HIV Status Detection Among Women Using Machine Learning – User Manual

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1.0 Introduction

This user manual is intended to guide the users on using the HIV status detection application which was deployed as a web application on the *shinyapps.io* platform.

This project aims to build an HIV status detection application. The application can detect whether an individual is HIV-positive or HIV-negative based on some questions answered by the user. The application can also find out the trends of keywords used by medical professionals and researchers especially in the field of HIV as well as AIDS by generating word clouds for them. This application can even receive file inputs and generate new files, easing the users in exploring the geographical map distribution of HIV, as well as looking into the dataset with plots and summary tables.
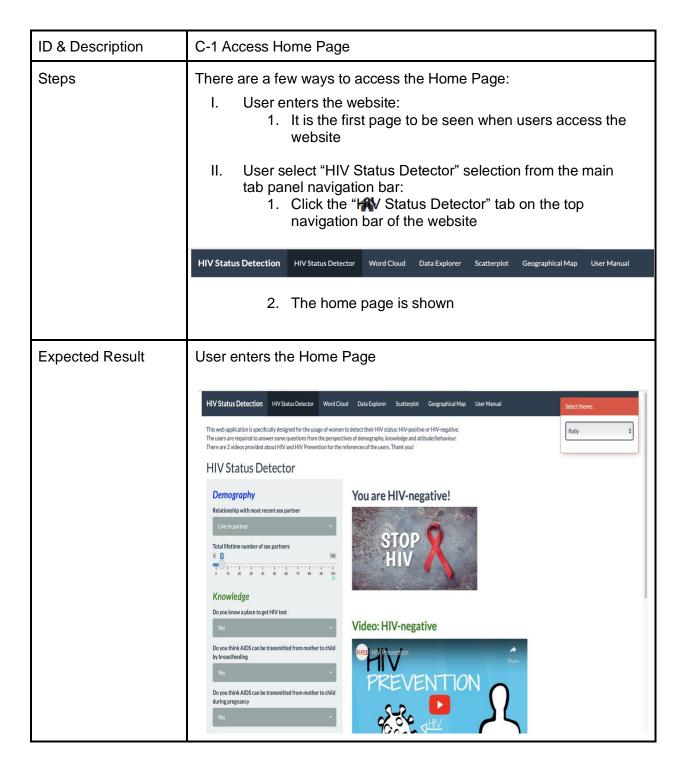
The usage of this application is divided into a few use cases. Each use case has a unique ID for searching, a description of the use case, step-by-step instructions with screenshots, and the expected outcome.
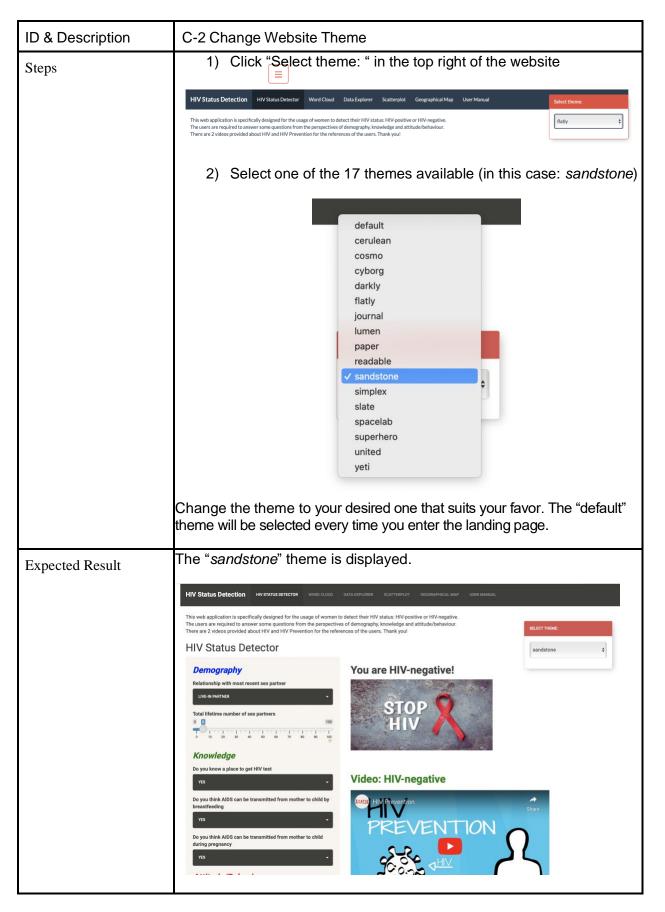
Terminologies
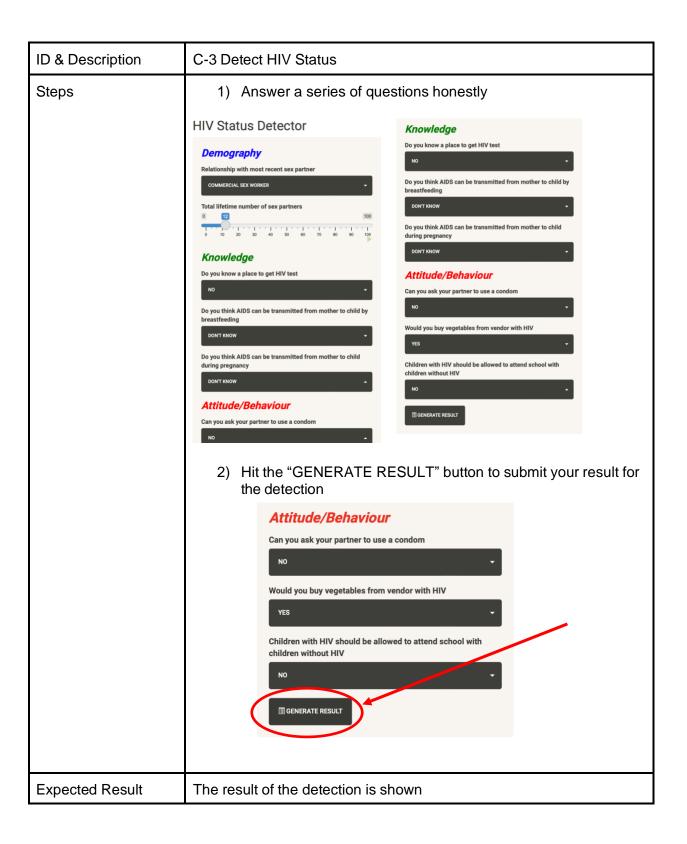
Vocabulary	Description
User	Users are people who have access to the HIV Status Detection site. They can use all the features in the application.
Main Tab Panel	A tab panel navigation bar atop that shows different features and helps users to direct to different pages of the application.
Theme Selector	Users can select up to 17 different themes for the web application for a better user interface.
Home Page (HIV Status Detector)	The website's landing page for users contains a brief introduction. This page consists of a trained machinelearning model which allows users to input numbers and answers for detecting the HIV status of the individual. This page also contains videos for reference to the users.
Word Cloud Page	The page consists of word cloud visualizations that could help in visualizing and comprehending the datasets. There are also several ways for the users to generate the word sources and customizing the word cloud is also made available.
Data Explorer Page	The page lets the users explore datasets used for the model building and visualizations in this project by themselves. There are 4 sub-tab panels on this page which include an interactive data table, 2 summary tables (categorical and numerical variables), and a word cloud generator.
Scatterplot Page	The page will generate a scatterplot or pairs plot to show the correlation between 2 variables in the dataset.
Geographical Map	The page shows a geospatial visualization of HIV statistics in 14 different countries in Africa.

