

# **User Guide for Interactive U.S. Map of Respiratory Deaths and Air Pollution by County**

DEATH\_and\_POLLUTION Group

CSE 583, Fall 2019

## Step 1:

Clone the following GitHub project repository using the command:

git clone [https://github.com/nghitrampham/DEATH\\_and\\_POLLUTION.git](https://github.com/nghitrampham/DEATH_and_POLLUTION.git)

## Step 2:

Navigate to the Interactive\_Map/ directory by following the below path within the cloned GitHub Repo:

“/DEATH\_and\_POLLUTION/air\_pollution\_death\_rate\_related/Interactive\_Map”

This directory will contain the following files:

```
Brandon Pratt@DESKTOP-AHVPLNH MINGW64 ~/Desktop/CSE583/Final_Project/DEATH_and_POLLUTION/air_pollution_death_rate_related/Interactive_Map (master)
$ ls
AQI_sample.csv          deathrate_countydata.csv  interactive_map.py
combined_air_data_2000_2019.csv  export_cor.csv           Pylint_Score_interactive_map_script.jpg
```

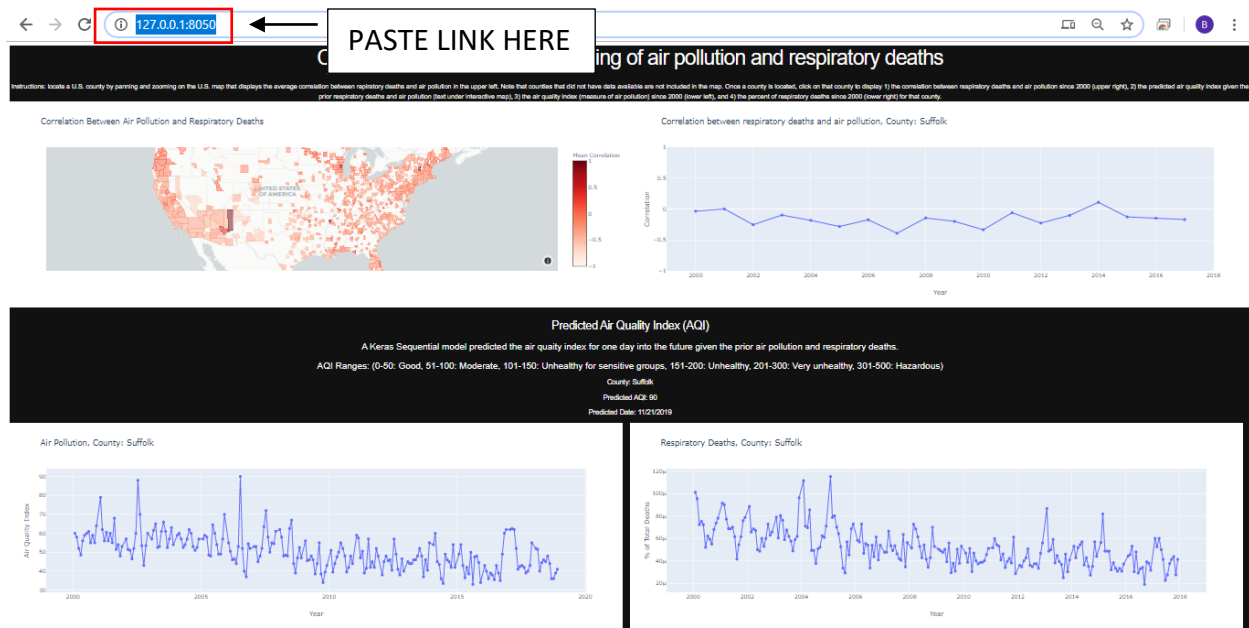
## Step 3:

Run the python module called “interactive\_map.py” to generate the html link for the interactive map (see below):

```
Brandon Pratt@DESKTOP-AHVPLNH MINGW64 ~/Desktop/CSE583/Final_Project/DEATH_and_POLLUTION/air_pollution_death_rate_related/Interactive_Map (master)
$ python interactive_map.py
* Serving Flask app "interactive_map" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
* Running on http://127.0.0.1:8050/ (Press CTRL+C to quit)
```

## Step 4:

Copy the generated html link (i.e. <http://127.0.0.1:8050/>) and paste it into a web browser (e.g. Google Chrome) to launch the interactive map interface:



*Interactive map launched through Chrome.*

## Step 5:

Browse the startup interface to understand get of the interface's components (description of interface components highlighted where the numbers on the screen shots correspond to the numbered descriptions below):

- 1) Project Title: "Correlation and predictive modeling of air pollution and respiratory deaths".
- 2) Instructions on how to use the interface: "Instructions: locate a U.S. county by panning and zooming on the U.S. map that displays the average correlation between respiratory deaths and air pollution in the upper left. Note that counties that did not have data available are not included in the map. Once a county is located, click on that county to display 1) the correlation between respiratory deaths and air pollution since 2000 (upper right), 2) the predicted air quality index given the prior respiratory deaths and air pollution (text under interactive map), 3) the air quality index (measure of air pollution) since 2000 (lower left), and 4) the percent of respiratory deaths since 2000 (lower right) for that county."
- 3) Interactive U.S. map that shows the mean correlation of the respiratory deaths and air pollution across U.S. counties. One can zoom, pan, and click on the map.

