GUI POWERED BY PYTHON FOR VISUALIZATION AND ANALYSIS OF AIR POLLUTION DATA FOR MAJOR CITIES

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Domain

Environment

Problem Statement

To show the trend in AQI and other pollutant levels as a Time-Series Plot and analyse the effect of COVID-19

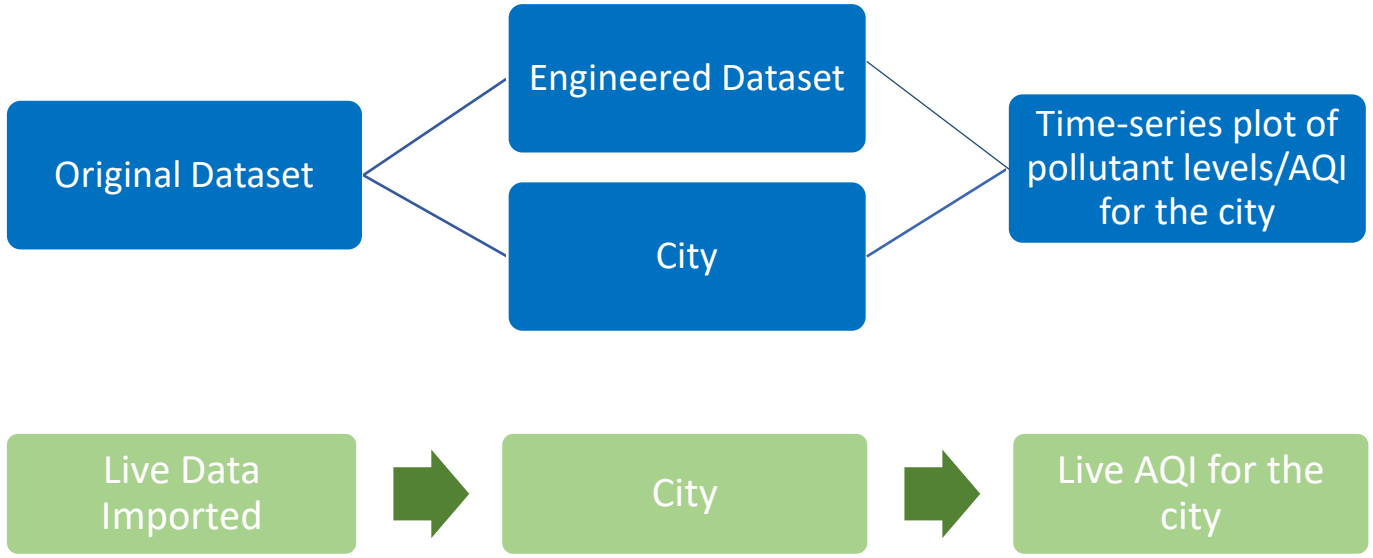
Approach

The dataset of AQI and levels of other pollutants in atmosphere was obtained from aqicn.org . Using this dataset, a GUI was built showing the evolution of pollutant levels in atmosphere from 2015 to 30th April 2020. It is noteworthy that the complete dataset for the COVID-19 period has been included for a thorough analysis. This clearly demonstrates the significant effect of COVID-19 and associated reduction in environmental air pollution. The user can easily understand this using various interactive plots and AQI parameters.

All influencing factors have varied impact on pollution levels and comparison of pollution levels in different cities in COVID time helps in a better global understanding.

The interface also displays live Air Quality Index (AQI) in major cities. The data analysis has shown us that there is a definite declining trend in AQI levels in most of the major cities during COVID-19 period.