User Manual Page	The page shows the description of the basic functionalities of the application.

2.0 Home Page (HIV Status Detector)

ID & Description	C-1 Access Home Page

Steps	There are a few ways to access the Home Page:
	
	I. User enters the website:
	    1. It is the first page to be seen when users access the website
	
	II. User select "HIV Status Detector" selection from the main tab panel navigation bar:
	    1. Click the "HIV Status Detector" tab on the top navigation bar of the website
	
	    2. The home page is shown

Expected Result	User enters the Home Page

ID & Description	C-2 Change Website Theme
Steps	1) Click "Select theme: " in the top right of the website 2) Select one of the 17 themes available (in this case: *sandstone*) Change the theme to your desired one that suits your favor. The "default" theme will be selected every time you enter the landing page.
Expected Result	The "*sandstone*" theme is displayed.

ID & Description	C-3 Detect HIV Status
Steps	1) Answer a series of questions honestly 2) Hit the "GENERATE RESULT" button to submit your result for the detection
Expected Result	The result of the detection is shown

	You are HIV-positive!

3.0 Word Cloud Page

ID & Description	C-4 Access Word Cloud Page
Steps	1) Click "Word Cloud" on the top navigation bar
Expected Result	User enters the Word Cloud Page

ID & Description	C-5 Display 'Angola Dataset' Word Cloud
Steps	1) Select the 'Angola dataset' option

Word Cloud
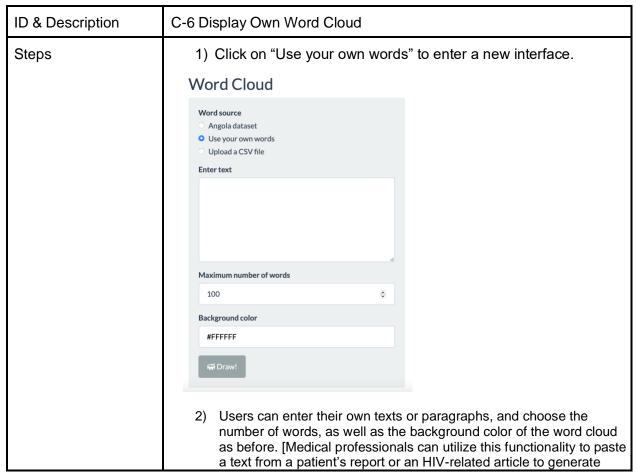
Word source
- Angola dataset
- Use your own words
- Upload a CSV file

Maximum number of words

100

Background color

#FFFFFF

[Draw!]

2) By default, 'Angola dataset' will be selected and the number of words shown in the word cloud is 100 and a 'white' background color.

3) User may adjust the number of words to be shown as well as the background color and hit the "Draw!" button.

Maximum number of words

25

Background color

#E68787

Maximum number of words

25

Background color

#E68787
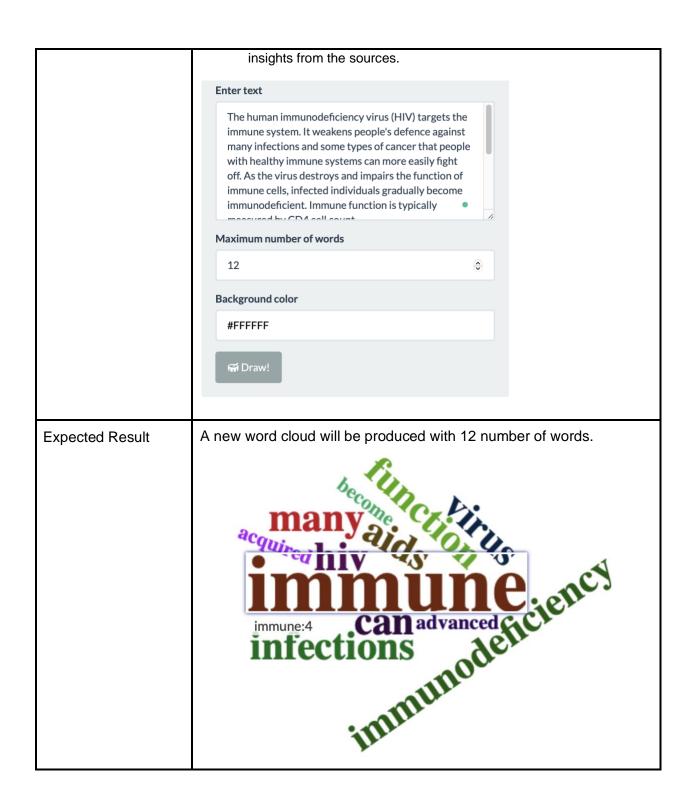
[Draw!]
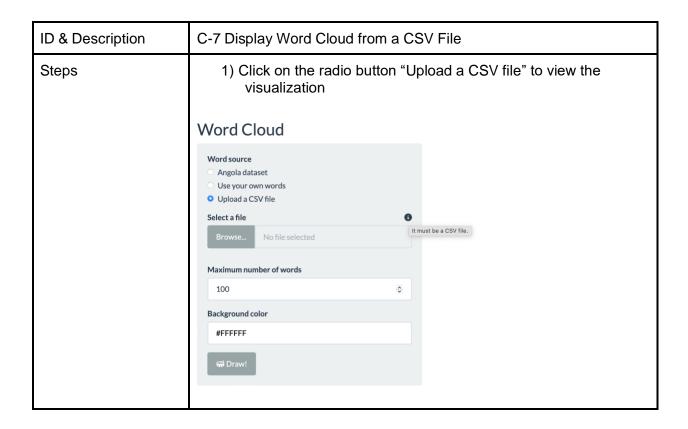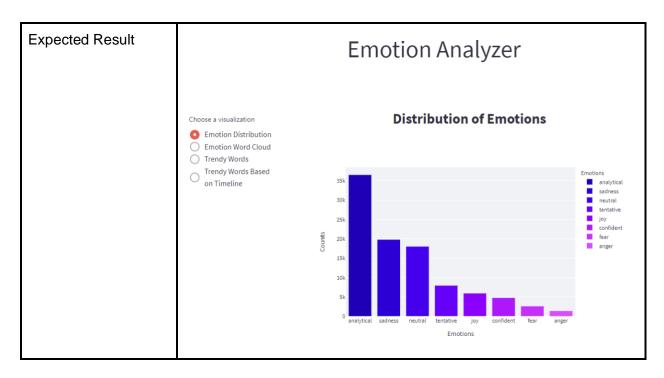
Expected Result	The customized word cloud will be shown with the frequency of the word that appeared when hovering over that word. A different arrangement of word clouds will be displayed each time the "Draw!" button is pushed.

