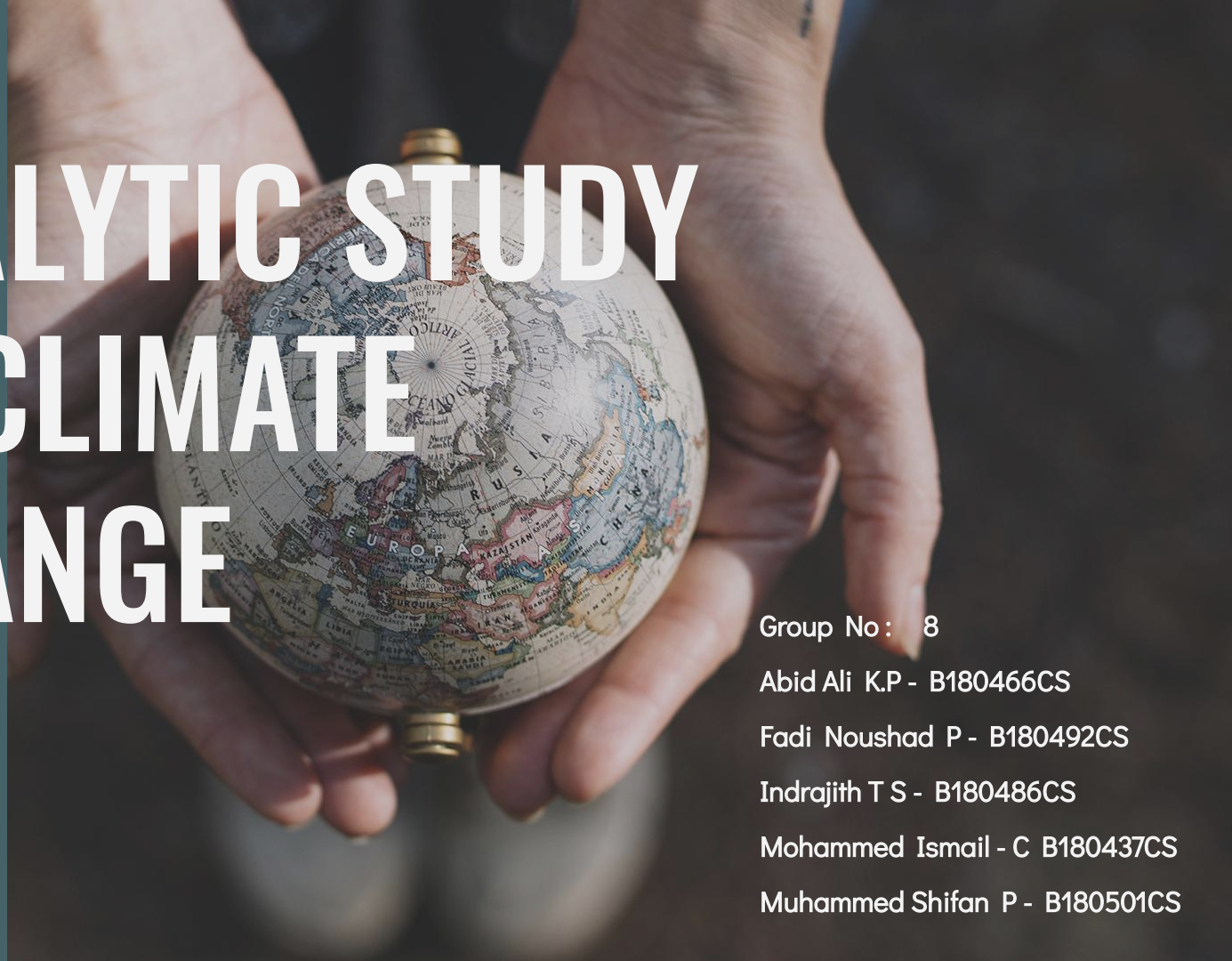
ANALYTIC STUDY OF CLIMATE CHANGE



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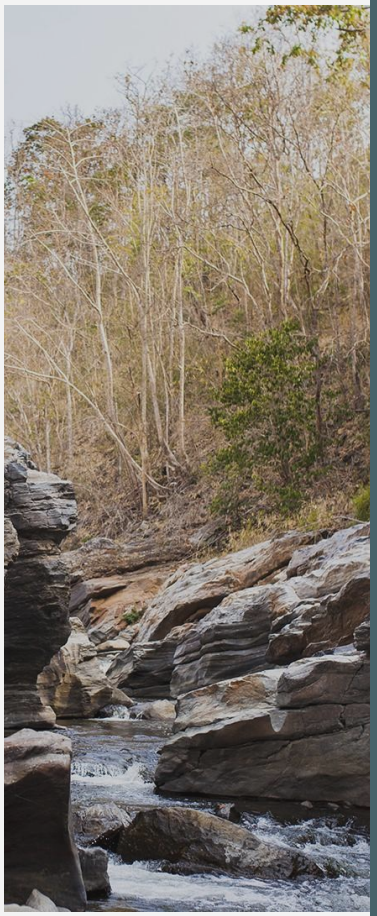
PROBLEM

Climate Change is a huge predicament,however the public perception is still mixed.Our aim is to do a thorough data analysis and see if any of the data we obtain can further our understanding on this subject.

Abid Ali K.P



INTRODUCTION

This is an analytic study using Google Earth Engine where we explore one of the most important question of this century ,

Is Climate Change a Myth?.