Architectural design



Benefits

- ✓ Quick overview of environmental impact of COVID-19
- ✓ As a reference to data scientists looking at how COVID-19 mortality rate correlates with pollutant levels in atmosphere
- ✓ Can serve as a starting point for predictive modelling of pollutant levels once the human activity becomes normal

Softwares Used

Python 2.7.2 - NumPy, Matplotlib, Pandas, Requests, TkInter

MS Excel

GitHub

Google Drive

Dependencies

To run the GUI python app, you need the following:

1. Data (format given as per AQICN Database) (.xlsx or .csv)

Data set for AQI, SO_2, NO_2, CO PM10 and PM25 uploaded on GitHub

1. WAQI Token, to access live air quality index (waqitoken.txt) – Use strictly limited to only open source use
2. List of major cities (MajorCities.py)
3. GUI python app (main_COVID_pollution_tracker.py)

PLATFORM STRENGTHS

- **Before and After AQI values** to understand COVID-19 impact
- **Real-time** data integration of 500+ Major Cities
- **Comparison** between Air Quality of multiple cities
- In-built data file of **615 cities**
- Air Quality **Trend Evaluation**
- AQI **Forecast Model** can be developed in future
- Multiple Air Quality parameter evaluation

MEASURABLE INDICES

- ✓ PM 10
- ✓ PM 2.5
- ✓ SO2
- ✓ NO2
- ✓ O3
- ✓ AQI

Social Impact Analysis during COVID19

The platform will provide insights how pollutant levels in air have fallen down significantly due to inactivity during COVID-19. This gives the public a quick overview on how the air quality around them have evolved during this pandemic. Further it provides live data on air quality which is extremely useful information for people living in highly polluted or densely populated area. According to recent Harvard research, there is a positive correlation between COVID-19 death rates and air pollution, people can use this interface and exercise appropriate level of cautiousness.

Platform Link

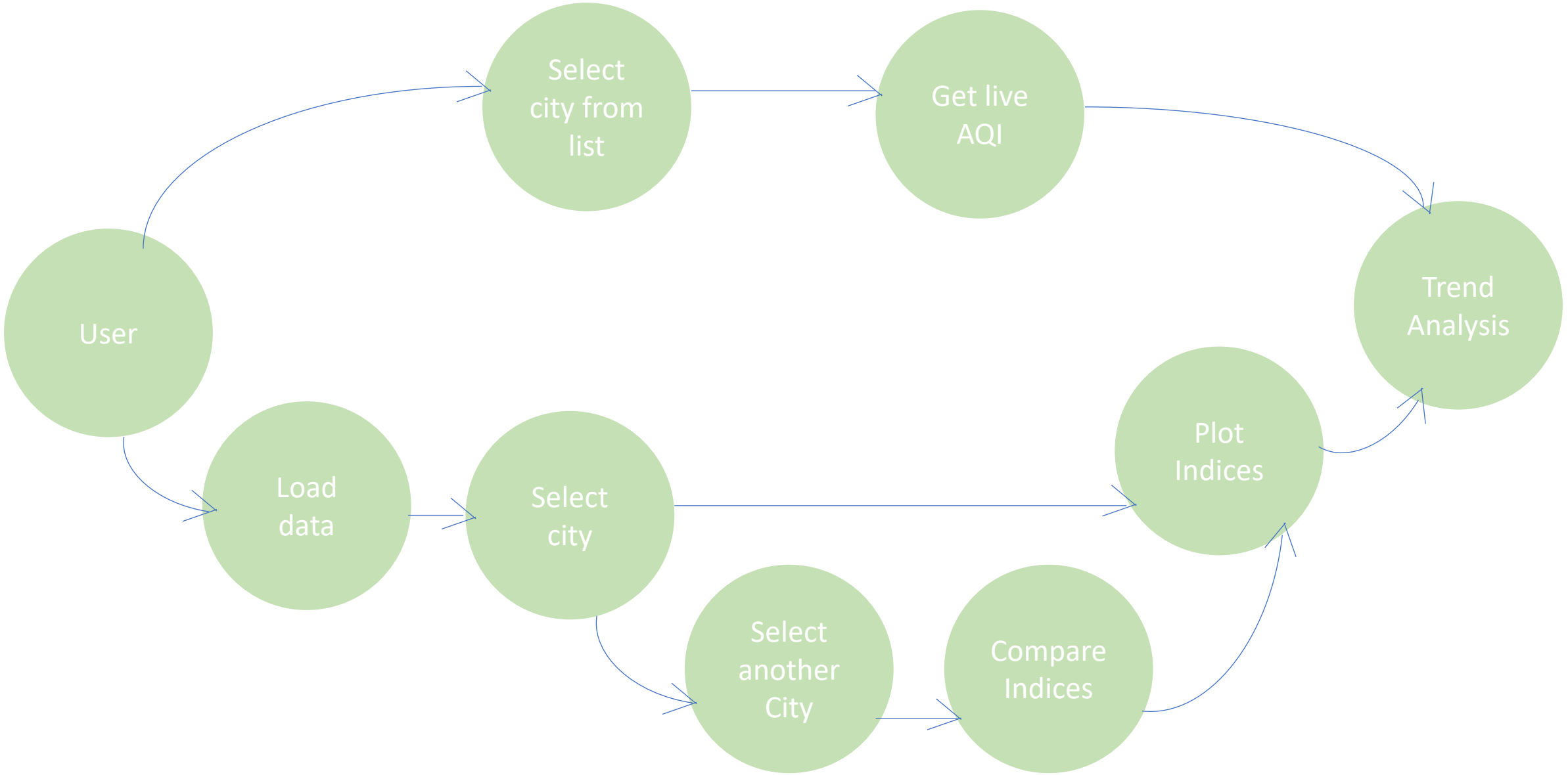
GitHub link
https://github.com/aman-gupt/hackovit_ENV_3

