Modeling And Prediction Of Infectious Disease Cases In Iloilo City Using Multiple Linear Regression

by Arsenio et al.

USER MANUAL

MODELLING AND PREDICTION OF INFECTIOUS DISEASE CASES IN ILOILO CITY USING MULTIPLE LINEAR REGRESSION

In Partial Fulfilment
of the Requirements for the Degree
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

by

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Deployment Guide

I. Getting Started

A. The application is currently accessible through the link : https://mlrfinal.streamlit.app/

1. You will be navigated to the Welcome/Home menu (Figure 1) where we give a brief explanation and methodology we used to explain the usage of Multiple Linear Regression within our Data. The checkboxes in the **Dataset Options for Viewing** will allow users to see said methodologies.

B. If you choose to deploy the application locally, please proceed to **Installation** (Page 6) section for more details.

Figure 1: Welcome/Home Menu

II. System Requirements

A. For the web version of the application that is already deployed with the help of Streamlit, we recommend the two most recent versions of the following browsers when accessing the application:

1. Google Chrome
2. Firefox
3. Microsoft Edge
4. Safari

B. For deploying the application on a local server, here are the following requirements:

1. Python: Streamlit currently supports versions 3.7, 3.8, 3.9, 3.10, and 3.11 of Python.
2. Operating system: Streamlit is currently supported on Windows and macOS/Linux operating systems.
3. Editor: Streamlit runs on almost all IDE's. For this project we decided to use Pycharm.
4. Dependencies: Since the application uses external libraries such as Pandas, Matplotlib, Scikit-learn, etc, a "requirements.txt" file is added to the project link and this is installed with the help of pip after installing your desired version of Python.

III. Installation

A. Accessing Online

1. No external Installation is needed to run the web application (Unless you wish to deploy it locally, please refer to **part B of Installation** for more details). Though we recommend referring to the **System Requirements** (Page 5) section to verify which browsers are supported to access and utilize the application.

B. Deploying in Local Server

1. Clone or save the project from this link: https://github.com/arlekaidot/Thesis_Edits
2. Install the required (please check requirements) applications/dependencies such as:
    a) Your browser of choice
    b) Your IDE of choice
    c) A compatible version of Python
    d) The dependencies from requirements.txt on the project link (install with pip)
3. The main Python file to be used in the project is named "Welcome.py", we open this file with our IDE of choice and run the file in the terminal. This can be done with the command "streamlit run Welcome.py". If successful, this would show that the application can be viewed with a local/network URL (Figure 2).
    a) A common error that would occur is if one or more dependencies haven't been previously installed with pip. Please refer to **System Requirements section B, item no. 4 to troubleshoot.** This is also true if one or more sections of the web application display an error message.
    b) If successful, you will be greeted with the same welcome screen as the already deployed application but with a different url:

Figure 2: Local and Network URL

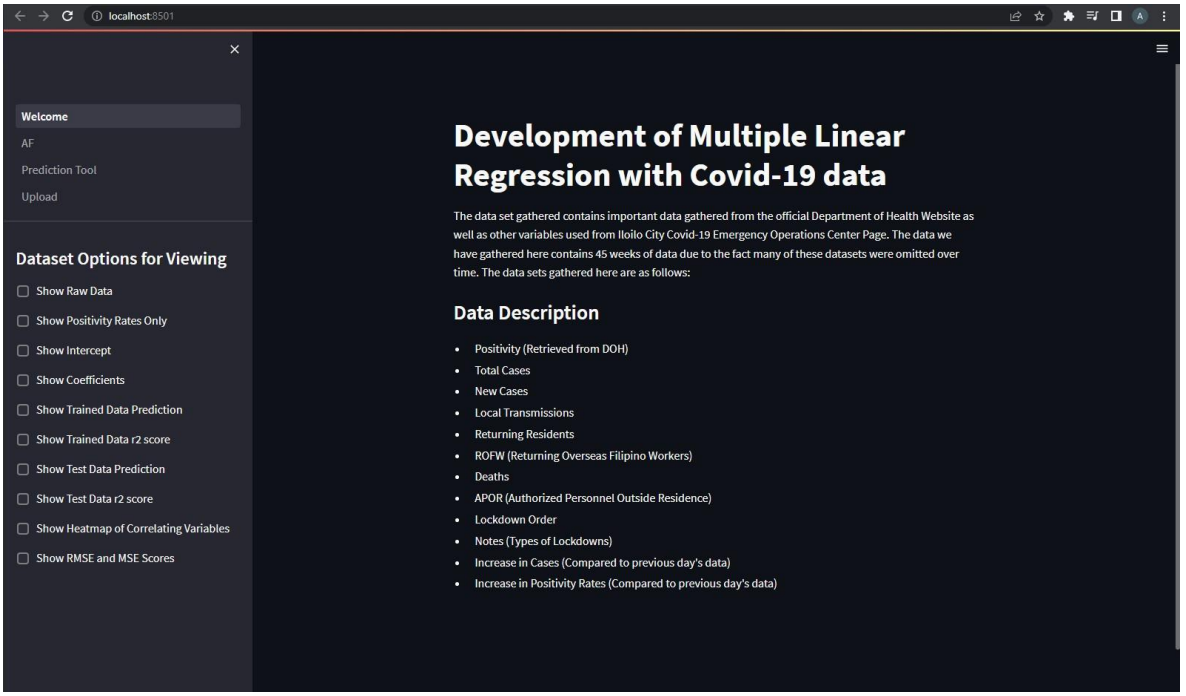


Figure 1: Welcome Window

IV. Usage

Currently, the web application has 3 main features:

-Automatic Forecasting via uploading a csv file (with the help of PythonAF or Python Automatic Forecasting)

-Manual Forecasting via manually inputting variable inputs and displaying a forecast value (with the help of Multiple Linear Regression)

-Forecasting and prediction of values through set timeframes with Multiple Linear Regression via uploading a csv file.

Automatic Forecasting

1. For Python Automatic Forecasting, select the "AF" option on the sidebar and this will lead you to the AF page of the application(Figure 3).

