

# Software Requirements Specification Document

AI for Marketing  
CE903: Group Project



## **Group 11**

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# 1. Introduction

## 1.1. Goal/Objective

This Software Requirements Document is poised at succinctly identifying the details of the software system that is to be developed, that is an AI Marketing tool that'll permit a proper digital marketing plan for Brand/Company growth as measured from past campaign performances. It'll outline the functional and non-functional requirements, constraints, and overall design goals for the system, ensuring that group member involved in the project has a shared understanding of what the software system should accomplish and ways/ how it will be created.

This document was generated precisely for:

- Internal Bodies: The Group members of the said Project, the Team Supervisor Dr. Vito De Feo, and the involving stakeholder, Dr. Erik Jacobi.
- External Bodies: Individuals, Project Managers, Researchers who may want amplify the process and make use of this tool as a foundation into developing something more, that can facilitate digital marketing.
- Professional Bodies: Users, Brands, Businesses, Marketers that'll find this software good enough for implementation into real life/ daily business scenarios.

## 1.2. Scope

During Digital Campaigns, the goals are usually surrounded on Brand Awareness, Better Reach, Conversion/Sales, Leads Generation, Traffic/Engagement. Measuring the outcomes of Campaigns done by businesses and their competitors has proven to be a good strategy for the development of future campaign reach, sales, and positioning. This AI Marketing tool will permit the accurate measurement of past and recently ran campaigns using basic Indicators like keywords, caption, while considering demography, geographical location and Duration.

As a product, it will be designed to help start-up brands delving into the digital sphere, assist known brands with better specifics on campaigns that'll be productive and yield more drops down their sales funnel. Although, the focus of the scope of this project will be on the Fashion Industry, it can be easily implemented into any industry provided the basic metrics are indicated.

### **1.3 Definitions, Acronyms, and Abbreviations**

<b>Terms/ Acronyms, and Abbreviations</b>	<b>Definition /Description</b>
<b>AI</b>	The creation of intelligent machines that can perform tasks that typically require human intervention, such as speech recognition, decision making, and language translation.
<b>API</b>	A set of protocols and routines for accessing a web-based software application or web tool that specifies how software components should interact between different systems.
<b>Backlog</b>	A prioritized list of tasks, requirements or features to be completed in this software development project. It acts as a repository of work that needs to be done and helps teams prioritize and plan their work.
<b>Competitive intelligence</b>	The process of gathering and analysing information about a company's competitors and the market to help it make informed business decisions.
<b>Data</b>	Information that has been collected, processed and organized in a specific manner to aid individuals and organizations make informed decisions.
<b>Digital footprint</b>	The trail of data that a person leaves behind while using the internet and digital technologies. This includes information such as website visits, social media activity, and online purchases.
<b>Fashion</b>	A popular style or practice, especially in clothing, footwear, accessories, makeup, hairstyle, and body piercing. It is a form of self-expression and can be influenced by cultural and social attitudes.
<b>Gantt Chart</b>	A graphical representation of a project schedule that displays tasks as horizontal bars to show the start and end dates and their relationship to other tasks..
<b>Jira</b>	A project management tool used for software development and other forms of project tracking. It provides features such as issue tracking, agile project management, and reporting.
<b>Gitlab</b>	A web-based Git repository manager that provides source code management (SCM), continuous integration, and more.
<b>Sprint</b>	A set period of time, usually two to four weeks, in an Agile software development process where teams work to complete a set of tasks and deliver a usable product increment.

## **1.4. Overview**

The succeeding sections of this document furnish an overview of the project's target audience, the design of the product's infrastructure, and the software and data specifications of the product. The second chapter of this document delves into a comprehensive overview of the project, including functional specifications, data needs, infrastructure, suppositions and connections. It also showcases the viewpoint of the users towards the product. The third part outlines the testing timeline for the project, while the fourth chapter concentrates on the project's planning aspects, inclusive of Gantt charts and information regarding early stages. Though all sections of this document hold significance for the intended readers, non-technical researchers may concentrate solely on chapters two and three, which put the spotlight on the product's perspective, attributes, connections, presuppositions, and the testing procedure.

## **2. Overall Description**

### **2.1. Product Perspective**

AI for Marketing as a product tool requires multiple solutions and requirements, taking inspiration from Data Analytics, Machine Learning, and Digital Marketing. Data is retrieved from Social Media channels by connecting with developer APIs, and mining information that will provide the end user with insightful and relevant results. The goal is to perform Topic Modelling, Sentiment Analysis, and Visualisation of competitor market coverage, brand image and campaign awareness, consumer response, and ultimately insights into competitor products through agent keyword search via an information retrieval system.

The visualisation is to provide the end user with interactive metrics that can be used to enhance product positioning, brand awareness, and forecasting analysis to supplement future ad campaigns and delve into further granular details to best suit market positioning.