Google Drive link
https://drive.google.com/open?id=1w_J5Nr3rhtKxBLKw2uyl0yXVB36K8-HL

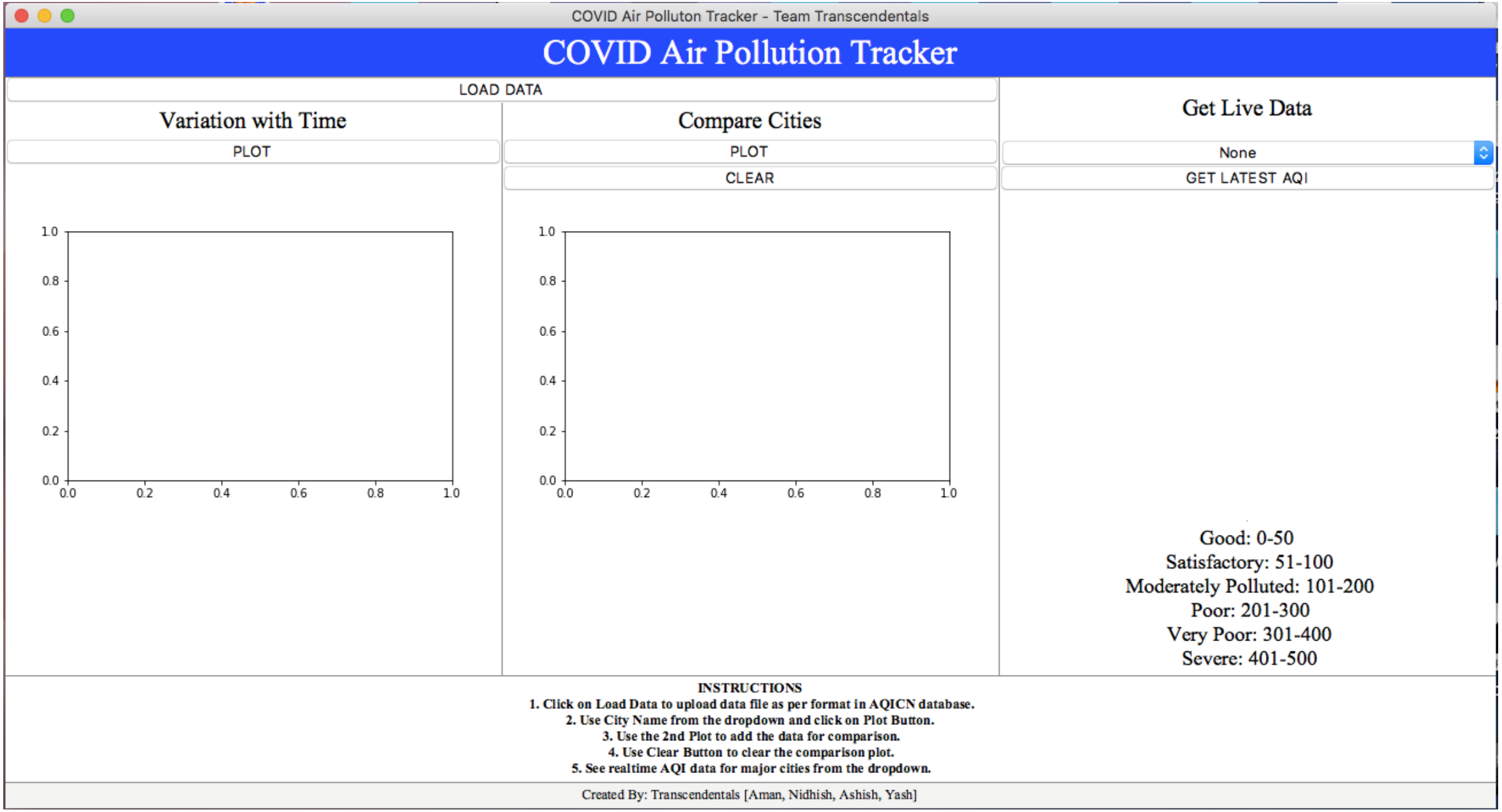
Average AQI (PM 2.5) before and after COVID-19 (analysis sourced from the platform)