ID & Description	C-6 Display Own Word Cloud
Steps	1) Click on "Use your own words" to enter a new interface.
	2) Users can enter their own texts or paragraphs, and choose the number of words, as well as the background color of the word cloud as before. [Medical professionals can utilize this functionality to paste a text from a patient's report or an HIV-related article to generate

	insights from the sources.
	Enter text The human immunodeficiency virus (HIV) targets the immune system. It weakens people's defence against many infections and some types of cancer that people with healthy immune systems can more easily fight off. As the virus destroys and impairs the function of immune cells, infected individuals gradually become immunodeficient. Immune function is typically measured by CD4 cell count. **Maximum number of words** 12 **Background color** #FFFFFF 🔊 Draw!
Expected Result	A new word cloud will be produced with 12 number of words.

ID & Description	C-7 Display Word Cloud from a CSV File
Steps	1) Click on the radio button "Upload a CSV file" to view the visualization **Word Cloud** **Word source** ○ Angola dataset ○ Use your own words ◉ Upload a CSV file **Select a file** ⓘ Browse... No file selected It must be a CSV file. **Maximum number of words** 100 **Background color** #FFFFFF Draw!

Expected Result	

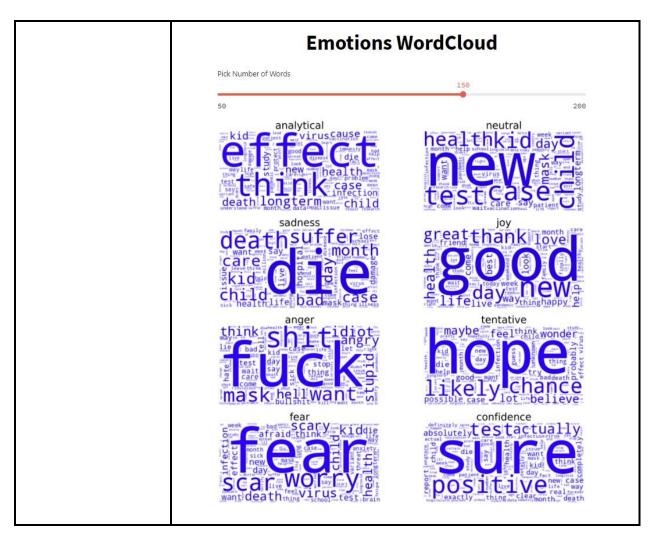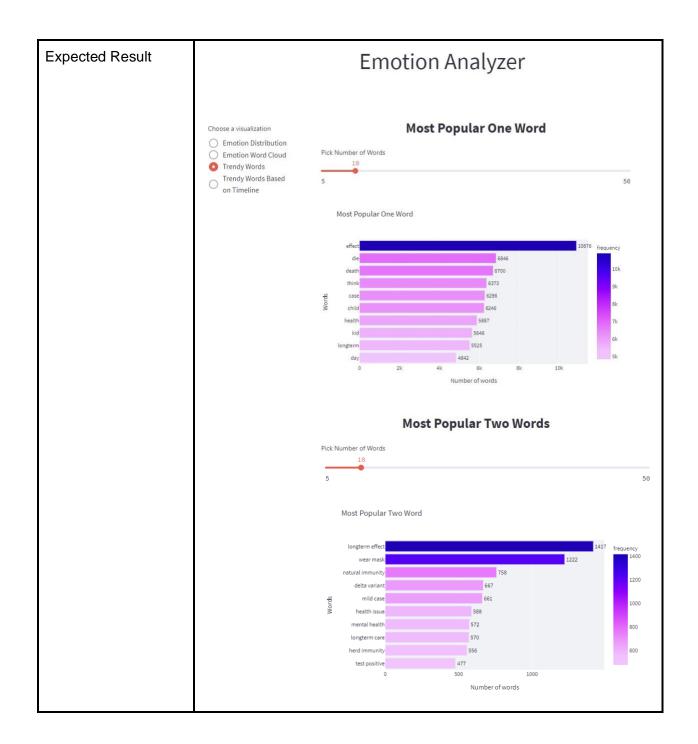| ID & Description	C-8 Select Emotion Word Cloud Visualization
Steps	1) Click on the radio button "Emotion Distribution" to view the visualization **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process.

Expected Result	
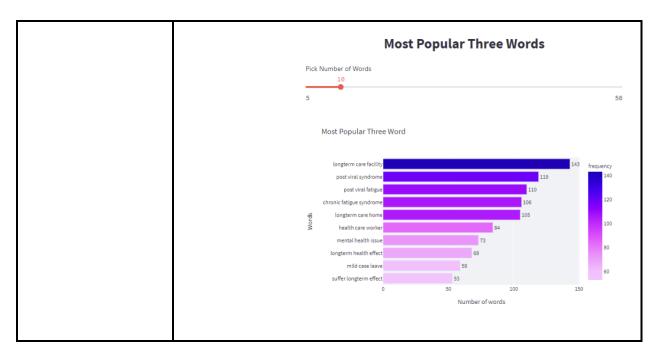
ID & Description	C-9 Select Number of Words to be Displayed in Word Cloud
Steps	1) Drag the slider to choose the desired number of words to be displayed in the word cloud **Note:** By default, 50 words is selected
Expected Result	The word cloud shown will be according to the number of words that have been chosen **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process.

Emotions WordCloud

Pick Number of Words

150

50   200

ID & Description	C-10 Select Trendy Words Visualization
Steps	1) Click on the radio button "Trendy Words" to view the visualization **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process.

Expected Result	

Most Popular Three Words

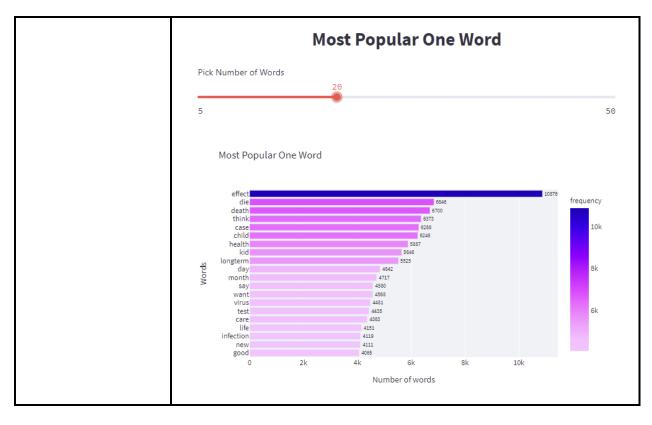| ID & Description	C-11 Select Number of Words to be Displayed in Bar Chart of Most Popular Words
Steps	1) Drag the slider to choose the desired number of words to be displayed in the bar chart **Note:** By default, 10 words is selected
Expected Result	The bar chart shown will be according to the number of words that have been chosen **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process.