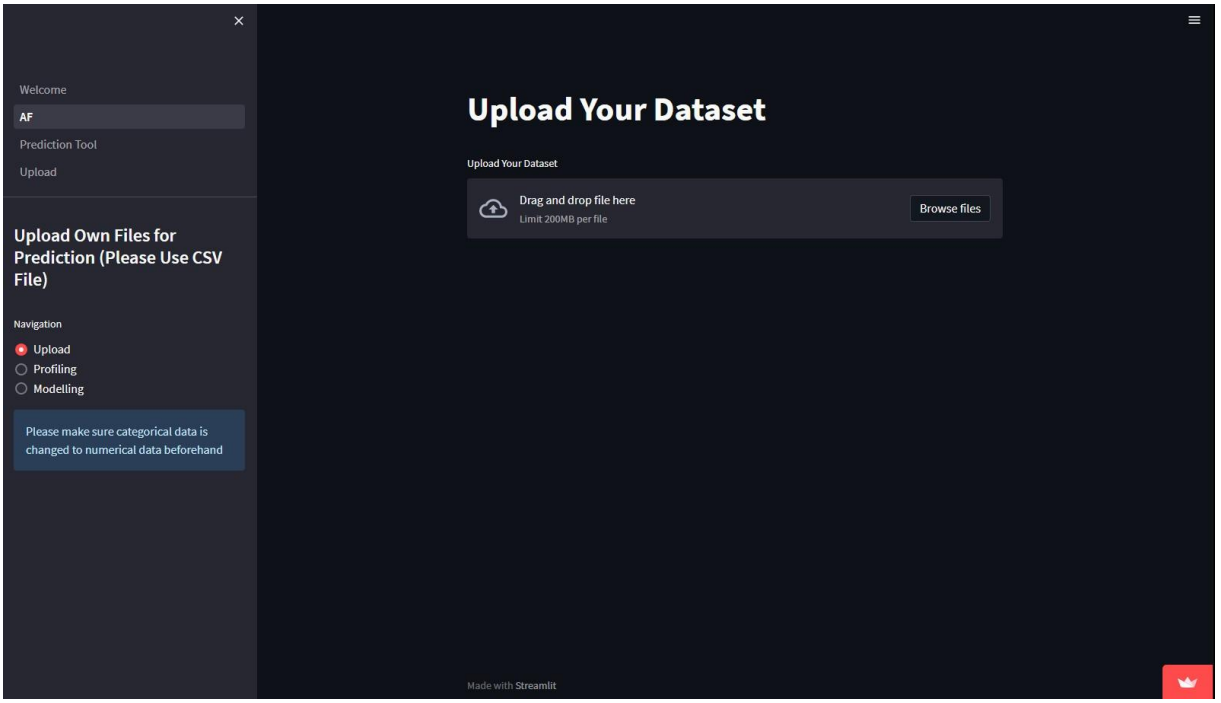
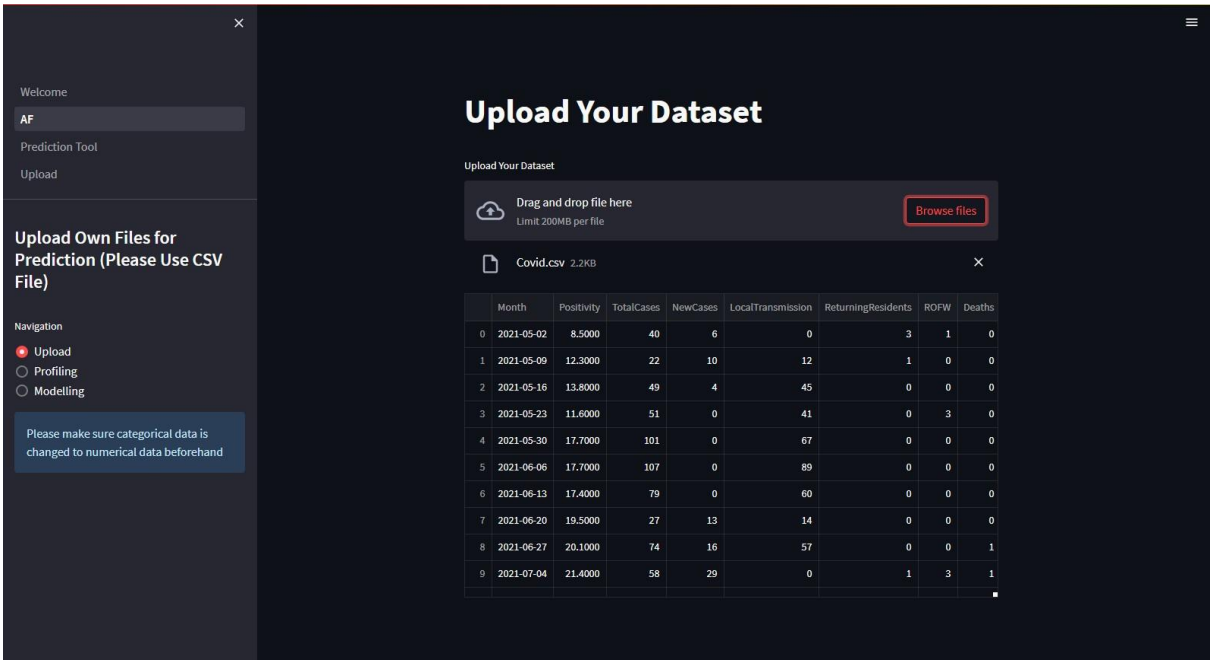


Figure 3: AF Upload Menu

2. This will prompt you to upload a CSV file for the prediction algorithm (Figure 4). (If you receive an error please refer to the troubleshooting guide. (Pages 19-20))