With the help of various data we determine whether the rising temperatures can be attributed to any changes

OUR DATASET

We used the NCEP/NCAR Reanalysis data on Surface Temperature of 11 cities in india (Mumbai, Chennai, Delhi, Kolkata, Bengaluru, Delhi, Jaipur, Pune, Ahmedabad, Bhopal, Hyderabad and Bhubaneswar).

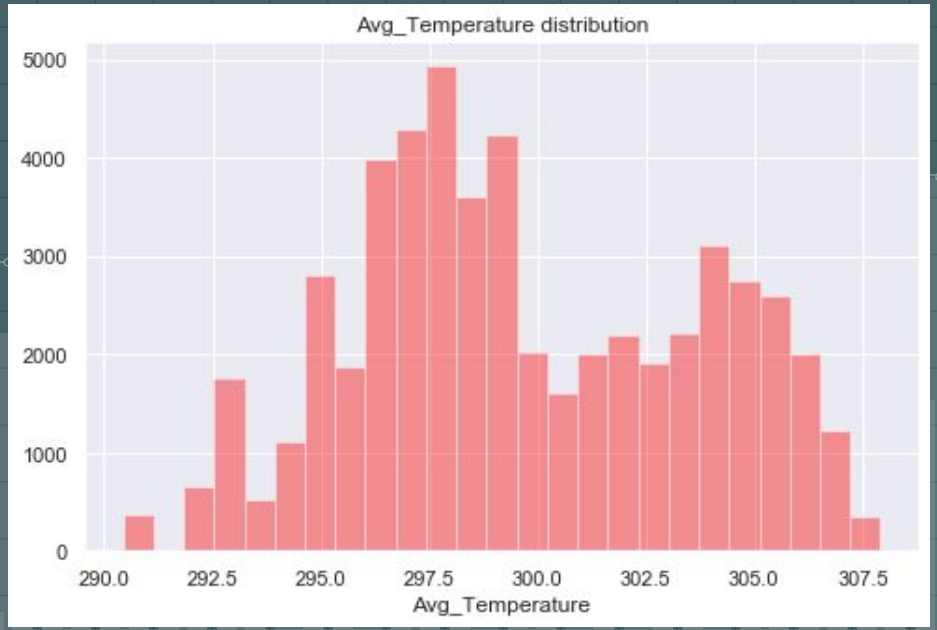
We extracted the temperature data of these 11 cities for the years 2011-2020

Exploratory data analysis

Abid Ali K.P

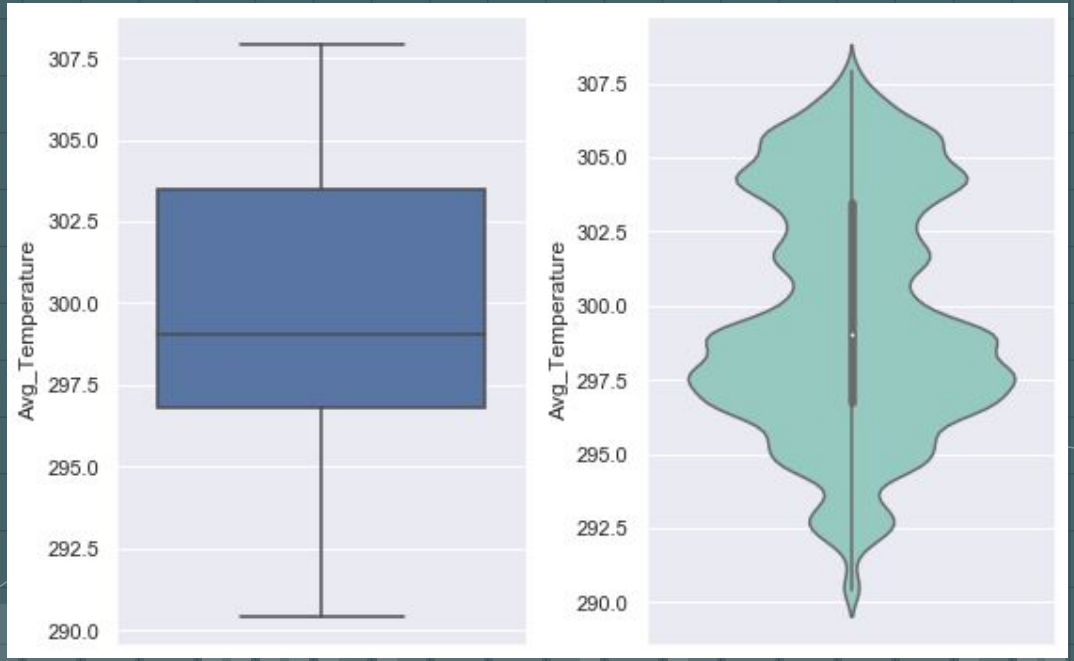
Univariate Analysis

- Average Temperature in indian cities is distributed around 299.72 K.
- The most counted temperature is 297.5 K.
- Minimum value of Temperature is 290.43 K
- Maximum value of Temperature is 307.91 K
- Range of Temperature is 17.477 K