Current AI based digital marketing solutions which are already available only perform a few steps in each required area. Web updates, content management and copywriting, engagement, and other areas of digital footprints are tied together as an offering that may give a company a step up or advantage over another. Some products which already exist and have been bought to market is ProQuoAI, Klue, and Jasper to name but a few. ProQuoAI focuses on brand management, specifically market research and competitor analysis. Klue is a market intelligence software company which delivers “battlecards” from information gathered through real time monitoring of competitor websites, pricing, product releases and more. Jasper is a platform focused on copy and content creation, allowing business to arm themselves with content generation scaled up using machine learning and artificial intelligence tools. It is a chat bot trained on data from digital marketing data and industry experts in the field of marketing that spans multiple areas.

### **2.1.1 System Architecture**

The System Architecture functionality will be divided into five modules covering the requirements of each stage which builds into the next. The first four is composed of Backend processes and building scripts to carry out automated data retrieval and cleaning, feeding from one into the other. The Information Retrieval stage is where machine learning tasks will take place, such as topic modelling, sentiment analysis and natural language processing tasks. The User GUI section will be an interface which will allow a user to input a request through a search bar or terminal.

The results will display highest rated topics for a particular keyword search, positive or negative connotations associated with the keyword, Users which most frequently talk about the keyword topic and generate talking points. This can be broken down even further into location and time to really delve into the granular details of a particular subject, for example looking at a past ad campaign and its performance.

#### **1. Data Retrieval**

The primary stage to begin building a corpus of data. Using the Python library 'snsrape' [1], we can connect to multiple social media streams and recover data about a particular subject. This can be modified to give us several features depending on importance and requirement specified by the client. For example, with tweet data this can be broken down into the user, user profiles, hashtags, searches, tweets (including single or surrounding threads, list posts and trends. This can be further broken-down using twitters advanced search wrapper. Data collected will be pulled and put into a pandas' data frame. This can be easily saved as a CSV or JSON file format depending on required use.

#### **2. Cleaning and Pre-processing**

Once pulled, a script will run and perform the cleaning stage of the tweets. As the focus will be on tweet data, removal of ascii characters, emoji's, html tags, and stop words will be performed. Then subsequently, Normalization, Lemmatization, stemming to break the tweets into a corpus, which will be a dictionary of each individual word. The corpus is then ready to be fed into the next stage, to produce a 'final corpus', containing the predefined requirements.

#### **3. Information Retrieval System (ML Stage)**

The information retrieval system will be comprised of two main parts.

- Topic Modelling and Sentiment Analysis
- Brand and Market Distribution Detection

The Machine Learning Algorithms will be trained to detect frequent occurring terms, topics, organisations, word inflections, and sentiment analysis. In the second part, it

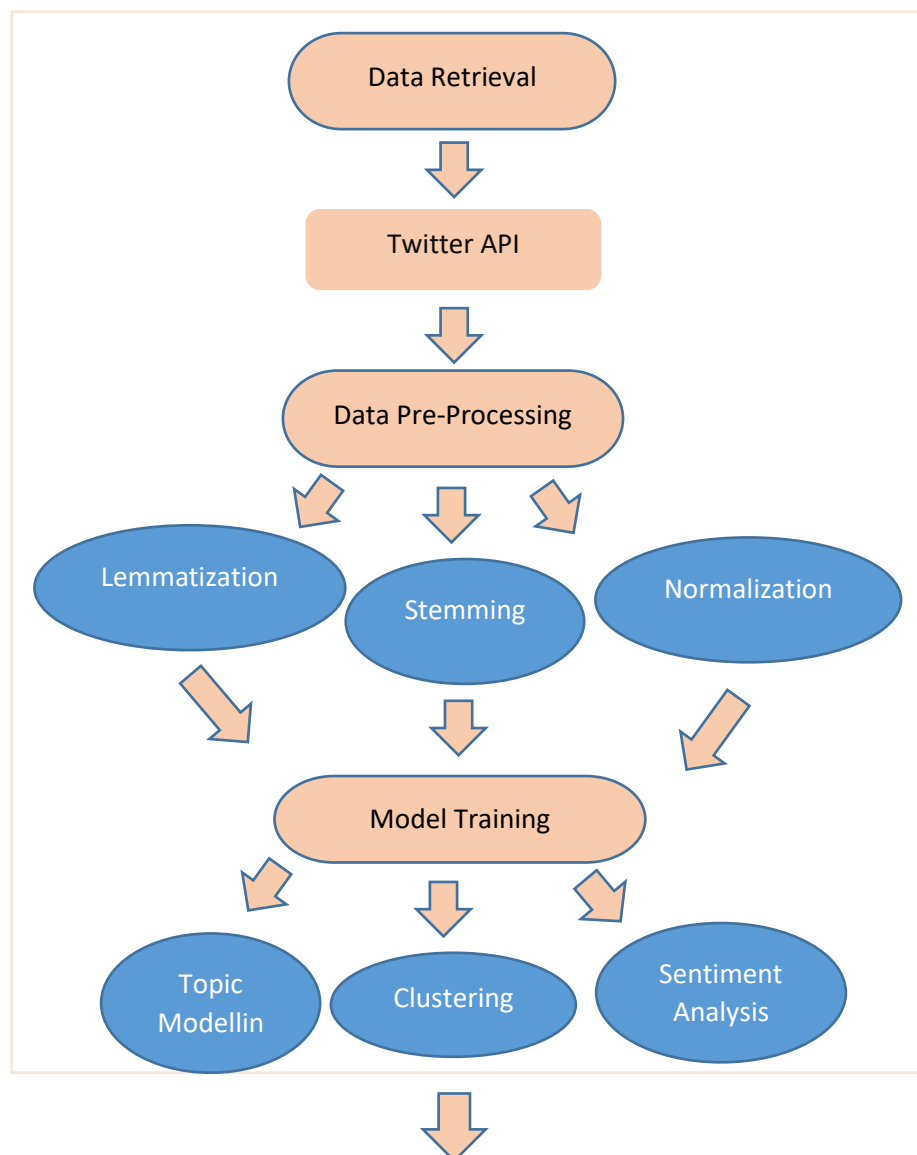
will also return a list of brands and their market distribution through clustering algorithms and online learning.