	Month	Positivity	TotalCases	NewCases	LocalTransmission	ReturningResidents	ROFW	Deaths
0	2021-05-02	8.5000	40	6	0	3	1	0
1	2021-05-09	12.3000	22	10	12	1	0	0
2	2021-05-16	13.8000	49	4	45	0	0	0
3	2021-05-23	11.6000	51	0	41	0	3	0
4	2021-05-30	17.7000	101	0	67	0	0	0
5	2021-06-06	17.7000	107	0	89	0	0	0
6	2021-06-13	17.4000	79	0	60	0	0	0
7	2021-06-20	19.5000	27	13	14	0	0	0
8	2021-06-27	20.1000	74	16	57	0	0	1
9	2021-07-04	21.4000	58	29	0	1	3	1

Figure 4: AF File Upload Menu

3. The Profiling option will then generate a report on the data gathered from the csv file for further viewing.

	Month	Positivity	TotalCases	NewCases	LocalTransmission	ReturningResidents	ROFW	Deaths
0	2021-05-02	8.5000	40	6	0	3	1	0
1	2021-05-09	12.3000	22	10	12	1	0	0
2	2021-05-16	13.8000	49	4	45	0	0	0
3	2021-05-23	11.6000	51	0	41	0	3	0
4	2021-05-30	17.7000	101	0	67	0	0	0
5	2021-06-06	17.7000	107	0	89	0	0	0
6	2021-06-13	17.4000	79	0	60	0	0	0
7	2021-06-20	19.5000	27	13	14	0	0	0
8	2021-06-27	20.1000	74	16	57	0	0	1
9	2021-07-04	21.4000	58	29	0	1	3	1

Figure 5: Generating Profile Report

4. Users may then view the Overview (Figure 6), Alerts (Figure 7), as well as the Reproduction tab (Figure 8), which will allow them to download a.json file that can be used for external data us shown in the figures.