CITY	BEFORE	AFTER
Beijing	119	107
Delhi	177	177
Dubai	124	84
London	37	34
Moscow	39	35
Paris	52	47
Kolkata	141	139
Los Angeles	49	43

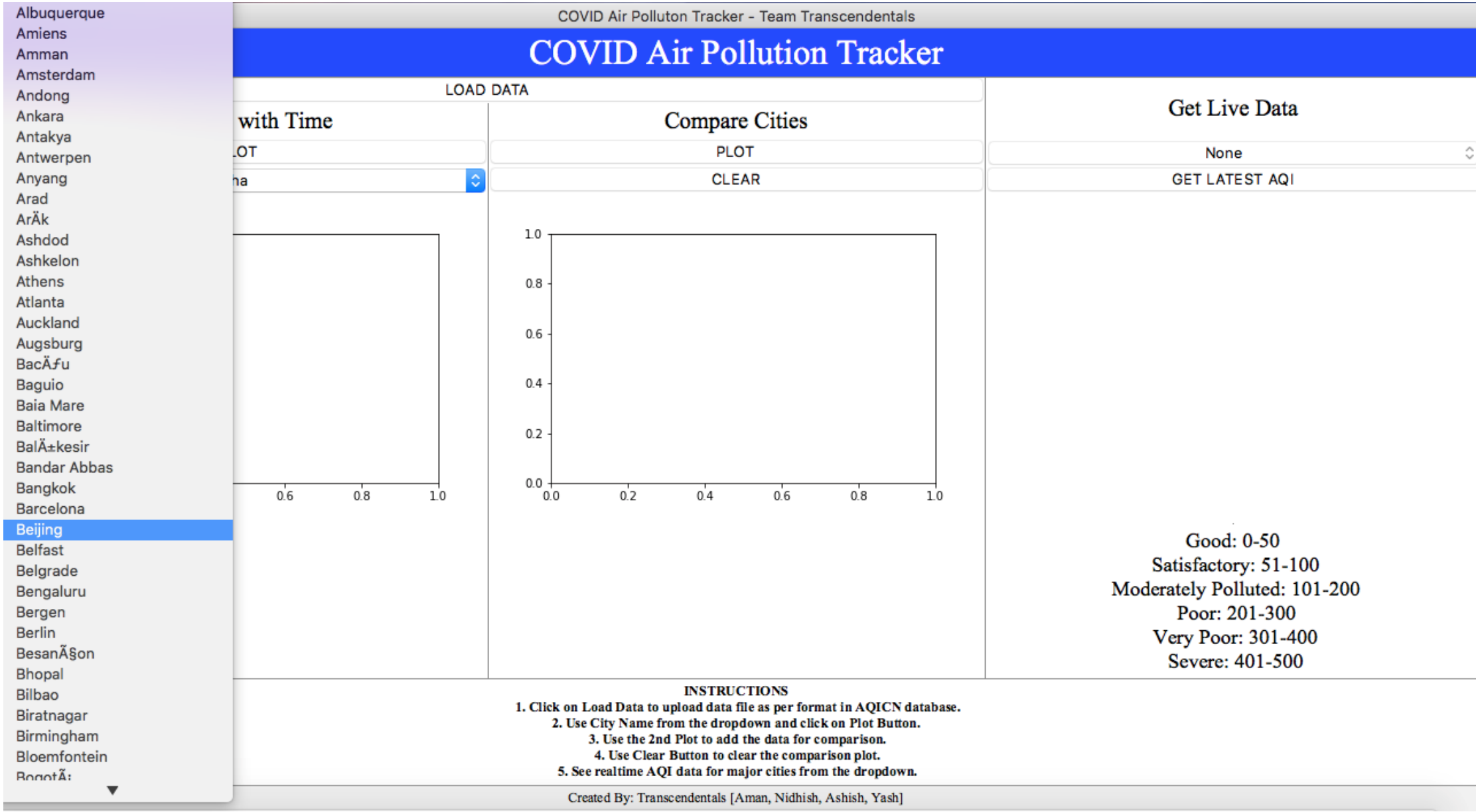
USE CASES


User
Select city from list
Get live AQI
Trend Analysis
Load data
Select city
Plot Indices
Select another City
Compare Indices