#### 4. User GUI (User input and request for information)

A user GUI terminal will be used, such as a search box interface where organisations and keywords can be entered. Spelling and nearest match will be considered, however if no matches are found it will ask the user to re-enter an input until a match or closest match can be found.

#### 5. Visualisation and Analysis (Results are displayed)

Results are shown in the GUI from graphs, word clouds, Topics, Market demographics, Brand description and distribution, and Frequent Occurring Terms, as well as breakdown of positive or negative connotations associated with the keyword entered.



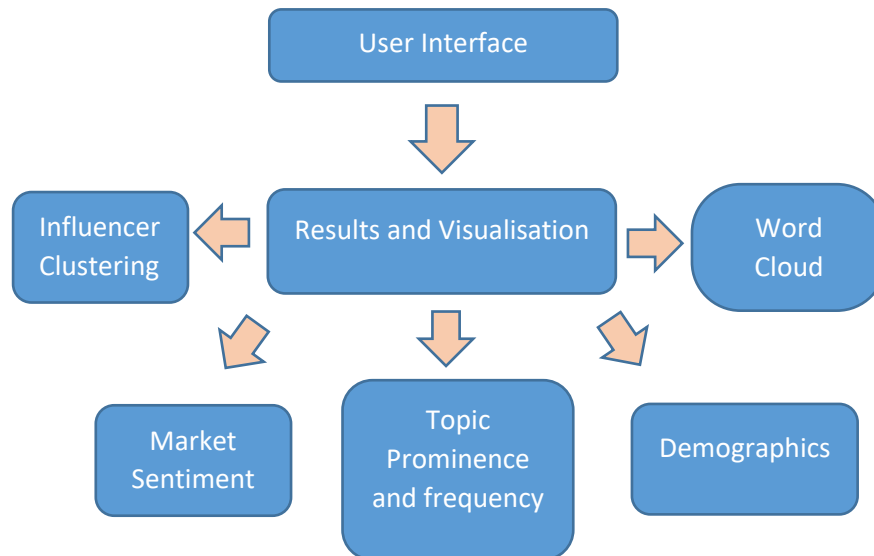


Figure 1. As above, this details the outline of the system architecture.