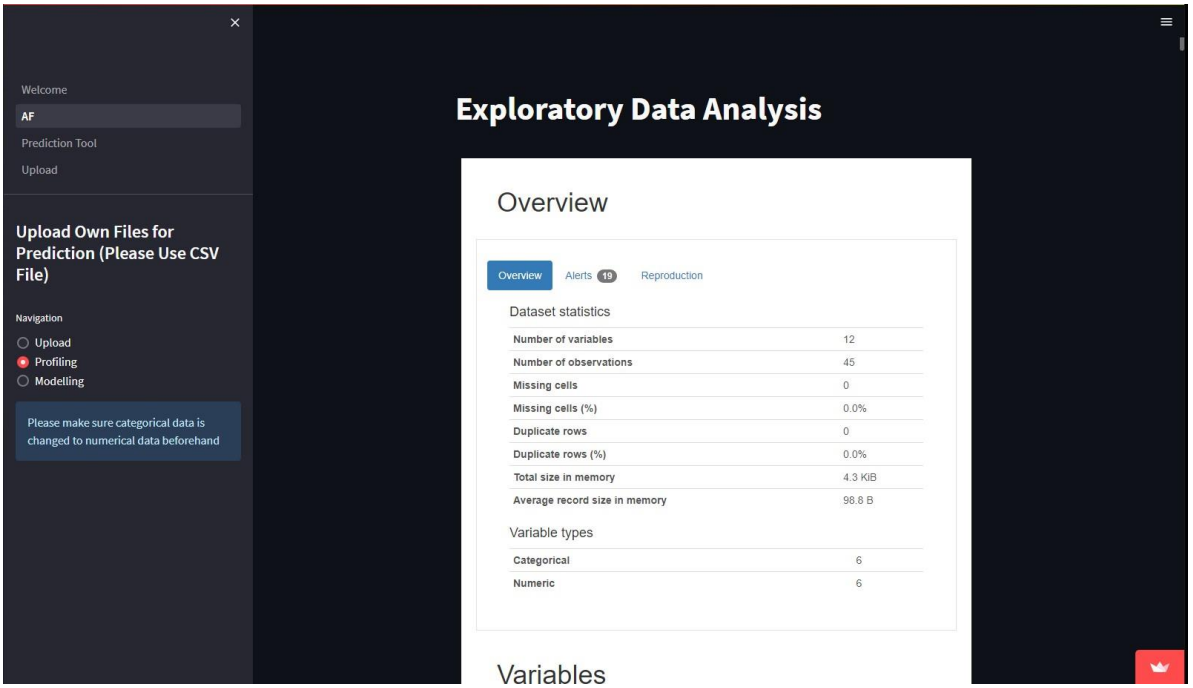


Figure 6: Profiling Menu Overview

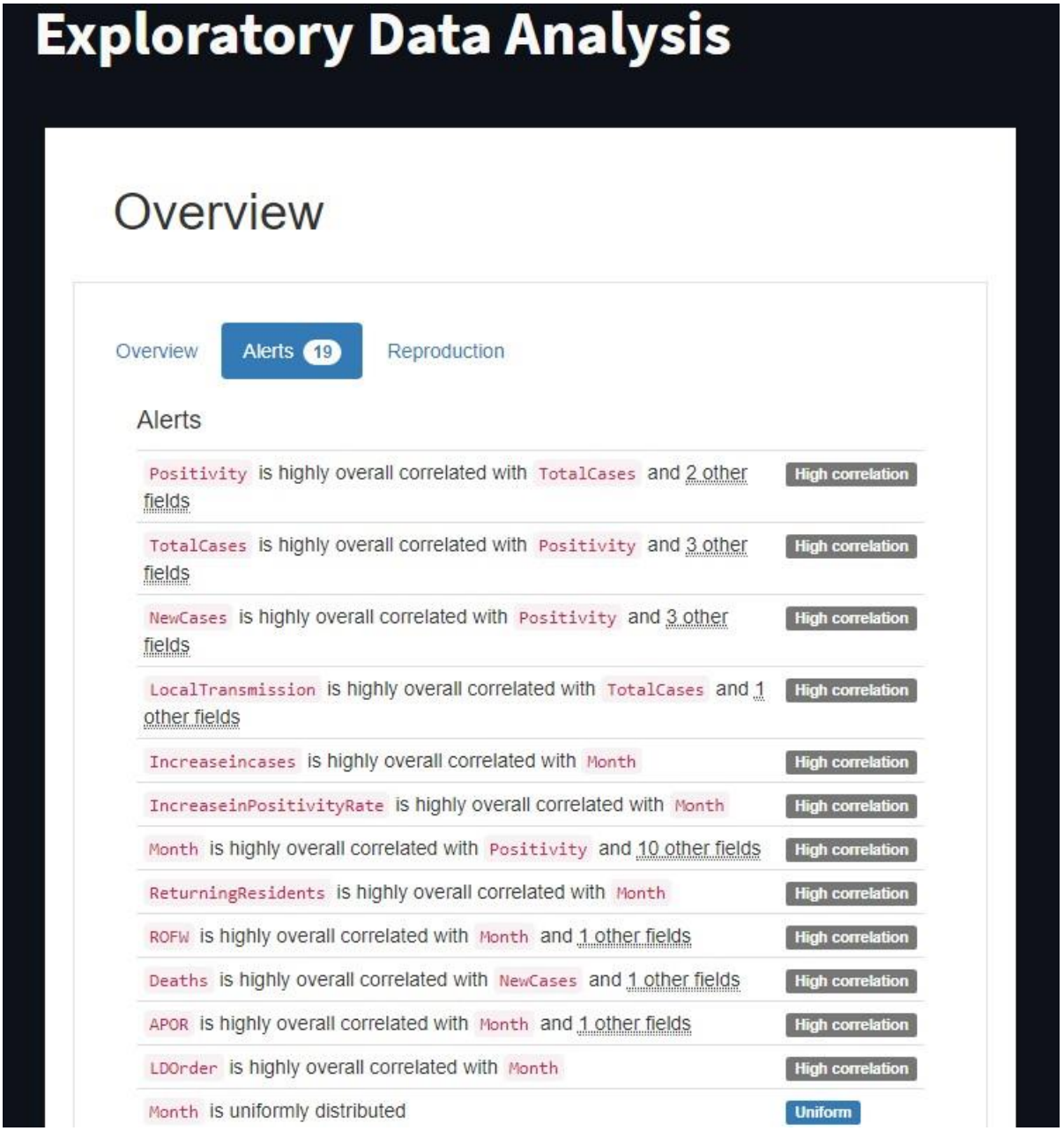


Figure 7: Profiling Menu Alerts

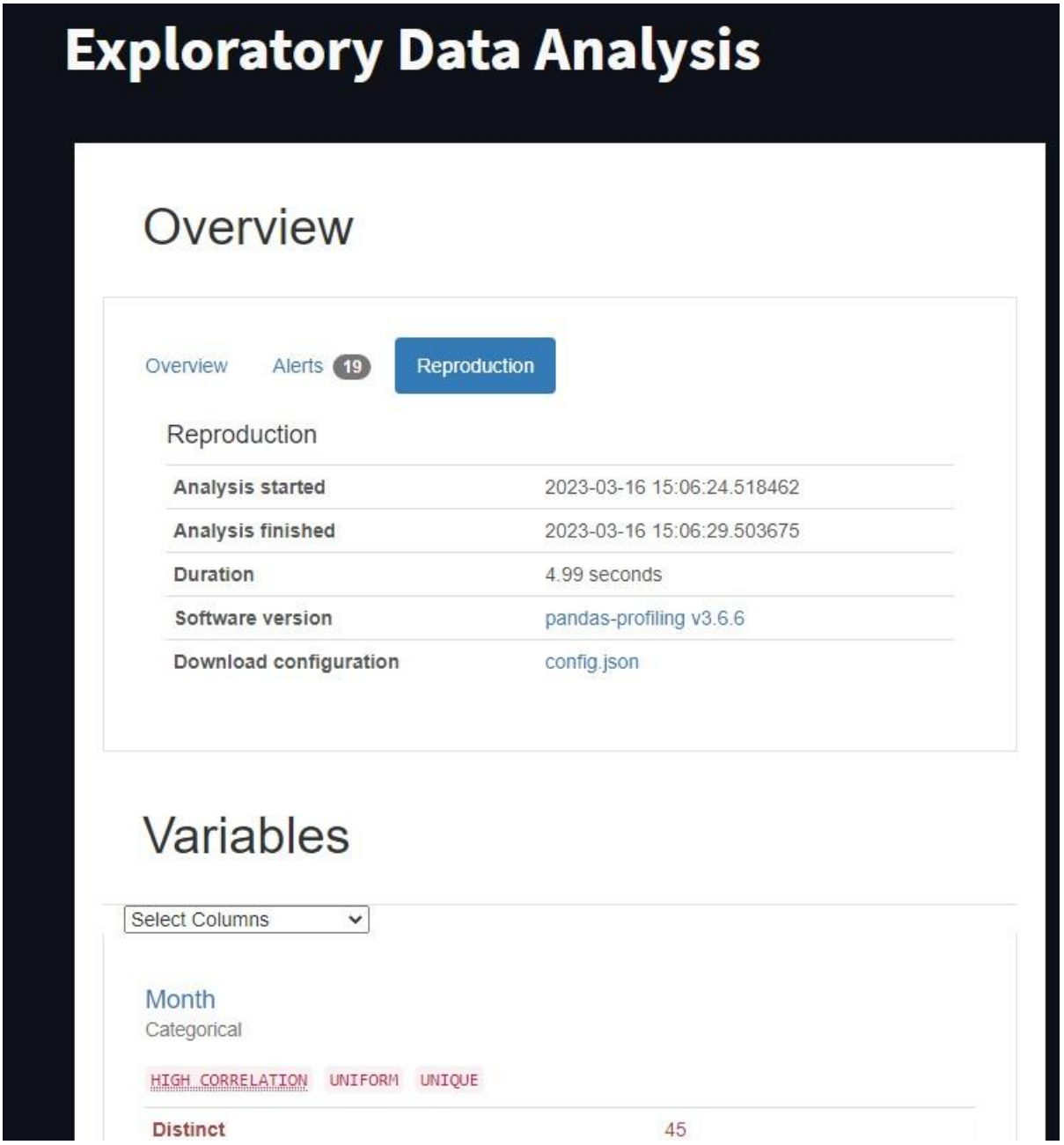


Figure 8: Profiling Menu Reproduction

5. Users may then opt to see the actual data modelling process by clicking the modelling tab followed by selecting the specific variables followed by the **Run Modelling**(Figure 9) function.