Most Popular One Word

Pick Number of Words

20

5   50

Most Popular One Word

ID & Description	C-12 Select Trendy Words Based on Timeline Visualization
Steps	1) Click on the radio button "Trendy Words Based on Timeline" to view the visualization **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process. Choose a visualization ◯ Emotion Distribution ◯ Emotion Word Cloud ◯ Trendy Words 🔘 Trendy Words Based on Timeline

Expected Result	
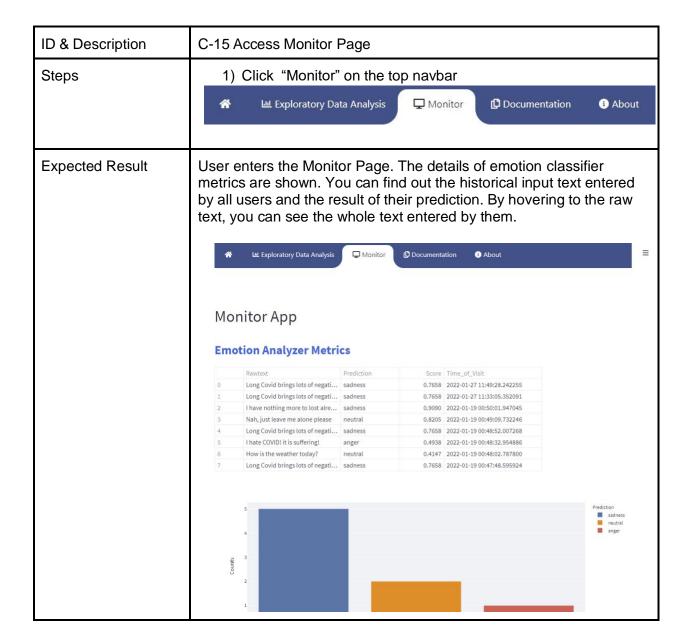
ID & Description	C-13 Select Month to be Displayed in Bar Chart of Trendy Words Based on Month
Steps	1) Select the radio button to choose the desired month to be displayed in the bar chart **Note:** By default, "May" is selected

Expected Result	The bar chart shown will be according to the month that has been chosen

IMPORTANT : It might take some time for the results to load due to the large dataset that is needed to process.

 |
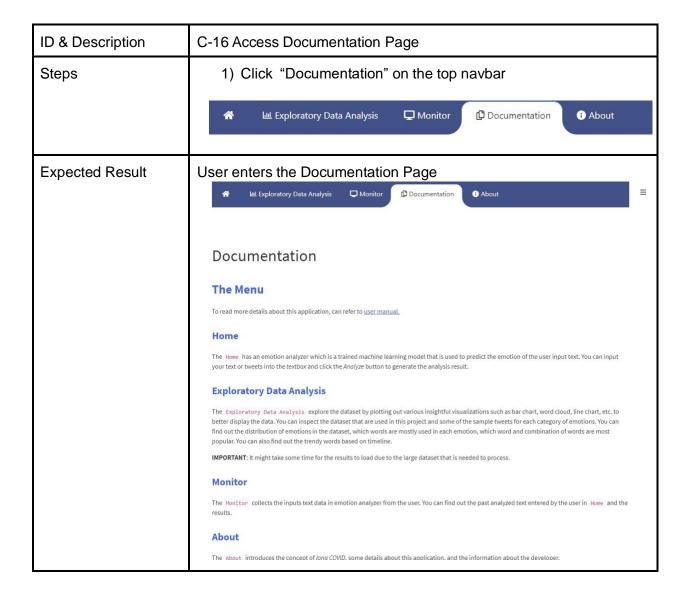
ID & Description	C-14 Select Number of Words to be Displayed in Bar Chart of Trendy Words Based on Month
Steps	1) Drag the slider to choose the desired number of words to be displayed in the bar chart
Note: By default, 10 words is selected