### 2.1.2 System User Interface Diagram

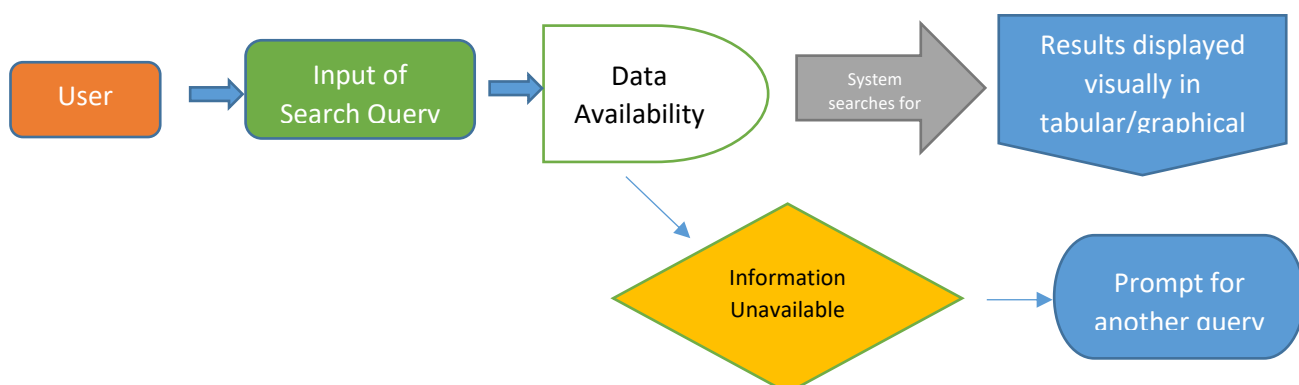
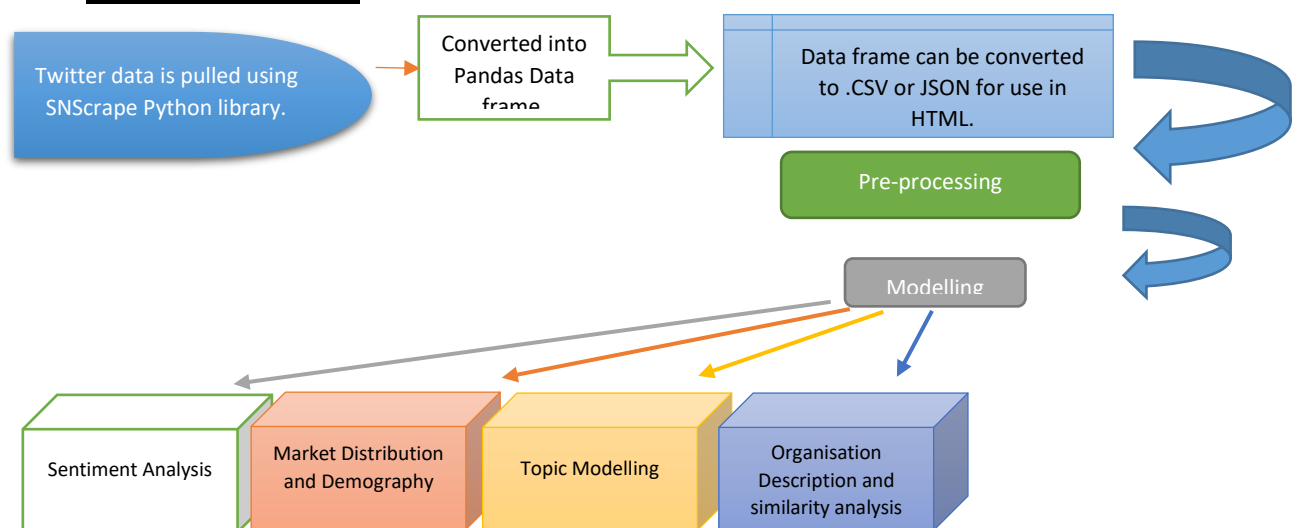


Figure 2. Details the process flow of the expected functionality of the user interface. This is the front-end user facing side which will be implemented using a simple GUI, that will return desired results.

### 2.1.3 Back End Design





**Figure 3. Represents Back End – Data is extracted from Twitter, pre-processed using several scripts, which outputs into several modelling algorithms. This gives us different results which can be used based on user query.**

### 2.1.3 Use Case

**Table 1**

Use Case	UC 1.1
Use Case Name	Input
Actors	User
Description	User enters query such as competitor, keywords, topics, names based on appropriate request.
Trigger	GUI will ask user to enter input in the appropriate field.
Precondition	N/A
Postcondition	Network Internet Connection access required.
Normal Flow	List is retrieved and displayed allowing user to access most relevant result.
Alternative Flow	Closest match available from retrieved corpus.
Exceptions	N/A
Includes	N/A
Assumptions	N/A
Notes and Issues	N/A

**Table 2**

Use Case	UC 1.2
Use Case Name	Input FAQ/Guidelines
Actors	User
Description	Instructions/Suggestions are given to input appropriate query.
Trigger	If 'Help' is given as input, appropriate list of commands for the user are given which display further details on how to provide necessary input.
Precondition	N/A
Postcondition	Network Internet Connection access required.
Normal Flow	<ol style="list-style-type: none"> <li>1. User inputs '_Help' command.</li> <li>2. Instructions and further guidance is displayed on GUI terminal.</li> </ol>
Alternative Flow	N/A
Exceptions	N/A
Includes	N/A
Assumptions	Assumes Internet Connection is made available.
Notes and Issues	N/A

## 2.2 Product Function

**Table 3. Product Functionality FR 1.1.**

Identifier	FR 1.1
Title	Login Identifier
Requirements	Prompt is given to user for login credentials.
Source	User
Rationale	If 'Help' is given as input, appropriate list of commands for the user are given which display further details on how to provide necessary input.
Restriction and Risk	Incorrect login details will deny access to user.
Dependencies	Network Internet Connection access required.
Priority	High

**Table 4. Product Functionality FR 1.2.**

Identifier	FR 1.2
Title	Selecting appropriate input, such as keyword.
Requirements	Results will be displayed visually in tabular/graphical format
Source	User
Rationale	If 'Help' is given as input, appropriate list of commands for the user are given which display further details on how to provide necessary input.
Restriction and Risk	N/A
Dependencies	FR 1.1 and access granted.
Priority	High

