bag-of-words to effectively analyze data which yields results with meaning from which decisions can be made.
When cleaning up data in the chat content, there is factoring of wrongly spelt texts and other inconsistencies which is not a 100% accurate or efficient process.

- **OS**

The functionality of chat analysis application will be dependent upon any standard operating system features functioning properly. The software will only be made available for devices running on any OS of any version

- **Data importation**

The application's functionality will be dependent upon an uploaded dataset which is to be analyzed.
The data set should be a csv file or xls file.

3. EXTERNAL INTERFACE REQUIREMENTS

3.1 User Interfaces

A SKETCH SHOWING IMPLEMENATION INTERFACE OF CHAT ANALYSIS APP

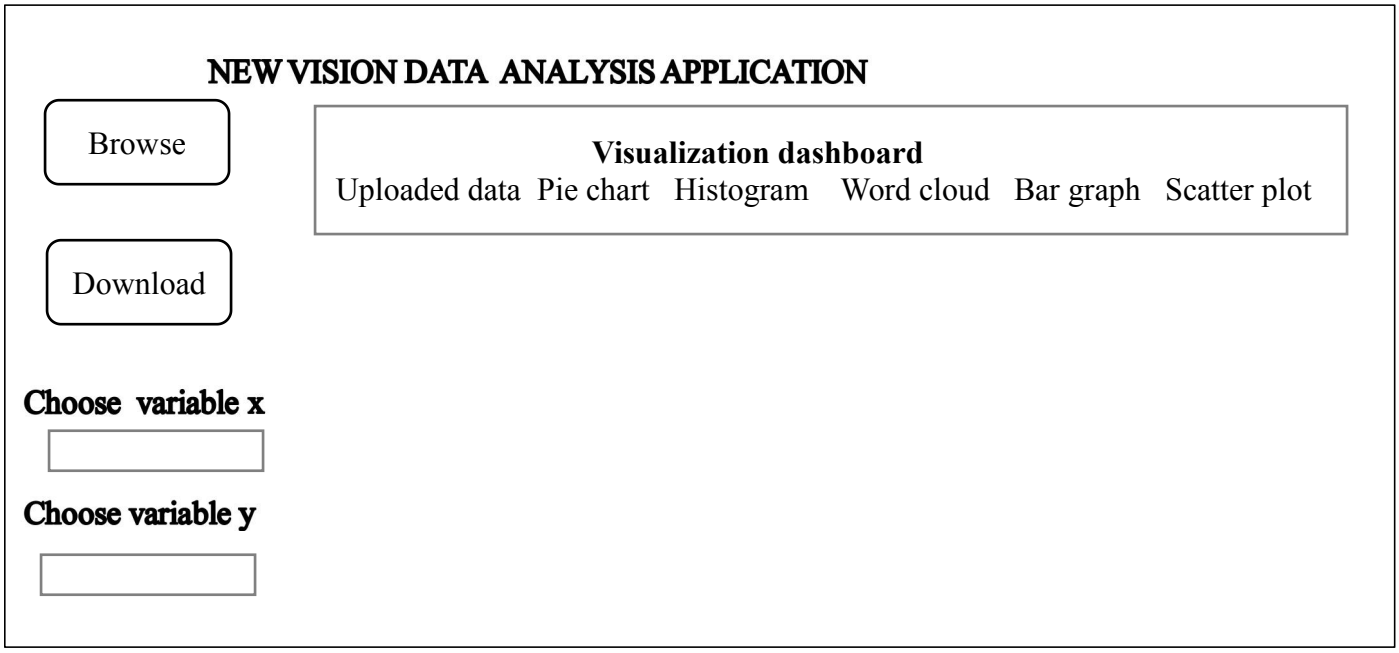

Fig 4.0 shows a sketch of how the index page of New Vision chat analysis application will look like. It indicates how the useful buttons and tab panels will be arranged on the user interface.

The user of the application will use browse button to locate, select and upload the file containing data to be analyzed.

On clicking the uploaded contents tab panel, the data in the uploaded file will be displayed in the Main Panel on right hand side.

For a user to view the uploaded data in the different visual diagrams, he/she will have to choose the visual diagram of choice from the visualization dash board and on clicking it, the uploaded data will be analyzed and visualized according to the chosen model.

3.2 Hardware Interfaces

Since chat analysis application for New Vision doesn't have any designed hardware, there is no direct hardware interfaces associated with the application.

3.3 Software Interfaces

Installed Browser on the computer. Chat analysis application will be opened via any browser installed on the computer of the user.