Clicking on a county updates graphs and text sections 3-8 to show that county's data.

4) Time series (15 years) of the correlation between respiratory deaths and air pollution for a chosen county.

5) Predicted Air Quality Index description box that states, "Predicted Air Quality Index (AQI), A Keras Sequential model predicted the air quality index for one day into the future given the prior air pollution and respiratory deaths. AQI Ranges: (0-50: Good, 51-100: Moderate, 101-150: Unhealthy for sensitive groups, 151-200: Unhealthy, 201-300: Very unhealthy, 301-500: Hazardous)". This description explains how the predicted AQI was determined and what the AQI value means in terms of respiratory health.

6) Updated county name, predicted AQI, and the date that the AQI is predicted for when a county is clicked on.

7) Time series (15 years) of the air quality index for a chosen county.

8) Time series (15 years) of the percent respiratory deaths for a chosen county.

## Correlation and predictive modeling of air pollution and respiratory deaths

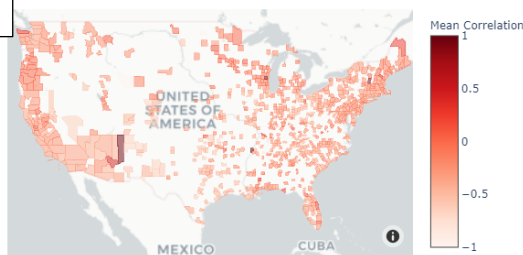
1

2

Instructions: locate a U.S. county by panning and zooming on the U.S. map that displays the average correlation between respiratory deaths and air pollution in the upper left. Note that counties that did not have data available are not included in the map. Once a county is located, click on that county to display 1) the correlation between respiratory deaths and air pollution since 2000 (upper right), 2) the predicted air quality index given the prior respiratory deaths and air pollution (text under interactive map), 3) the air quality index (measure of air pollution) since 2000 (lower left), and 4) the percent of respiratory deaths since 2000 (lower right) for that county.

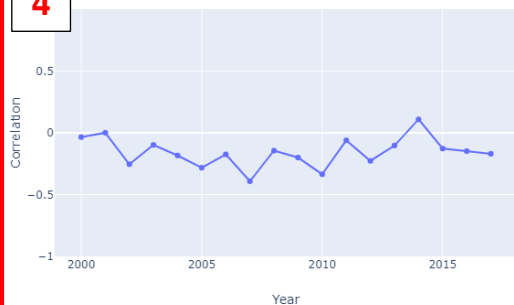
Correlation Between Air Pollution and Respiratory Deaths