**Table 5 Product Functionality FR 1.3.**

Identifier	FR 1.3
Title	Description of Industry or Organization
Requirements	Key words entered which match or relate to the desired industry or organization, fed as input.
Source	User
Rationale	Return a generated list of competitors and information regarding them.
Restriction and Risk	N/A
Dependencies	FR 1.1 and access granted.
Priority	High

**Table 6. Product Functionality FR 1.4**

Identifier	FR 1.4
Title	Selecting appropriate input, such as keyword.
Requirements	Results will be displayed visually in tabular/graphical format
Source	User

<b>Rationale</b>	If 'Help' is given as input, appropriate list of commands for the user are given which display further details on how to provide necessary input.
<b>Restriction and Risk</b>	N/A
<b>Dependencies</b>	FR 1.1, access, 1.3
<b>Priority</b>	High

**Table 7 Product Functionality FR 1.5**

<b>Identifier</b>	<b>FR 1.5</b>
<b>Title</b>	Competitor Overview
<b>Requirements</b>	Results will display information of competitors, engagement, and other twitter data from a summary of activity.
<b>Source</b>	User
<b>Rationale</b>	Required to know both qualitative and quantitative engagement between brands and market positioning.
<b>Restriction and Risk</b>	N/A
<b>Dependencies</b>	FR 1.1, access, FR 1.2
<b>Priority</b>	High

**Table 8 Product Functionality FR 1.6**

<b>Identifier</b>	<b>FR 1.6</b>
<b>Title</b>	Retrieving data using Snscraper Python Library
<b>Requirements</b>	Python script will run, generating a data frame containing twitter data.
<b>Source</b>	Internet
<b>Rationale</b>	Collection of data to use for system.
<b>Restriction and Risk</b>	If internet connection is unavailable, then the system will not be able to be accessed and the task will be unable to be performed.
<b>Dependencies</b>	FR 1.1, FR 1.2
<b>Priority</b>	High

**Table 9 Product Functionality FR 1.7**

<b>Identifier</b>	<b>FR 1.7</b>
<b>Title</b>	Pre-Processing data
<b>Requirements</b>	Using several Python Libraries to process and convert data into required format.
<b>Source</b>	Pandas Data frame with information from twitter.
<b>Rationale</b>	Processing is required prior to modelling so system can generate required outputs.
<b>Restriction and Risk</b>	It will list users, user profiles, hashtags, searches, tweets (single or surrounding thread), list posts, and trends.
<b>Dependencies</b>	FR 1.1, FR 1.2, FR 1.6
<b>Priority</b>	High

**Table 10 Product Functionality FR 1.8**

Identifier	FR 1.8
Title	Visualization and Analysis
Requirements	Application should be able to display analysis performed on twitter data to provide visual representation using graphs and tabular data.
Source	User input.
Rationale	Visualization gives greater leverage to make informed business decisions.
Restriction and Risk	N/A
Dependencies	FR 1.1, FR 1.2, FR 1.6, FR 1.7
Priority	High

**Table 11 Product Functionality FR 1.9**

Identifier	FR 1.9
Title	Model Training
Requirements	Different Machine Learning Algorithms will be utilized to give relevant information under topic modelling, sentiment analysis and other natural language processing tasks.
Source	N/A
Rationale	Modelling will turn unusable information into relevant information that can be visualized.
Restriction and Risk	Performance of modelling is dependent on success of data processing task, and the data available through scraping.
Dependencies	FR 1.1, FR 1.2, FR 1.6, FR 1.7
Priority	High

**Table 12 Product Functionality 1.10**

Identifier	FR 1.10
Title	Results Analysis
Requirements	Application will return results gathered by the model.
Source	N/A
Rationale	The system will display results so that decision making can be performed by the user.
Restriction and Risk	Requires internet connection.
Dependencies	FR 1.1, FR 1.2, FR 1.6, Fr1.7, FR1.8, FR 1.9
Priority	High

## **2.3 User Characteristics**

The software is primarily aimed at firm marketing teams and who know how to use a computer, performing search terms on a website. These users must be familiar with technology and web browsers. They should have some background in market investigation and analysis.

Users of the product should be able to define the company's offering using their own descriptions of potential propositions and have a working knowledge of market and consumer categories, and social media platforms to gather competition and customer data. Users should also have a keen eye for detail, be able to comprehend and group competitor and customer descriptions according to price, functional demands, emotional preferences, and income. To recommend the ideal proposition-customer pair, they must be able to conceptualize, compare, and analyze the commonalities between alternative descriptions.

With the help of the help and FAQ section's high visibility, users of the system should be able to obtain information and refine their proposals. The lack of primary tech literacy among the system's intended users had no impact on its design.