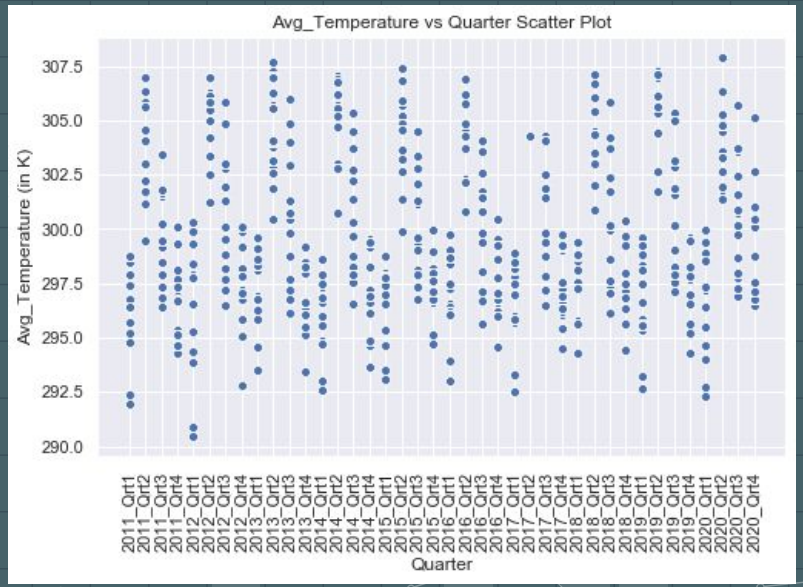


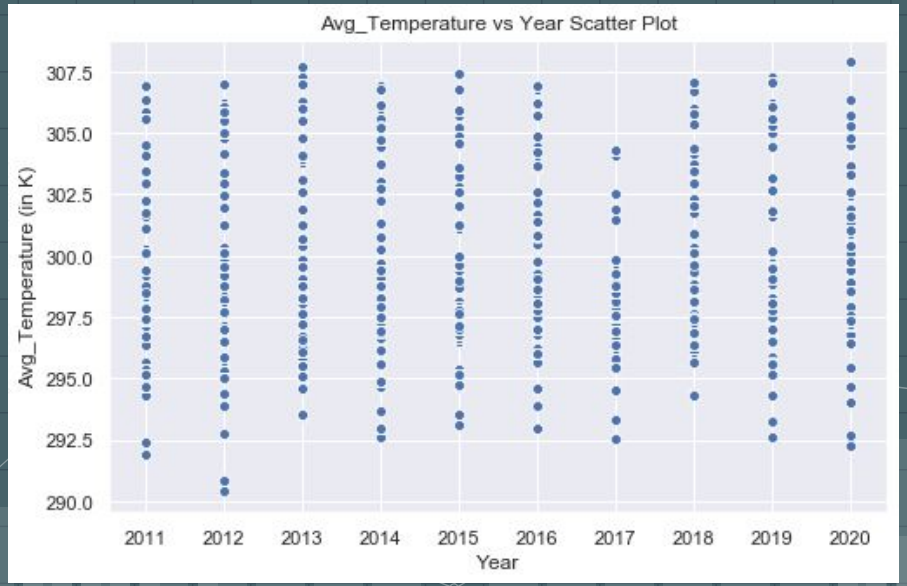
Average Temperature plots on boxplot and violin plot

The middle value of temperature lies at 299 K.



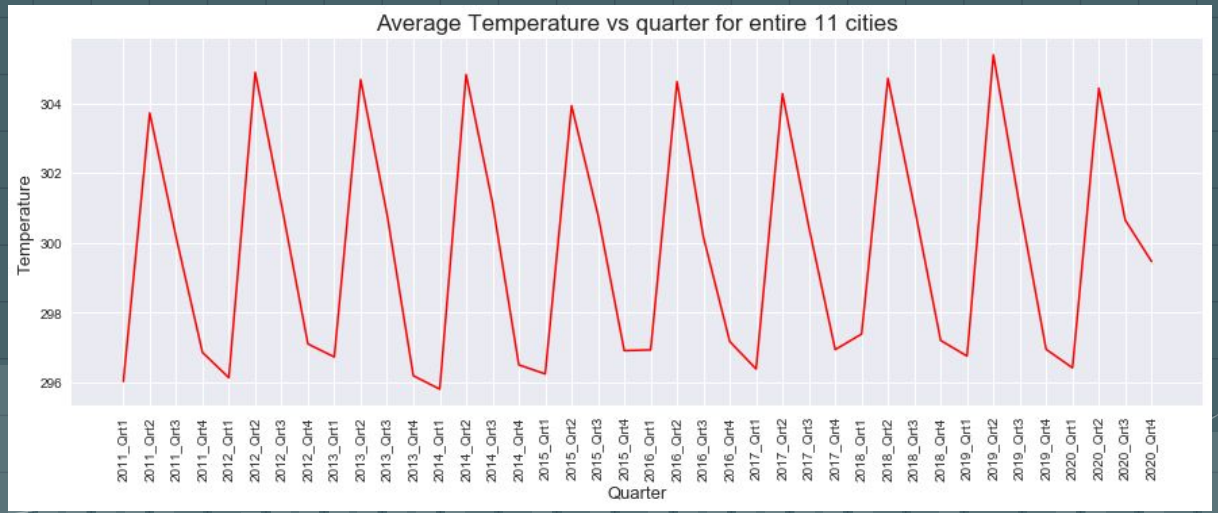
Average Temperature vs Quarter and Year Scatter plot