3.4 Communications Interfaces

Chat analysis application requires any installed web browser on a computer machine that uses either FTP or HTTP or HTTPS as the standard application protocol for the chat analysis application to run. Chat analysis application interacts with the database server to provide authentication details of the person,going to use the application.

4 SYSTEM FEATURES

4.1 USE CASES

A USE CASE DIAGRAM THAT SHOWS MAJOR COMPONENTS OF CHAT ANALYSIS APPLICATION.

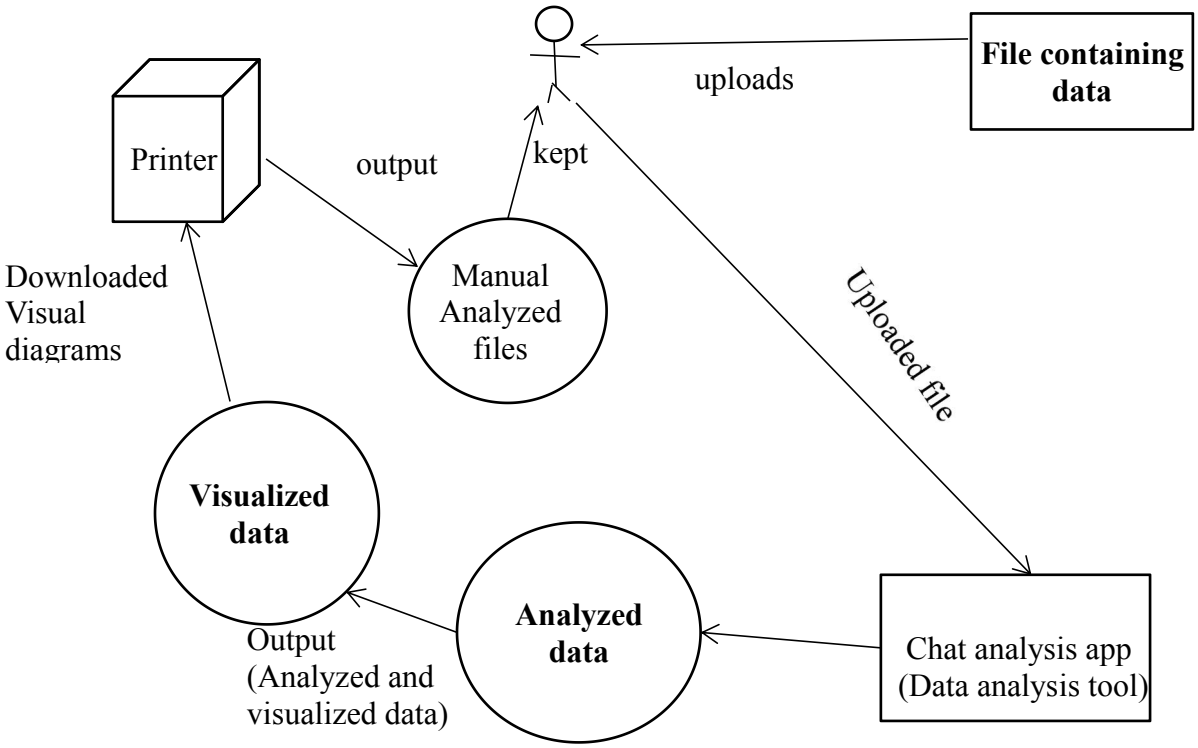

Fig 5.0 A simple use case diagram that shows the major components (subsystem interconnections, and external interfaces) of chat analysis application.

4.1 Use Case 1: File upload

4.1.1 Name: upload file

4.1.2 Goal: To use the uploaded file to analyze and visualize given data.

4.1.3 input: A csv or xls file.

4.1.4 output: Analyzed and visualized data.

4.1.5 procedure: Browse, select and upload file

4.1.6 pre-condition: The file should be in a csv or xls format

4.1.7 Steps

4.1.7.1 Step 1: Open R studio application

4.1.7.2 Step 2: Run the app

4.1.7.3 Step 3: Browse and select the file.

4.1.7.4 Step 4: Upload the selected file.

4.1.8 post-condition: Download visualized data.

4.1.9 Example: Chat analysis application, New Vision

4.2 Use Case 2: Make analysis on the data within the uploaded file

4.2.1 Name: Analyze data.

4.2.2 Goal: To transform data following computer and application's syntax.

4.2.3 input: A csv or xls file.

4.2.4 output: Analyzed and visualized data.

4.2.5 procedure: select the visualization diagram of choice from the dashboard.

4.2.6 pre-condition: The specified column names in the program code must correspond to those within the uploaded file.