## **2.4 Constraints**

**Limited data sources:** So far, the system is built towards using Twitter data, with information being limited to users, user profiles, hashtags, searches, tweets (single or surrounding thread), list posts, and trends.

**Resources:** The availability of financial, technical, and human resources may have an impact on the development and application of the AI system.

**Technical proficiency:** The system's intended users should have a basic understanding of AI and machine learning, as well as have experience analyzing and interpreting data.

**Data accessibility:** The AI system needs data from target client categories, social media accounts, and competitor websites. The accuracy of the findings generated by the AI system might be impacted by the kind and accessibility of this data.

## **2.5 Assumptions and Dependencies**

Below are the list of Assumptions and dependencies for developing this project successfully.

### **User Interface**

<b>Phase Name:</b>	<b>User Interface</b>
<b>Description</b>	User is required to enter input in the mentioned text field. This input will be used to fetch data from all the social media platforms.
<b>Assumptions</b>	<ul style="list-style-type: none"><li>• User enters the input in English language.</li><li>• User might know some influencers in this field</li></ul>
<b>Dependencies</b>	N/A

**Fetching Data**

Phase Name:	Fetching Data
Description	We will use Snsrapper and third party API to scrape data from social media platforms.
Assumptions	<ul style="list-style-type: none"> <li>The imported files will be in .csv format and in English language.</li> <li>All Non English Language text records will be dropped or converted to English.</li> </ul>
Dependencies	<ul style="list-style-type: none"> <li>Pandas</li> <li>Snsrapper</li> </ul>

**Pre-Processing Data**

Phase Name:	Pre-Processing data
Description	All the csv files that we have obtained from data fetching process are combined into a desired single data file
Assumptions	Data should be in single file
Dependencies	<ul style="list-style-type: none"> <li>Numpy</li> <li>Spacy</li> <li>Gensim</li> <li>NLTK</li> <li>Pandas</li> </ul>

**Data Visualisation**

Phase Name:	Data Visualisation
Description	Various Clustering techniques will be used to demonstrate and display information
Assumptions	Processing the data
Dependencies	<ul style="list-style-type: none"> <li>Matplotlib</li> <li>Sklearn</li> <li>Wordcloud</li> </ul>

**Model Training**

Phase Name:	Model Training
Description	Various Machine learning algorithms will be used to train and cluster data to cluster the data for decision making for the brand
Assumptions	Processing the data
Dependencies	Pandas, Numpy, SKlearn, SNScrapper and various clustering algorithm

### **3. Product Testing and Scheduling**

After completion of each module of the product we will perform the unit test to determine that either the developed module is working fine or not and sequentially when all the module developed step by step, we will integrate them together and perform the integration testing on the product to determine after integrating all the module is generating any error and make sure that nothing should be break after integration.

When the whole product will be made, we will perform the functional test or black box testing on the whole product to validate that the product is meeting the client requirement or not will perform the performance test as well if the product required any. Regression test will also carry out before the release and delivery of the final product to the client to avoid any bug leakage.

#### **3.1 Test Cases of Functional Requirements**

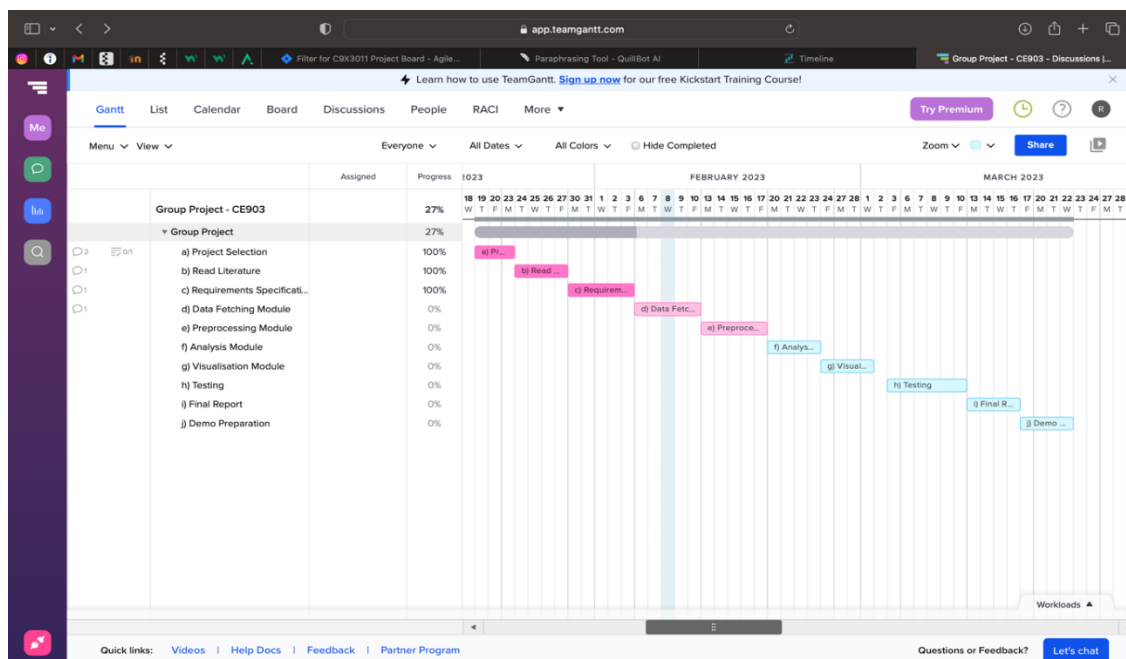
We are using the agile methodology so the few basic functional testcases of the product are as follows:

<b>S.NO</b>	<b>Input</b>	<b>Steps</b>	<b>Expected result</b>	<b>Time required for execution</b>
1	Login screen	User must enter the correct username and password	The GUI portal will be login	1 Day
2	Input Keyword	Enter the required correct keyword on field	Entered input keyword should be accepted	1 Day
3	Input Guideline	Click on help button	list of instructions will be given on how best to use the software/appropriate inputs	1 Day
4	Data Extract	Keyword data collection	The application should extract the data from social media platform according to that keyword	1 Day
5	Pre-processing/Cleaning	Remove irrelevant characters from the data	Data should be clean and in appropriate readable format	2 Day
6	Model Training	Model should be able to extract the correct information	Application will train the modal to gain the relevant information	2 Day

## 4. Project Planning

We are using the Waterfall methodology as different project management structures for our project. The Waterfall technique, often referred to as the Waterfall model, is a sequential development process that moves like a waterfall through all project phases (such as analysis, design, development, and testing), with each phase finishing up completely before the start of the next. This methodology is mostly used for the project's overall planning. The methodology employs a sequential process that is based on predetermined deadlines, specifications, and results. With this approach, the individual execution teams are not required to be in continual contact and are typically self-contained, until integrations are necessary. The Gantt chart below displays the duration of each task throughout the entire project.

With symbols, visual metaphors, and pointing devices, a person can communicate with a computer using a graphical user interface (GUI), a computer application. We will develop a GUI for our project. And the estimated time for creating that will be around 2 weeks.



**Figure 1: Gantt Chart describing the project plan**

There are a total of 10 jobs that must be finished as part of the project, as shown in the above image. The project selection, background reading on the subject, and creation of the requirements specification paper are the first three activities which have been completed.

The following four tasks entail creating the core system, which includes modules for data retrieval, pre-processing, analysis, and visualisation. While working on this portion of the project, we will adhere to the waterfall methodology and the Scrum framework. And we choose Gitlab to host all the project's source code along with JIRA for this purpose. We have allotted about 5 weeks for this stage of the project because it is here that most of the work is placed.



Finally, using the testing schedule provided in Section 3, we will thoroughly test every module. Writing the final report and getting ready for a demonstration of the entire system in action are the final two responsibilities.

In conclusion, the tools utilised for project management include Team Gantt for creating the Gantt chart that is used for project planning, Gitlab for managing code, and JIRA for Agile/Scrum.

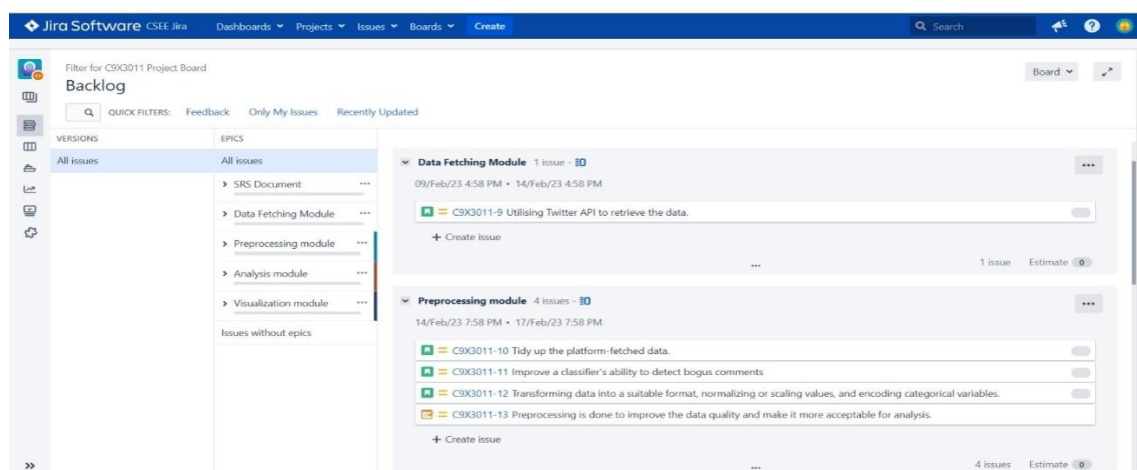
## 4.1. JIRA for agile/scrum

Basically, Jira is a member of a family of tools for managing projects in teams of all sizes. Jira was initially intended to be a bug and issue tracker. But today, Jira has developed into a potent task management solution for a variety of use cases, including agile software development and the administration of requirements and test cases. JIRA is an exclusive issue tracking tool created by Atlassian that enables agile project management and bug tracking. It was first made available in 2002. According to Atlassian, JIRA is utilised by 180,000 clients in 190 different nations.