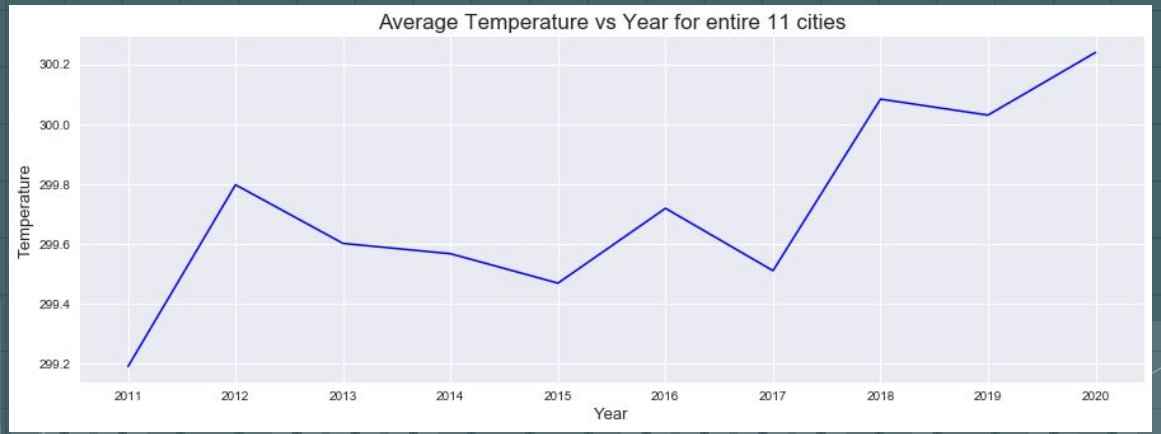
Average Temperature vs Quarter for Indian cities

- Graph explicitly shows the seasonal behaviour of the climate in India.
- In all the years, The second Quarter is showing a maximum value which depicts the temperature rise in summer season.
- In the winter season (4th Quarter), It is showing a dip in the temperature.



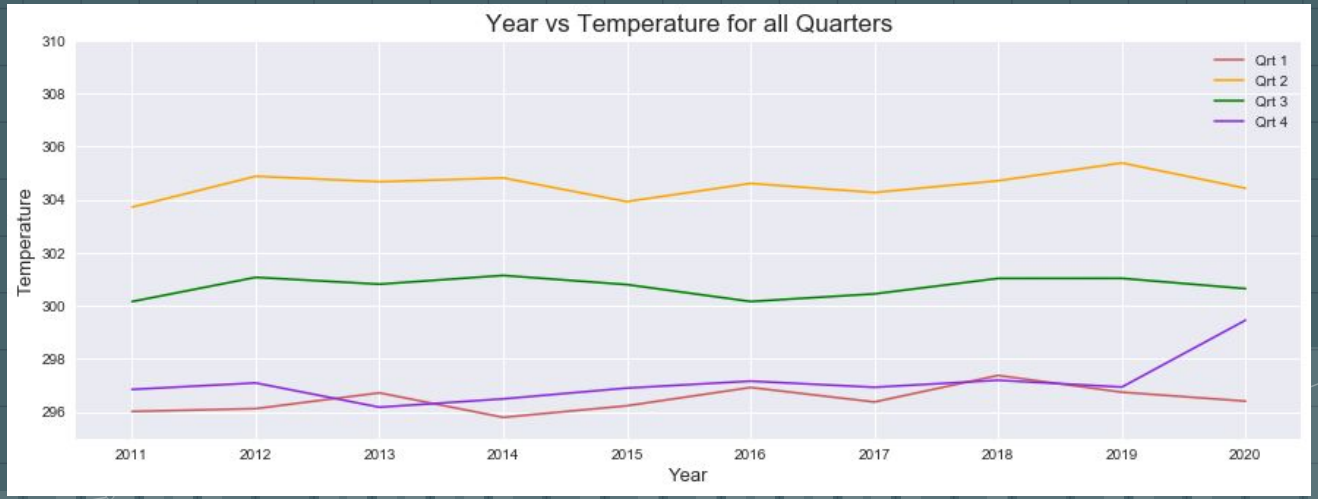
Average Temperature vs Year for Indian cities

- Based on the last 10 year data, The temperature is gradually increasing over the years.
- Not much increase in temperature is observed in the period 2012-2017.
- The temperature varies drastically over years, sometimes it is lower than the previous years but the general trend is increasing.