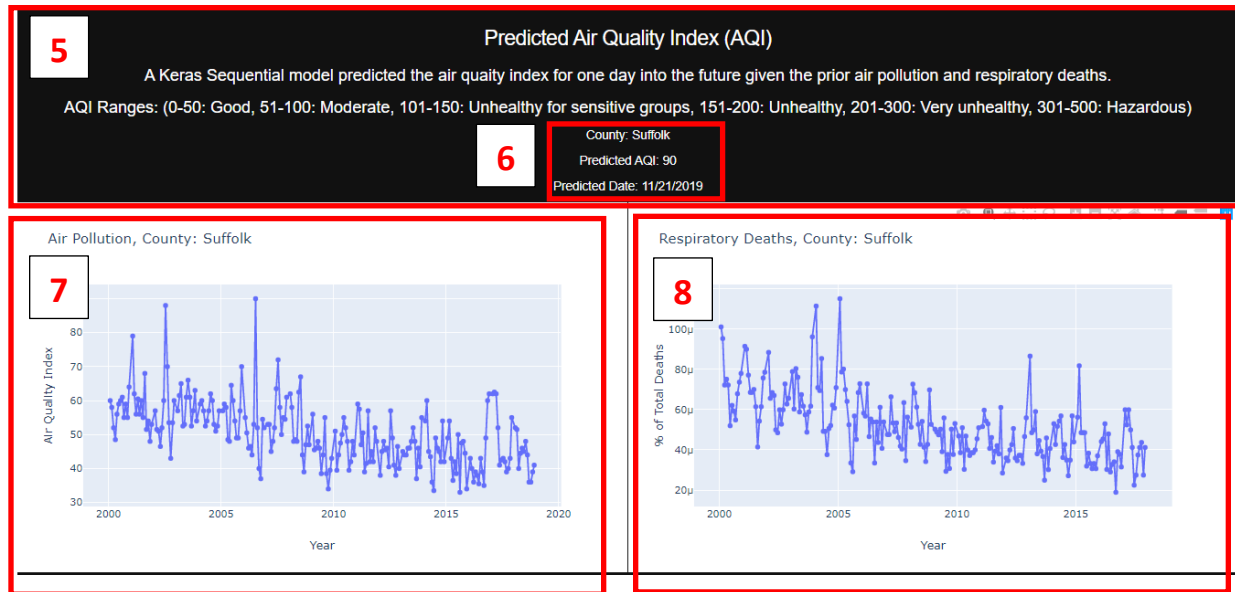
3



Correlation between respiratory deaths and air pollution, County: Suffolk

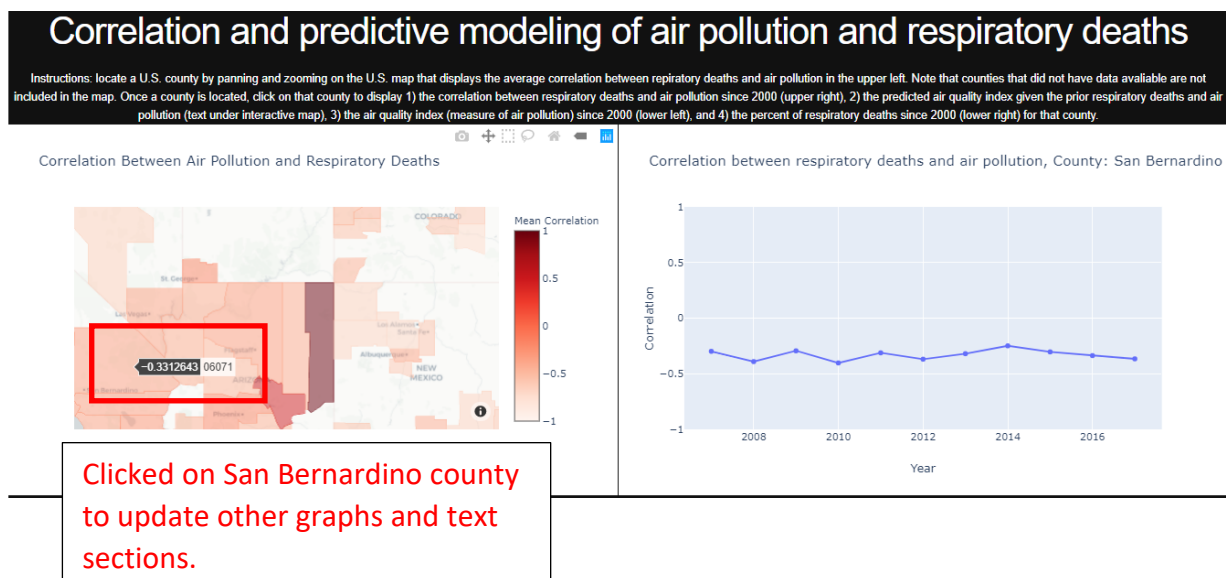
4





## Step 6:

Zoom and pan on the U.S. map displaying the mean correlation of the respiratory deaths and air pollution across counties to locate a particular county. Then click on a specific county with the mouse cursor to update the time series of the correlation, air pollution (AQI), percent respiratory deaths, and the predicted AQI for the following day of the time series. Below the county of San Bernardino was clicked upon and the associated data for that county was displayed on the updated graphs and text sections.



## Predicted Air Quality Index (AQI)

A Keras Sequential model predicted the air quality index for one day into the future given the prior air pollution and respiratory deaths.

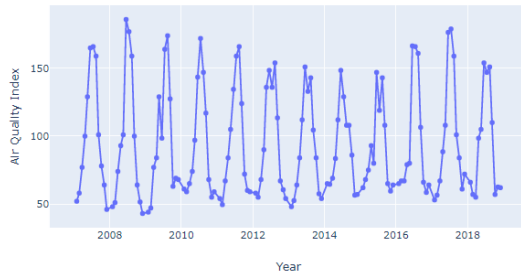
AQI Ranges: (0-50: Good, 51-100: Moderate, 101-150: Unhealthy for sensitive groups, 151-200: Unhealthy, 201-300: Very unhealthy, 301-500: Hazardous)

County: San Bernardino

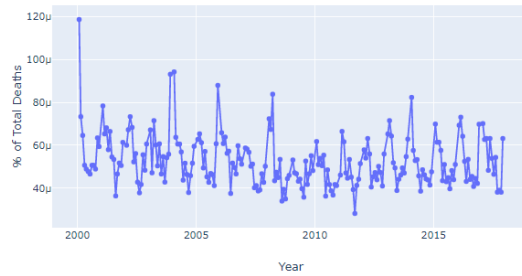
Predicted AQI: 51

Predicted Date: 11/21/2019

Air Pollution, County: San Bernardino



Respiratory Deaths, County: San Bernardino



## Step 7:

Have fun exploring!

