WORKING WINDOW

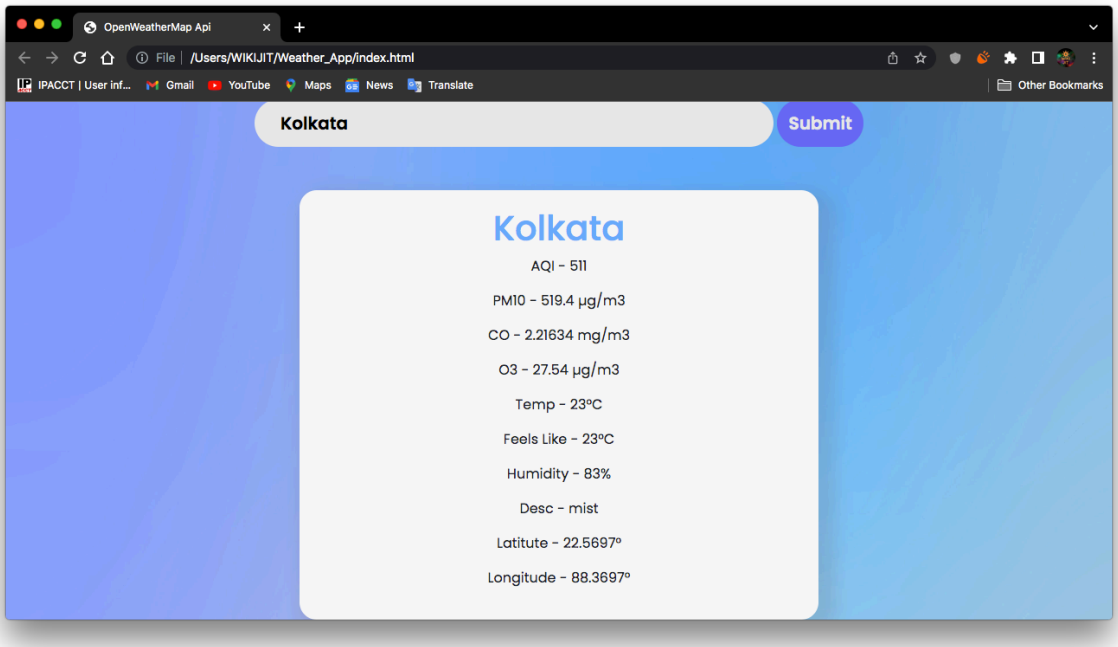

Fig 1

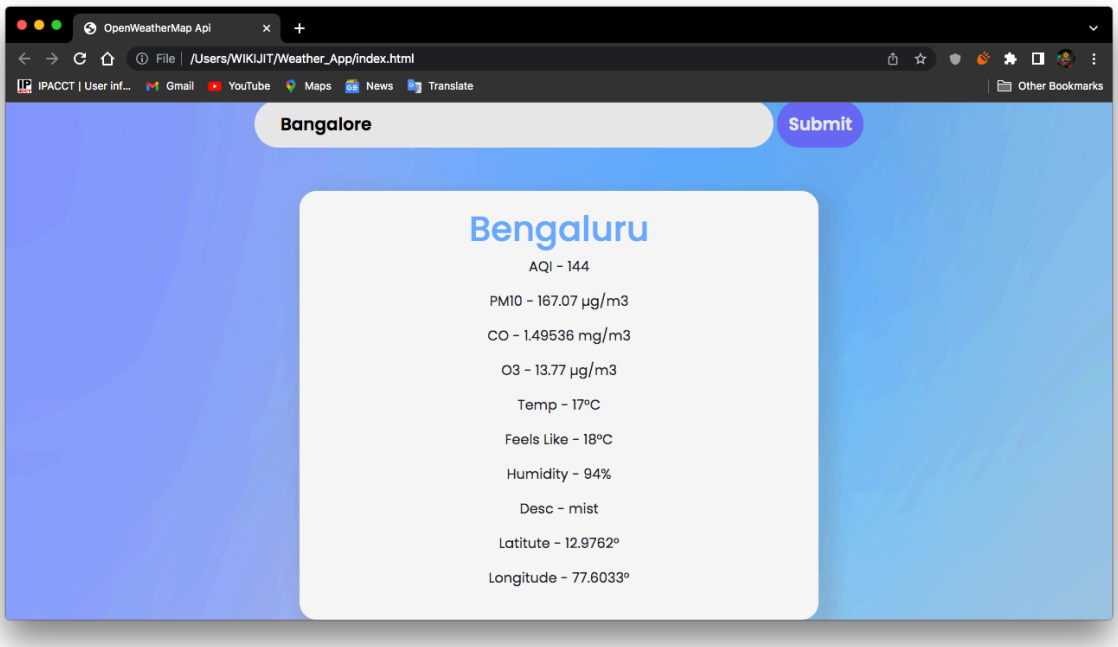

Fig 2

The figures above (Fig 1 & Fig 2) shows the working window the AQI calculator web app, in the app we can simply enter the name of any place and it will display AQI of that place and various other weather related information like Temperature, Humidity, Latitude, Longitude, etc.