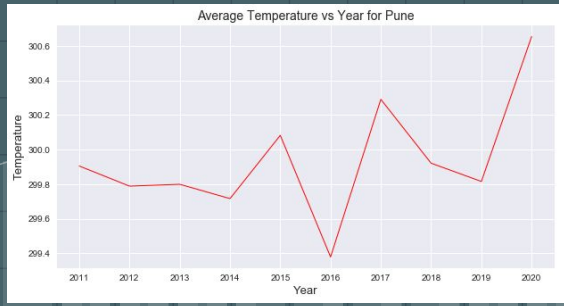
Avg Temperature in each quarter vs year

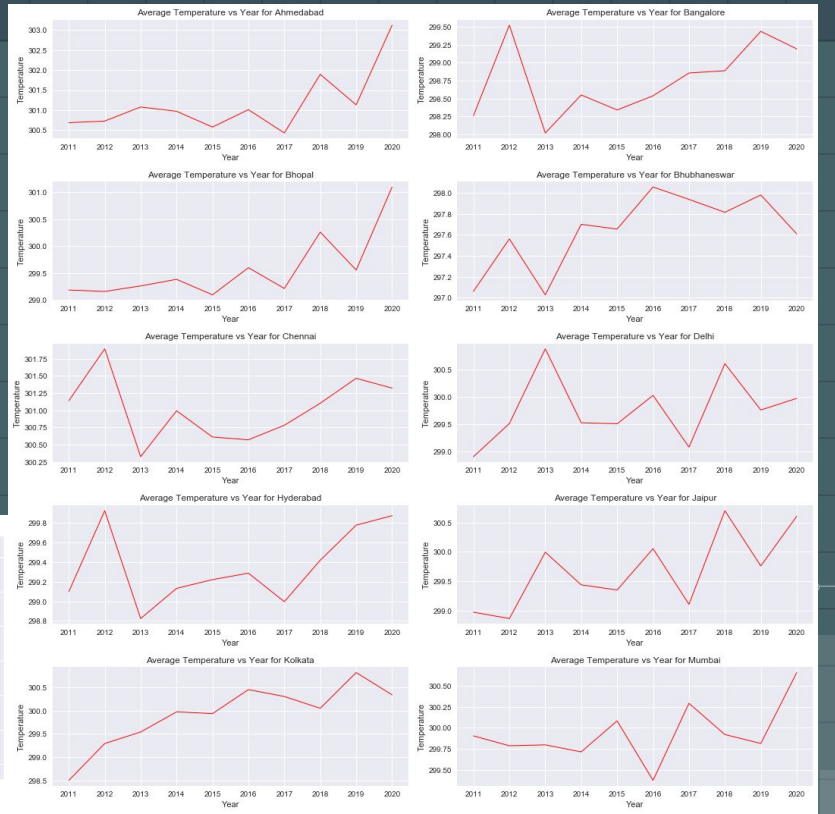
- Quarter 2 (summer season) shows highest value in all year.
- Quarter 4 and Quarter 1 shows minimal values over years
- Quarter 3 lies in between the above two.
- From the four lines, the temperature gradually increased from 2011 to 2020



Avg Temperature in each city vs Year

- Average Temperature across cities is gradually increasing over period.
- Maximum Avg temperature is showed in Ahmedabad city in the past 10 year.
- Minimum value of Avg Temperature is observed in Bhubhaneswar.





Mohammed Ismail C

Bivariate Analysis

Bivariate analysis for the dataset is done for :-

- Carbon Monoxide
- Sulphur Dioxide

BIVARIATE ANALYSIS OF TEMPERATURE AND CARBON MONOXIDE.

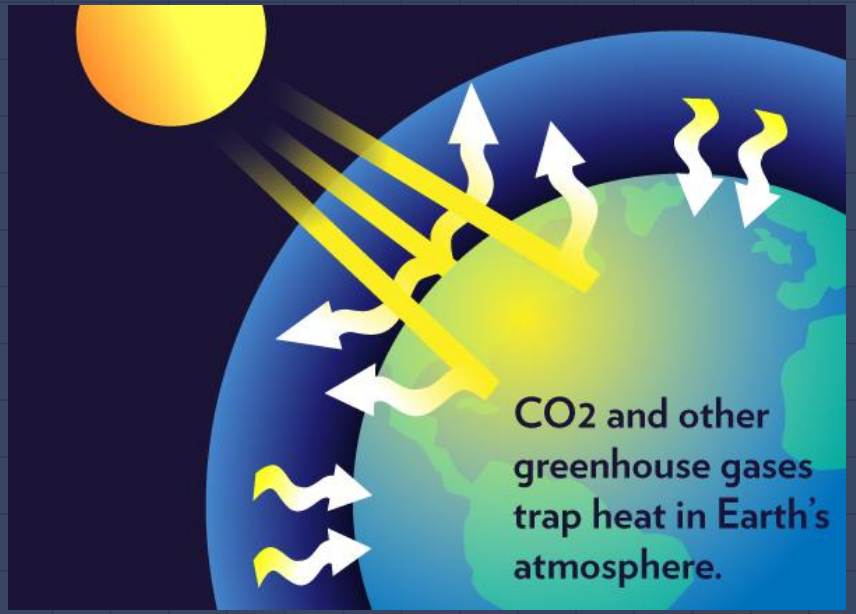
Carbon monoxide dataset obtained for the the year 2019-2020 for Bangalore was concatenated with temperature for the corresponding years and obtained the table .

	Quarter	AVG	CO_density
0	2019_Qrt1	299.054926	0.036923
1	2019_Qrt2	304.335135	0.043139
2	2019_Qrt3	297.741244	0.024007
3	2019_Qrt4	296.501674	0.034224
4	2020_Qrt1	299.174740	0.036271
5	2020_Qrt2	303.509478	0.040826
6	2020_Qrt3	297.253671	0.024205
7	2020_Qrt4	296.762563	0.033414