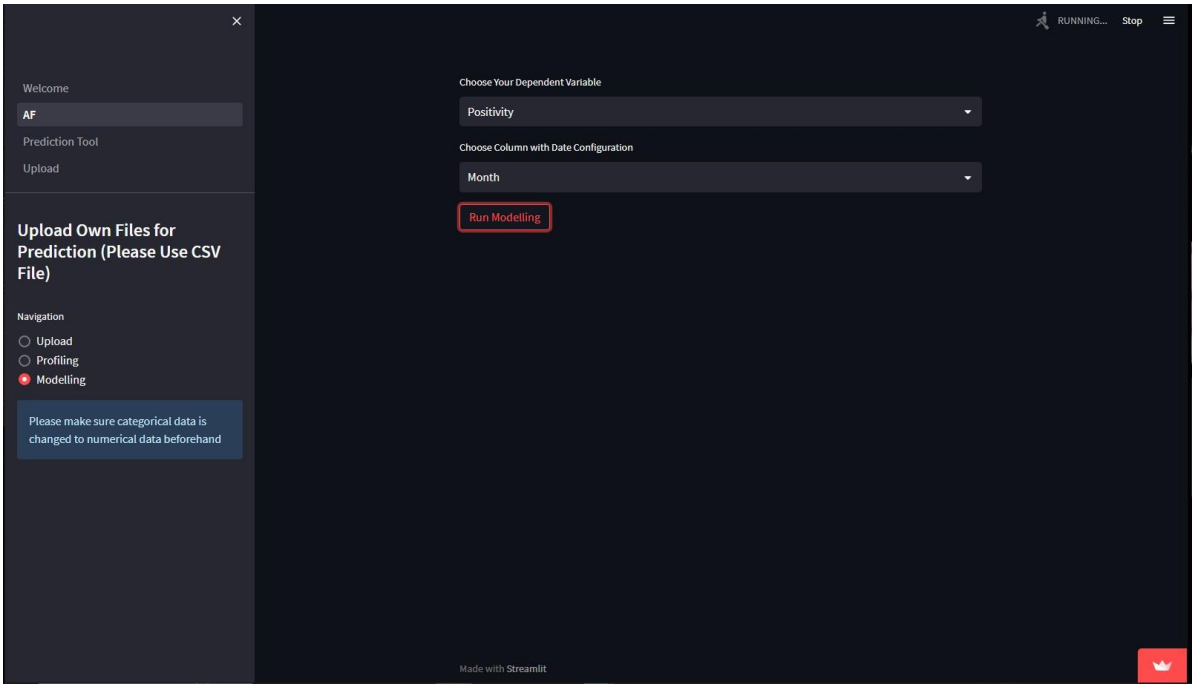


Figure 9: Modeling Tab

6. The modelled data is then displayed for interpretation.

	Month	Positivity	Positivity_Forecast	Positivity_Forecast_Upper_Bound	Positivity_Forecast
0	2021-05-02T00:00:00	8.5000	8.5000	0.0000	
1	2021-05-09T00:00:00	12.3000	12.3000	0.0000	
2	2021-05-16T00:00:00	13.8000	13.8000	0.0000	
3	2021-05-23T00:00:00	11.6000	11.6000	0.0000	
4	2021-05-30T00:00:00	17.7000	17.7000	0.0000	
5	2021-06-06T00:00:00	17.7000	17.7000	0.0000	
6	2021-06-13T00:00:00	17.4000	17.4000	0.0000	
7	2021-06-20T00:00:00	19.5000	19.5000	0.0000	
8	2021-06-27T00:00:00	20.1000	20.1000	0.0000	
9	2021-07-04T00:00:00	21.4000	21.4000	0.0000	

Figure 10: Result and Interpretation

Manually Inputting Values

1. Navigate to the Prediction Tool Page of the app.

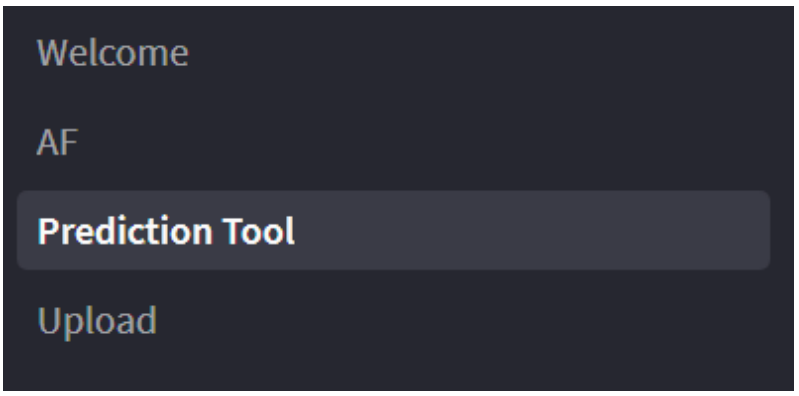


Figure 11: Prediction Tool Menu

2. Users may opt to input values to predict the positivity rate. Even leaving the data at 0 yields a result since this was during a period where Covid Cases were still being recorded.