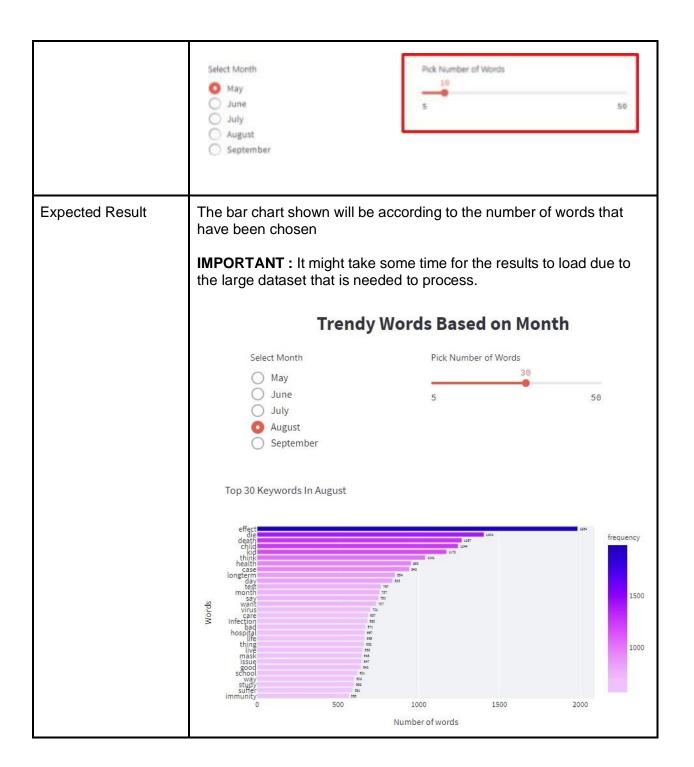|	
Expected Result	The bar chart shown will be according to the number of words that have been chosen **IMPORTANT :** It might take some time for the results to load due to the large dataset that is needed to process.

4.0 Monitor Page

ID & Description	C-15 Access Monitor Page
Steps	1) Click "Monitor" on the top navbar 🏠 📊 Exploratory Data Analysis 🖥 Monitor 📄 Documentation ℹ About
Expected Result	User enters the Monitor Page. The details of emotion classifier metrics are shown. You can find out the historical input text entered by all users and the result of their prediction. By hovering to the raw text, you can see the whole text entered by them. **Monitor App** **Emotion Analyzer Metrics** <table><tr><td></td><td>Rawtext</td><td>Prediction</td><td>Score</td><td>Time_of_Visit</td></tr><tr><td>0</td><td>Long Covid brings lots of negati...</td><td>sadness</td><td>0.7658</td><td>2022-01-27 11:49:28.242255</td></tr><tr><td>1</td><td>Long Covid brings lots of negati...</td><td>sadness</td><td>0.7658</td><td>2022-01-27 11:33:05.352091</td></tr><tr><td>2</td><td>I have nothing more to lost alre...</td><td>sadness</td><td>0.9090</td><td>2022-01-19 00:50:01.947045</td></tr><tr><td>3</td><td>Nah, just leave me alone please</td><td>neutral</td><td>0.8205</td><td>2022-01-19 00:49:09.732246</td></tr><tr><td>4</td><td>Long Covid brings lots of negati...</td><td>sadness</td><td>0.7658</td><td>2022-01-19 00:48:52.007268</td></tr><tr><td>5</td><td>I hate COVID! it is suffering!</td><td>anger</td><td>0.4938</td><td>2022-01-19 00:48:32.954886</td></tr><tr><td>6</td><td>How is the weather today?</td><td>neutral</td><td>0.4147</td><td>2022-01-19 00:48:02.787800</td></tr><tr><td>7</td><td>Long Covid brings lots of negati...</td><td>sadness</td><td>0.7658</td><td>2022-01-19 00:47:48.595924</td></tr></table>

5.0 Documentation Page

ID & Description	C-16 Access Documentation Page
Steps	1) Click "Documentation" on the top navbar
Expected Result	User enters the Documentation Page

6.0 About Page

ID & Description	C-17 Access About Page
Steps	1) Click "About" on the top navbar
Expected Result	User enters the About Page