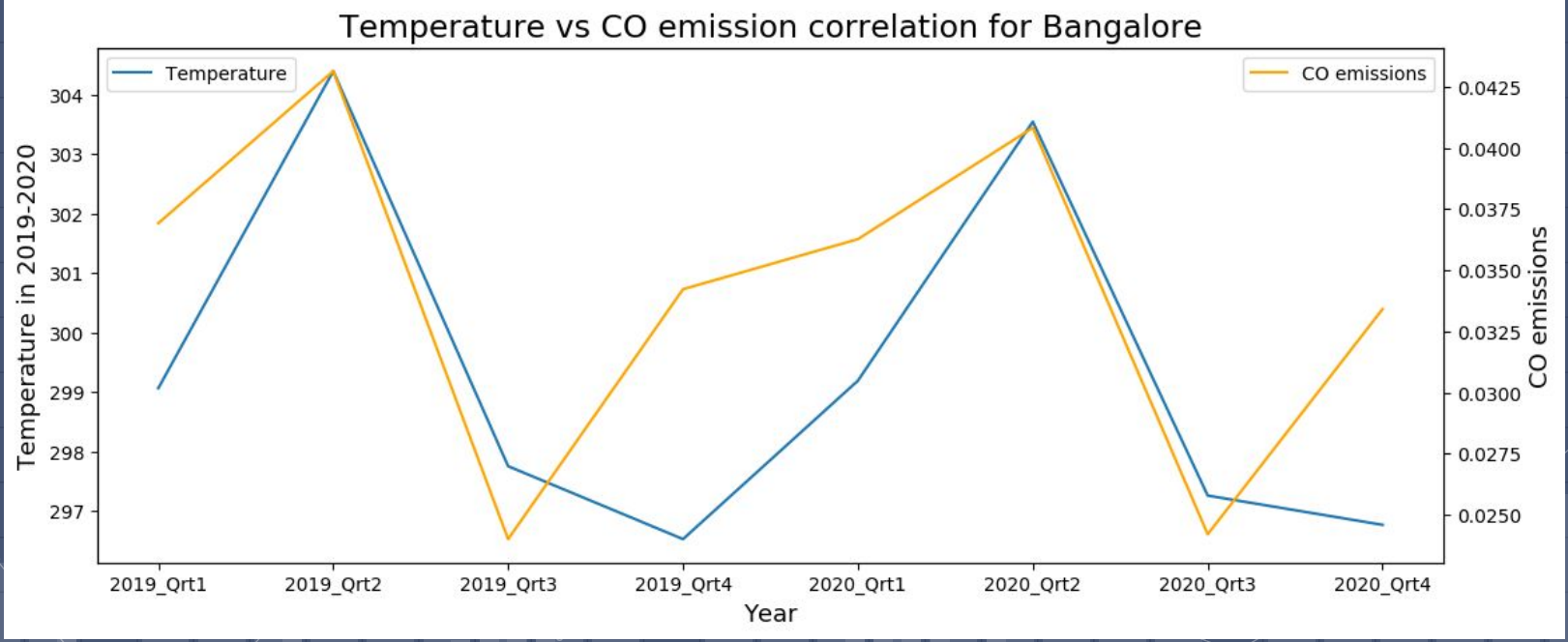
AVG - Average temperature
CO_density- Carbon monoxide Density

TEMPERATURE AND CARBON MONOXIDE CORRELATION

Carbon monoxide though doesn't affect climate change directly , it can change the amount of the greenhouse gas carbon dioxide which in turn affects the temperature. Carbon dioxide traps the heat at Earth's surface. So it is important to check the correlation between CO and temperature



TEMPERATURE AND CARBON-MONOXIDE CORRELATION GRAPH



TEMPERATURE AND CARBON-MONOXIDE CORRELATION

By taking the correlation between temperature and carbon monoxide density we were able to obtain a correlation of 74.78 % i.e. both the graphs representing each quantities plots to almost similar graphs .Which states pretty clearly that rising temperature is dependent on the increasing carbon monoxide amount.

INDRAJITH T S

BIVARIATE ANALYSIS OF TEMPERATURE AND SULPHUR DIOXIDE.

Sulphur dioxide dataset obtained for the the year 2018-2020 was concatenated with temperature for the corresponding years and obtained the table .

	Quarter	Avg_Temperature	CO_density
0	2019_Qrt1	299.067578	0.036923
1	2019_Qrt2	304.396960	0.043139
2	2019_Qrt3	297.755757	0.024007
3	2019_Qrt4	296.529750	0.034224
4	2020_Qrt1	299.193583	0.036271
5	2020_Qrt2	303.546840	0.040826
6	2020_Qrt3	297.261841	0.024205
7	2020_Qrt4	296.769352	0.033414

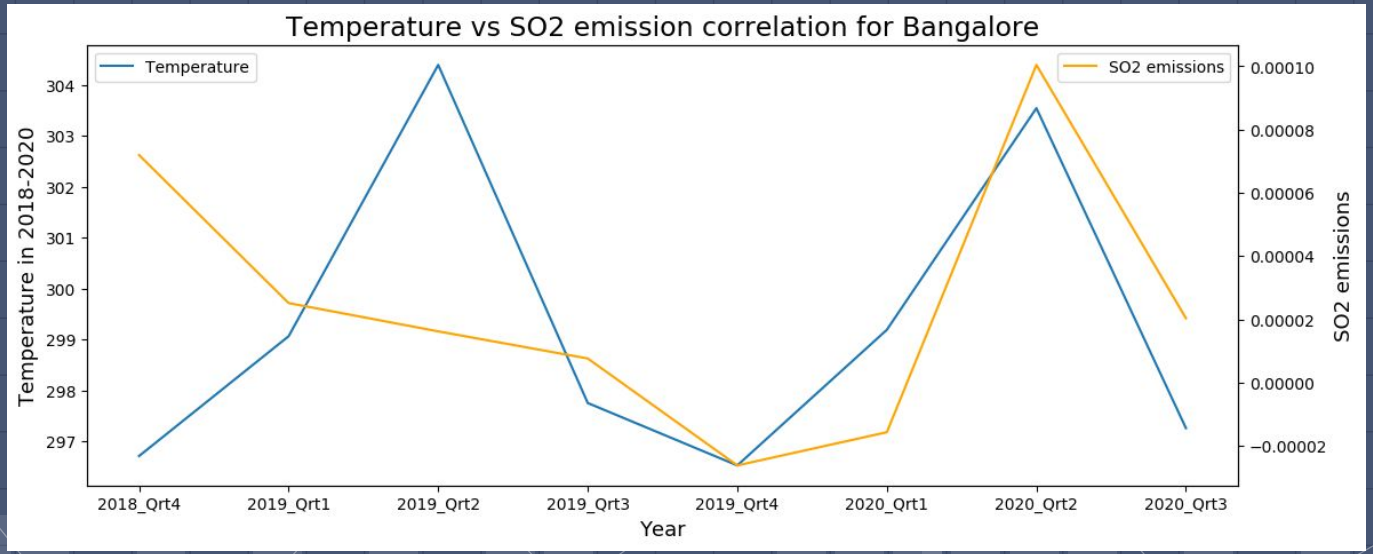
Avg_Temperature - Average temperature
SO2- Sulphur dioxide Density