Initial Interface



City Drop-down list



PM 10 Index for Los Angeles and comparison

COVID Air Polluton Tracker - Team Transcendentals

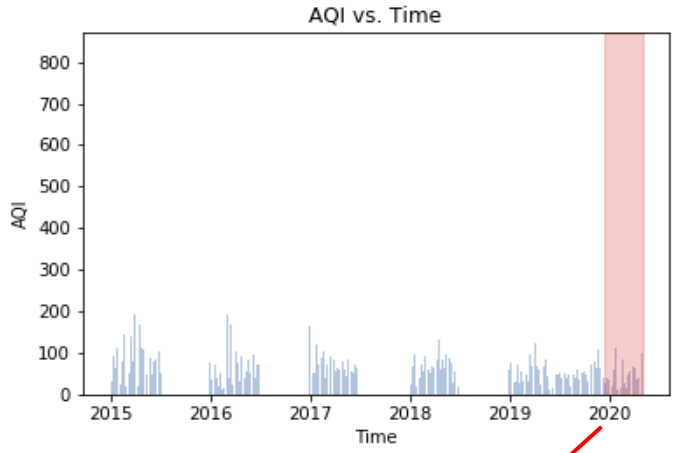
COVID Air Pollution Tracker

LOAD DATA

Variation with Time

PLOT

Los Angeles



Average Values

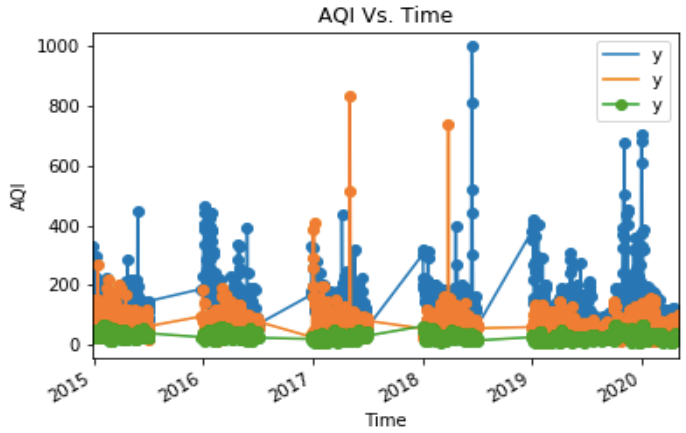
Before Corona: 68.0
After Corona: 52.0

Shaded to depict COVID epidemic

Compare Cities

PLOT

CLEAR



Get Live Data

Beijing

GET LATEST AQI

Air quality index: 159

Good: 0-50
Satisfactory: 51-100
Moderately Polluted: 101-200
Poor: 201-300
Very Poor: 301-400
Severe: 401-500

INSTRUCTIONS

1. Click on Load Data to upload data file as per format in AQICN database.
2. Use City Name from the dropdown and click on Plot Button.
3. Use the 2nd Plot to add the data for comparison.
4. Use Clear Button to clear the comparison plot.
5. See realtime AQI data for major cities from the dropdown.

Created By: Transcendentals [Aman, Nidhish, Ashish, Yash]

AQI for Johor Bahru and comparison

COVID Air Polluton Tracker - Team Transcendentals

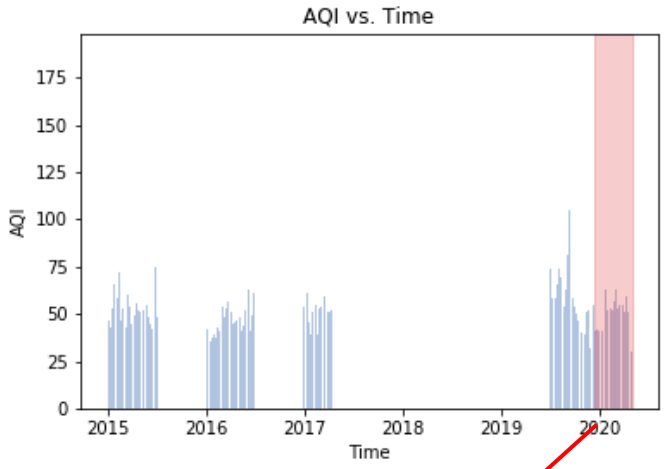
COVID Air Pollution Tracker

LOAD DATA

Variation with Time

PLOT

Johor Bahru



Average Values

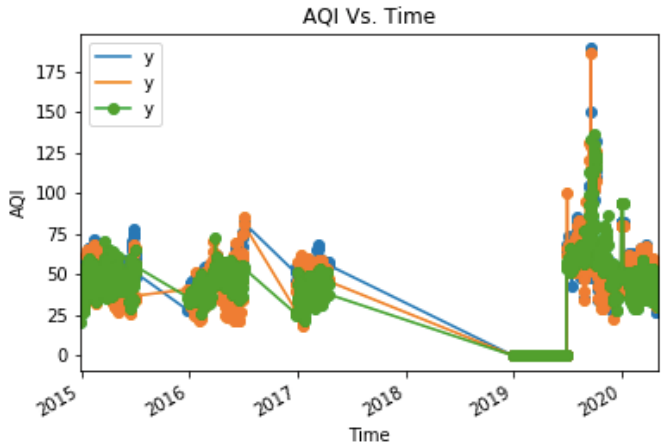
Before Corona: 53.0
After Corona: 49.0

Shaded to depict COVID epidemic

Compare Cities

PLOT

CLEAR



Get Live Data

Delhi

GET LATEST AQI

Air quality index: 124

Good: 0-50
Satisfactory: 51-100
Moderately Polluted: 101-200
Poor: 201-300
Very Poor: 301-400
Severe: 401-500

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THANK YOU !