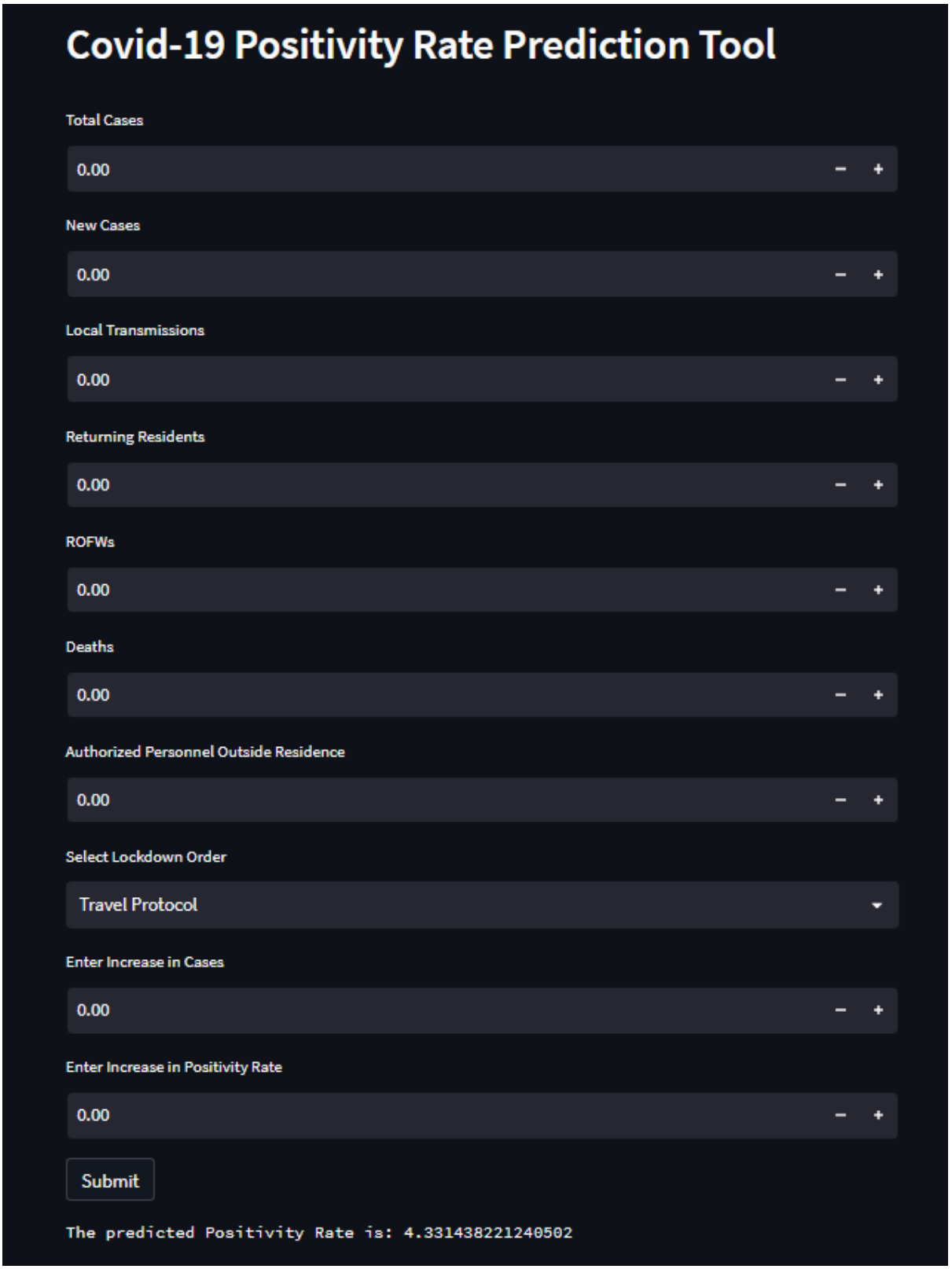


Figure 12: Prediction Tool Window

Multiple Linear Regression

1. Similar to Automatic Forecasting, users will have a similar experience when visiting this tab, the only difference is the ability to change the Test Size as well as having a fixed dependent variable.