4.2.7 Steps

4.2.7.1 Step 1: Open R studio application

4.2.7.2 Step 2: Run the app

4.2.7.3 Step 3: Browse and select the file.

4.2.7.4 Step 4: Upload the selected file.

4.2.7.5 Step 5: choose visualization diagram to analyze.

4.3 Use Case 3: Visualize data

4.3.1 Name: visualize data

4.3.2 Goal: To display results in form of visual diagrams for analysis.

4.3.3 input: Analyzed file.

4.3.4 output: visualized diagrams like pie chart, histogram, bar plot, bar graph etc.

4.3.5 procedure: Browse, select and upload file.

4.3.6 pre-condition: The file should be in a csv or xls format

4.3.7 Steps

4.3.7.1 Step 1: Open R studio application

4.3.7.2 Step 2: Run the app

4.3.7.3 Step 3: Browse and select the file.

4.3.7.4 Step 4: Upload the selected file.

4.3.7.5 Step 5: choose analysis tool.

4.3.7.6 Step 6: Visualize analyzed data.

4.3.8 post-condition: Download visualized and analyzed data.

4.3.9 Example: Bar graph, histogram showing countries with most customer base for New Vision.

4.4 Functional Requirements

REQ-1: The chat analysis application should allow the user to select a file containing data to be analyzed from any directory on the computer.

REQ-2: The chat analysis application should be able to clean up data from imported file by removing unwanted slag kind of language so that the transformed data is suitable for analysis.

REQ-3: The chat analysis application should output clear visualization models that can be easily understood and analyzed.

5. OTHER NONFUNCTIONAL REQUIREMENTS

5.1 Performance Requirements

- Response times.

Chat analysis application may involve response time delays of less significance on the app performance. These delays are approximated to be less than half minute and chat analysis application guarantees that the responsive time delay will not exceed half minute. The response time delays are proportional to the amount of data imported for analysis that is to say the less amount of data imported, the less time delays in terms of responsiveness and the more data imported the longer the responsive time delays.

TABLE SHOWING ESTIMATED RESPONSE TIME DELAYS WHEN USING CHAT ANALYSIS APP

Amount of data	small	Average	Big
Response times expressed in seconds	5	15	30

Table 2 showing estimated responsive time delays with varying data sizes.

5.2 Safety Requirements

There is a need to keep data files safe in order to keep data secure from inconsistencies and other unwanted actions of unknown authorities.

5.3 Security Requirements

The Chat analysis application and the file containing data to be analyzed must only be accessible by developers of chat analysis application and the Data manager of New Vision in order to protect data from unwanted actions of unauthorized users and destructive forces.

5.4 Software Quality Attributes

Portability
The chat analysis application should be portable with any version of either windows or UNIX operating system.
Reliability
Chat analysis application will meet all of the functional requirements without any unexpected behavior. At no time should the output consist of any incorrect visual diagrams unless there are bugs or errors within the data set.
Maintainability
The program code of chat analysis application will be well documented and particularly much care will be taken to design the application in a modular approach to ensure that its maintenance is easy. As time goes by, the operating environment may need to be updated and therefore need to have a well-documented application.

Availability
Chat analysis application will be available at all times on the user's computer, as long as the computer is in proper working order.

The application to be developed is meant to be flexible making it easy to be integrated with the New Vision website and other websites which convey statistical data. The application is maintainable as there are comments with in the application's source code to enable developers easily modify the code for better improvement of the application.

Reusability
Since chat analysis application consists of functions or modules which can be easily accessed and used by other program modules, it implies that chat The application to be developed is meant to be easy to use as simple commands are used to accomplish a given task such as use of buttons with a single click to display a bar graph.

Correctness in terms of results is also another quality attribute to be possessed by the application in development, since most of the functions used in source code of the application are inbuilt in R minimizing errors which may have come through use of many user defined functions.

Portability is another software attribute to be possessed by the application since it's meant to be light in terms of storage capacity of about 2 mega bytes, run on all operating systems since its web based and with low memory requirements.

5.5 Business Rules

The Chat analysis application and the file containing data to be analyzed must be accessed by only the developers whose access is time constrained that is when the application is under development or under maintenance. Once developers are done with the identified roles then there after the application and data must be accessible only by the Data manager of company (New Vision) in order to protect data from unwanted actions of unauthorized users and destructive forces.

6 OTHER REQUIREMENTS

Appendix A: Glossary

Acronym/Abbreviation	**FULL FORM**
REQ	REQUIREMENT
App	Application
SRS	Software Requirements Specification
Tm	Text mining
csv	Comma separated values
Xls	Microsoft Excel Spreadsheet
etc	Many others
DFD	Data Flow Diagram

Appendix B: Reference(s)

[1] IEEE Software Engineering Standards Committee, “IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specifications”, October 20, 1998.