FADI NOUSHAD

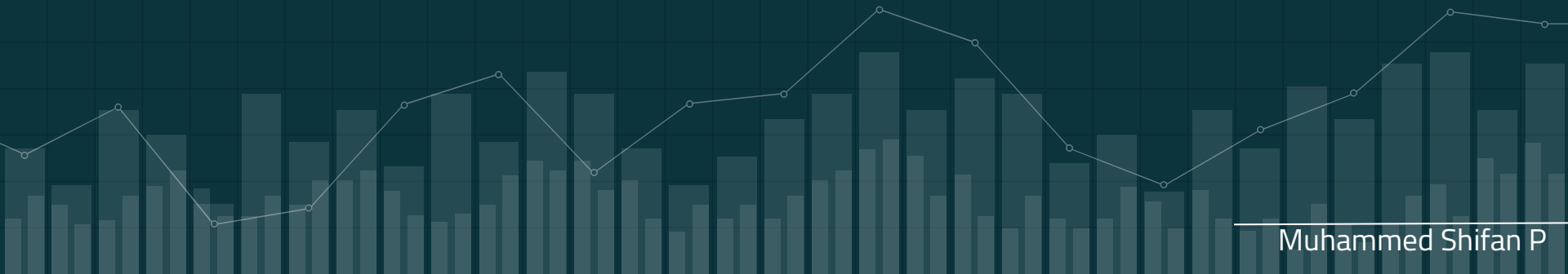
TEMPERATURE AND SULPHUR DIOXIDE CORRELATION

Sulphur dioxide though doesn't affect climate change directly. We found Temperature is having a 34% correlation with Sulphur dioxide. This is due to the reason that higher concentration of Sulphur dioxide causes acid rains and also change the concentration of other greenhouse gases. But Sulphur dioxide also reflect light when released in the atmosphere, which keeps sunlight out and creates a cooling effect. So presence of Sulphur dioxide increases and decreases the temperature. Moreover other factor also must be considered when analysing it.