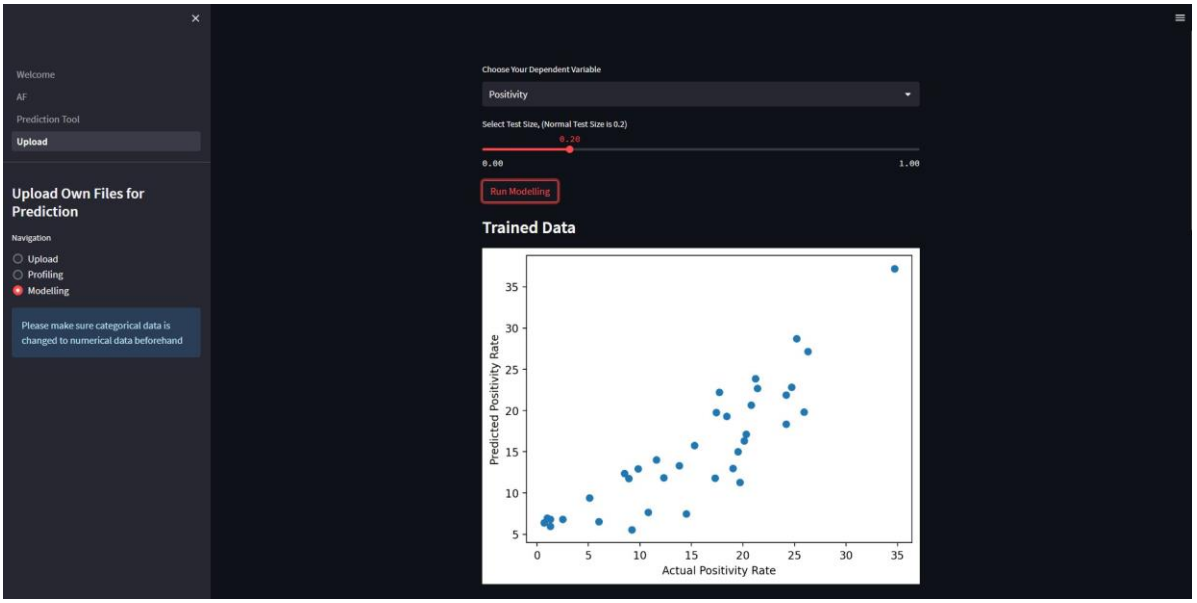


Figure 13: Trained Data Result

2. Users can click "Run Modelling" to get the results of using the algorithm.

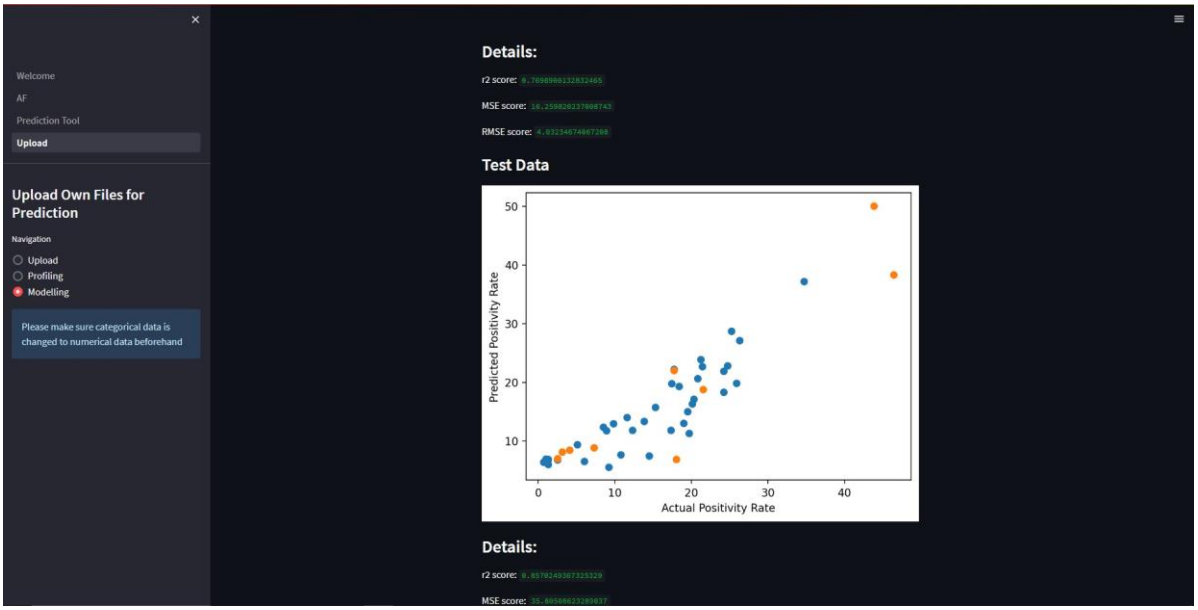


Figure 13: Test Data Result

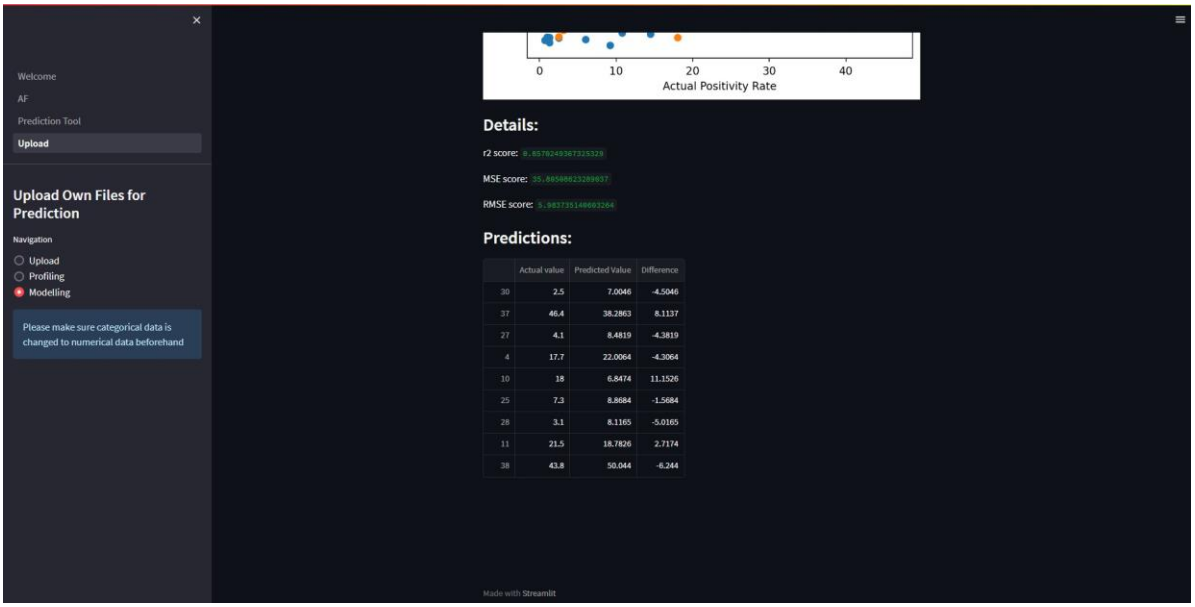


Figure 14: Data Prediction Result

V. Troubleshooting for fixing possible bugs

A. Deployment

1. Most bugs or errors would occur if the user chooses to deploy the application locally rather than use the application that has already been deployed by the team. For instance these could be but are not limited to:
    a) Missing dependencies
        (1) Please refer to the requirements section of the guide to check if you are missing any dependencies. If the application successfully runs on the Streamlit engine, sections of the application will display error messages referring to the dependency that is missing.
        (2) If the application is not running at all or is not displaying on the Streamlit browser, this is most likely caused by not having Streamlit installed with pip.
        (3) Please check Streamlit's official documentation for any changes or errors that might be happening with the version you are using.
        (4) Streamlit has specific conventions on how to properly deploy an app with Github. For more information, please visit https://docs.streamlit.io/streamlit-community-cloud/get-started/deploy-an-app
    b) Version Errors
        (1) Please check the requirements section to see which versions of the tools we recommend to use for the application to run successfully.
    c) Application Errors
        (1) Our application only utilizes **.csv** extensions. If you upload a different file format on the upload sections, this will display an error such as the one below:

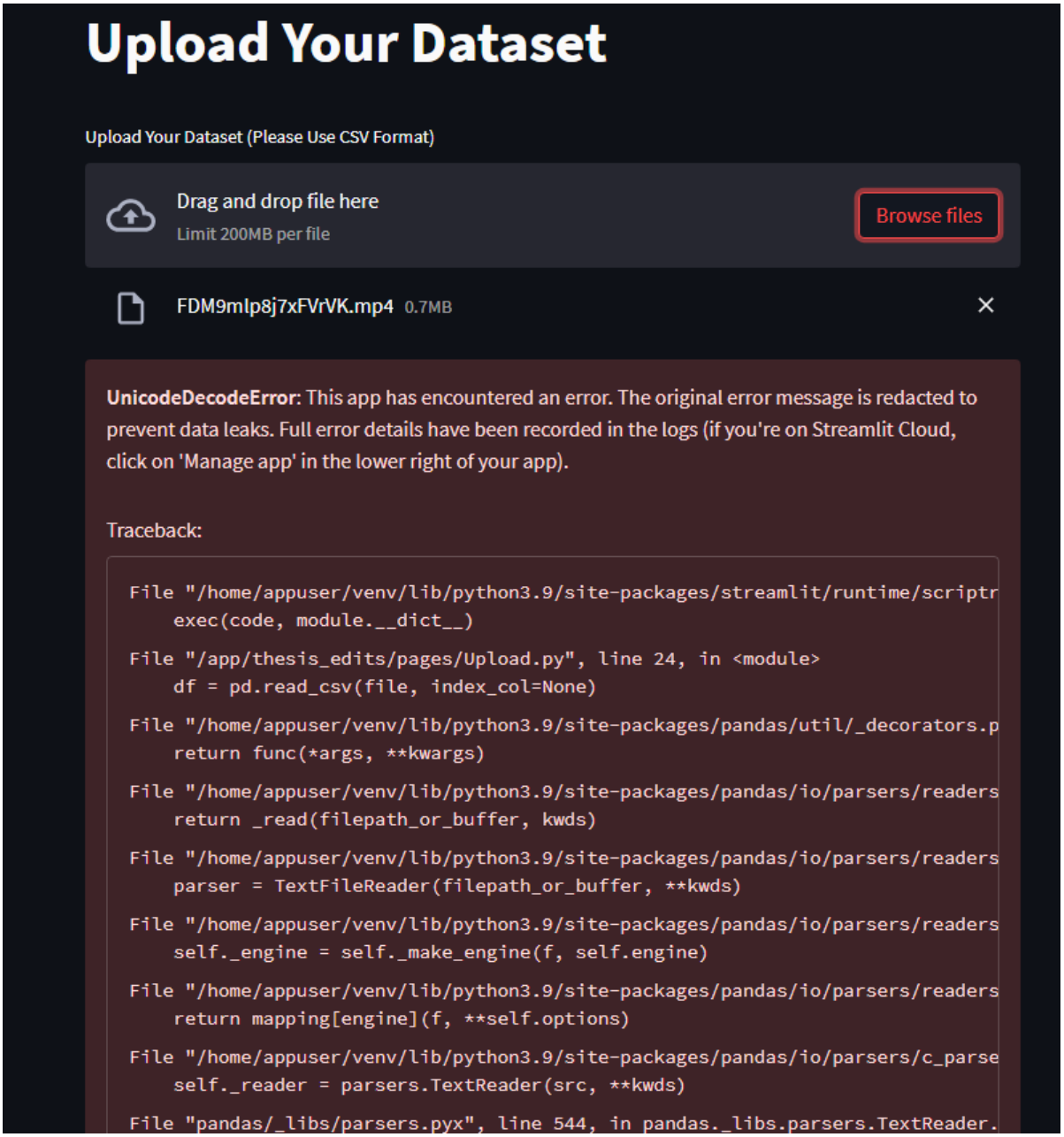


Figure 13: Error

VI. Frequently Asked Questions

Q: Who is the application made for? What goal did your team want to achieve?

A: The application is free to use for anyone but we focused on making it a useful tool for health professionals and government officials to have a better way to analyze and interpret Covid Data as well as show the strengths of algorithms in trying to combat Covid-19 as a whole through predicting positivity rates.

Q: Is your application free to use? Do you plan to monetize this application?

A: Yes, since Streamlit is a free to use platform that isn't gated behind premium tiers, the application is free to use and can be deployed locally for free.

Q: I noticed that on your project, you have a .pkl file or a pickle file. What is this used for?

A: We utilized pickle to streamline how our application reads data to be used for our Algorithm and is also used to store the algorithm/s used. If you wish to replicate or download the pickle file for your own data science project, feel free to do so by getting it from the project link.

Q: Do you have plans to continually update or improve the application being used?

A: We have lots of ideas to further improve the innovativeness of our application such as giving it the ability to extract live data and improving the algorithm and results by itself. Unfortunately, the sources of Covid Data are not as concise as we would want it to be. However, if you wish to use this application as inspiration for creating a project with more Covid Data, our project link is always public.

Q: How do you ensure the deployed application cannot be tampered with or changed to skew data results?

A: The application uses the configuration which was deployed on Github. If we wish to make any changes we would have to redeploy the application with Streamlit again and any changes are documented within the repository on Github as well. Locally deployed versions of the application with different datasets might skew the results if changes are made.

Q: Is this application accessible through mobile phones?

A: Yes, since it is a web application - mobile phones with browsers can easily access our application.

Q: Do you plan to deploy it as a standalone application?

A: Currently, no. We feel the web version is sufficient and also removes the need to install anything either on your phone or on operating systems.

Q: Is it possible to deploy any modifications we've made to the application to Streamlit as well?

A: For deployment to Streamlit please check their documentation here: https://docs.streamlit.io/streamlit-community-cloud/get-started/deploy-an-app

VII. Contact Details

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