JIRA still provides good support for everything required for a team to properly apply the Agile process; despite being widely used for bug tracking. It has every component necessary for a Scrum framework to function properly, including Sprints, Epics, Tasks, Stories, Backlog, etc.

Agile projects are divided into small, repeatable phases called sprints or iterations, which are typically one to four weeks long. A draught, prototype, or usable version of the ultimate deliverable should be produced at the end of each sprint, which should be decided upon at the start of the project. The number and duration of the project's sprints should be decided at the outset, even though each sprint is scheduled separately. A sprint is a specified amount of time during the project where several issues from the backlog are worked on in accordance with an earlier agreement. The typical duration of a sprint is one week to four weeks. For this project, a weekly sprint was selected.

A team's potential deliverables for new features, improvements to current features, bug repairs, infrastructure upgrades, and other tasks are listed in a backlog. Each issue is shown on a board in a JIRA backlog, grouped into epics and sprints. We can see who is responsible for each issue and when it needs to be resolved.



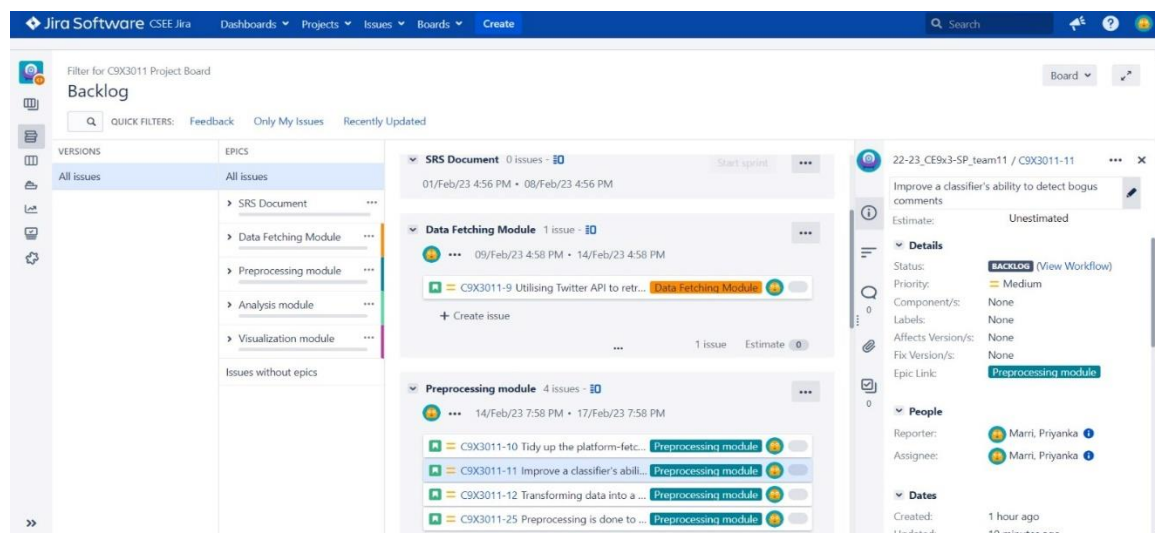
**Figure 2: JIRA tool being used for creating the sprints.**

It has a total of 5 sprints, the first of which is the creation of the SRS document. The items were distributed equally among the team members and this sprint will last until 8th of February. The above shown sprint(Figure 2) is focused on the Data Fetching Module and Pre-processing Module, where we must get the necessary data from Twitter API. This component is briefly described in Section 2.2.

The analysis module, and the visualisation module will all be worked on during the following three sprints.

## 4.2. Initial Sprints

We've produced a total of 5 sprints, as was stated in the part before this one. The difficulties produced during each sprint are described in the screenshot below. Only the data gathering sprint and the preparation sprint are displayed here. Anyone with access to our JIRA project can click on this link to view all the sprints we've so far made.

**Figure 3: JIRA backlog with tasks involved in each sprint.**

So far, the project has been set up in both Gitlab and JIRA, and each team member has access to both. Everyone on the team has also cloned the repository on their local machine, where they can make modifications in accordance with specifications and then push those changes back to the repository. To ensure that everyone on the team receives the most recent code, we will merge team members' code once everyone has reviewed and approved the modifications they made.

The team has done with the SRS document, and our next step is to fetch the data and show it to our project Supervisor to get his feedback on the same. After that step we must clean, analyse and visualize the fetched data in order to give the clean and clear output.

## 5. References

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