WORKING PROCEDURE

Before explaining how my code works let us understand more about AQI and how AQI is calculated according to Indian Standards.

What is the Air Quality Index (AQI)?

Air Quality Index (AQI) is a number used to convey the quality of air by the government to the general public. Air quality deteriorates with an increase in the concentration of pollutants. The Air Quality Index represents the severity of pollution for ordinary people.

Indian (CPCB) AQI:

According to the Indian Government (CPCB), Indian AQI range is from 0-500, from 0 being good and 500 being severe. There are eight major pollutants to be taken into account for AQI calculation, viz. particulate matter (PM 10 and PM 2.5), carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), sulphur dioxide (SO2), ammonia (NH3), and lead (Pb). To calculate AQI, data for a minimum of three pollutants must be present, of which one should be either PM10 or PM2.5, AQI ranging from 0-500 has different concentrations for each pollutant and has health effects accordingly.

Indian AQI range & probable impacts:

0-50: This range defines air quality as good as it shows minimal or no impact on health.

51-100: This is a satisfactory air quality range and it can show effects such as breathing difficulty in sensitive groups.

101-200: The range shows moderate air quality with impacts such as breathing discomfort for children and elderly people, and people already suffering from lung disorders and heart disease.

201-300: AQI falling in this range communicates that the air quality is poor and shows health effects on people when exposed for the long term. People already suffering from heart diseases can experience discomfort from short exposure.

301-400: This range shows very poor air quality and causes respiratory illness for a longer duration of exposure.

401-500: This is the severe range of AQI causing health impacts to normal and diseased people. It also causes severe health impacts on sensitive groups.

How my code is calculating the AQI of a particular place:

In my code the JavaScript uses two API calls to get various weather related data when the name of a particular place is entered in the search box. The APIs used are “Open Call API 3.0” and “Air Pollution API” from Open Weather Map.
The first API namely “Open Call API 3.0” takes the input of the name of a place which is entered by the user in the search box and then the API call is made which fetches latitude,

longitude and various other weather related data like temperature, humidity, weather description, etc of the particular place.
The second API namely "Air Pollution API" is then called automatically. This API takes input of the latitude and longitude of the particular place which was fetched by the previous API, in return this API call fetches various air quality related data like PM 2.5, PM 10, carbon monoxide (CO) concentration, ozone(O_3) concentration, nitrogen dioxide(NO_2) concentration, etc.
After fetching the concentration data of various air pollutants the JavaScript uses the concentrations of PM10, carbon monoxide (CO) and ozone(O_3) calculates the subindex for each pollutant using the formula:

$$\mathbf{Ip = [IHi - ILo / BPHi - BPLo] (Cp - BPLo) + ILo}$$

Where,

Ip = index of pollutant p
Cp = truncated concentration of pollutant p fetched by the API
BPHi = concentration breakpoint i.e. greater than or equal to Cp
BPLo = concentration breakpoint i.e. less than or equal to Cp
IHi = AQI value corresponding to BPHi
ILo = AQI value corresponding to BPLo

The BPHi, BPLo, IHi and ILo values for PM10 are determined using the Cp value and using the table shown in Fig 3

Indian AQI	Indian Range (24 hr)		US AQI	US-EPA range (24 hr)	
	PM10 (ug/m3)	PM2.5 (ug/m3)		PM10 (ug/m3)	PM2.5 (ug/m3)
0-50	0-50	0-30	0-50	0-54	0-12.0
51-100	51-100	31-60	51-100	55-154	12.1-35.4
101-200	101-250	61-90	101-150	155-254	35.5-55.4
201-300	251-350	91-120	151-200	255-354	55.5-150.4
301-400	351-430	121-250	201-300	355-424	150.5-250.4
401-500	430+	250+	301-500	425-604	250.5-500.4

Fig 3

The BPHi, BPLo, IHi and ILo values for Co are determined using the Cp value and using the table shown in Fig 4

Indian AQI	Indian Range CO (mg/m3)	US AQI	US-EPA Range CO (ppm)
0-50	0-1.0	0-50	0-4.4
51-100	1.1-2.0	51-100	4.5-9.4
101-200	2.1-10	101-150	9.5-12.4
201-300	10.1-17	151-200	12.5-15.4
301-400	17.1-34	201-300	15.5-30.4
401-500	34+	301-500	30.5-50.4

Fig 4

The BPHi, BPLo, IHi and ILo values for O_3 are determined using the Cp value and using the table shown in Fig 5

Indian AQI	Indian Range for O3 (ug/m3)	US AQI	US-EPA Range for O3 (ppm) (8 hour)
0-50	0-50	0-50	0-0.54
51-100	51-100	51-100	0.055-0.070
101-200	101-168	101-150	0.071-0.085
201-300	169-208	151-200	0.086-0.105
301-400	209-748	201-300	0.106-0.200
401-500	748+	301-500	–

Fig 5

Hence the greatest of the subindex values of the pollutants is taken and that becomes the AQI of the particular place.

My code can be found at: github.com/WIKIJIT/Weather_App