TEMPERATURE AND SO2 CORRELATION GRAPH



REGRESSION



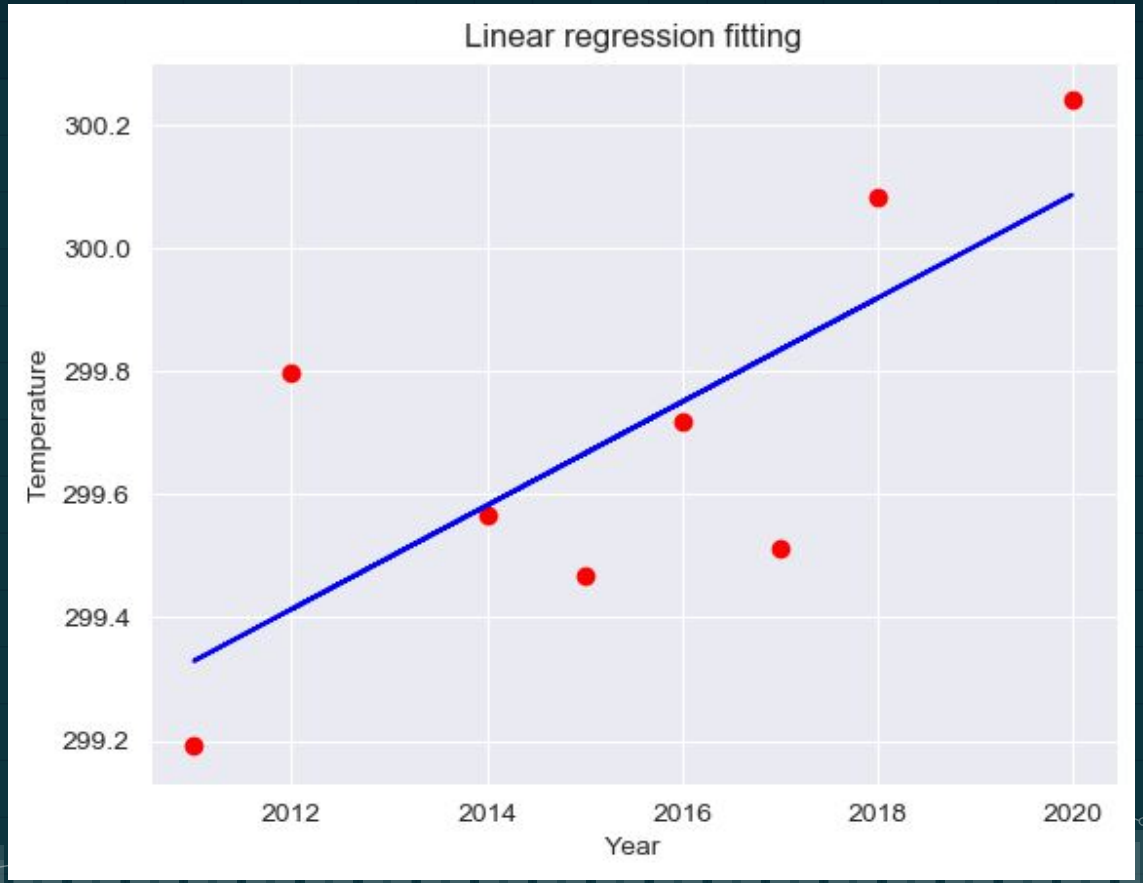
Muhammed Shifan P

OVERALL APPROACH

We used linear regression in order to predict the temperature of next 10 years temperature.
The train-test split procedure is used to estimate the performance of machine learning algorithm when they are used to make predictions on data not used to train the model.

Train: 80% of the dataset
Test: 20% of the dataset

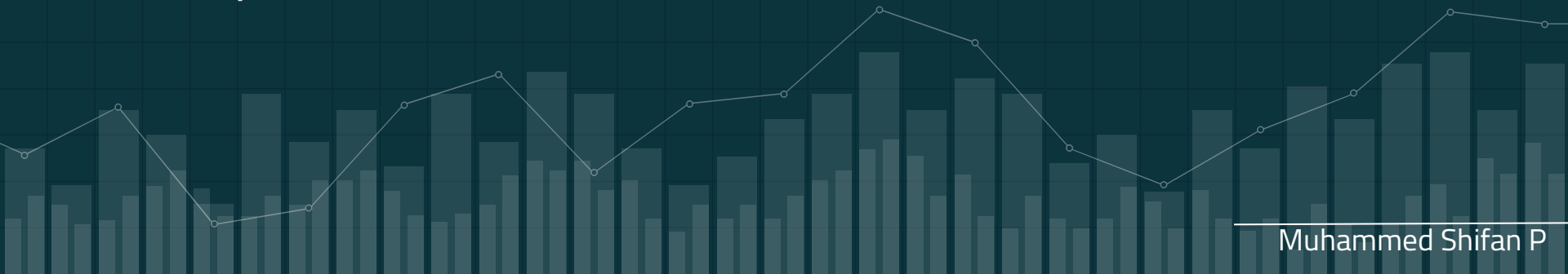
LINEAR REGRESSION FITTING



MODEL EVALUATION

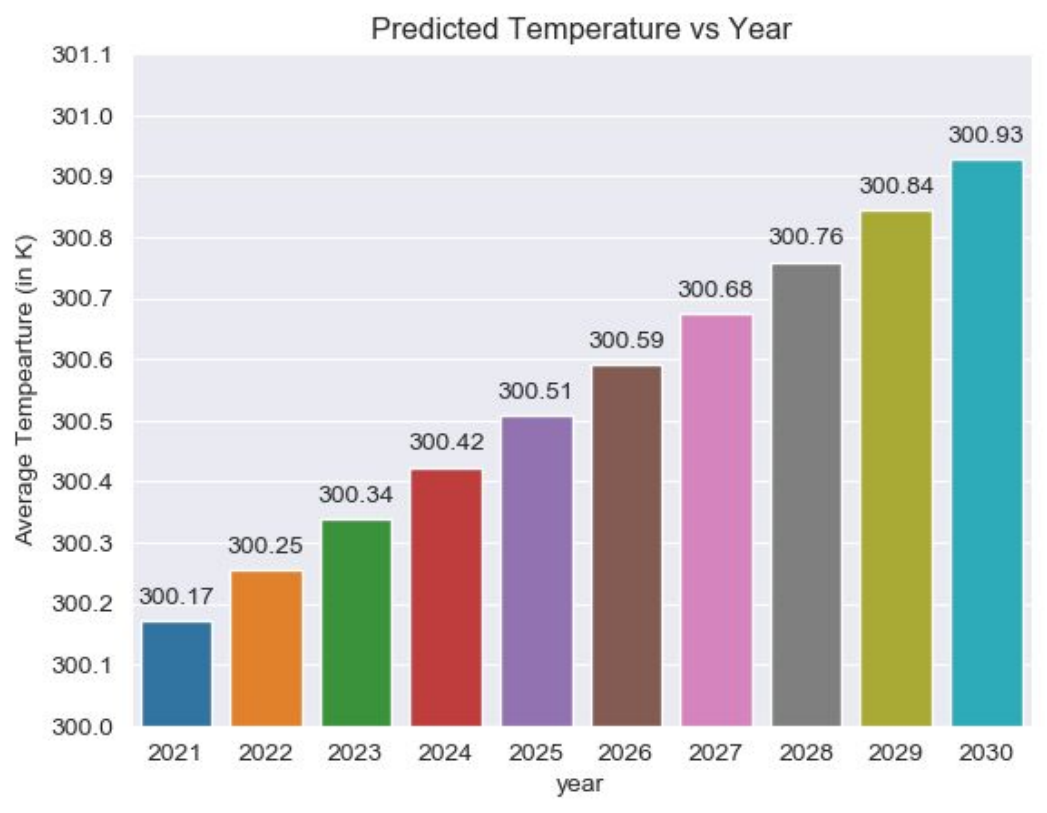
Mean Absolute Error: 0.066
Mean Squared Error: 0.0058
Root Mean Squared Error: 0.0765

This analysis ensures us a accurate predictions for next 10 years.



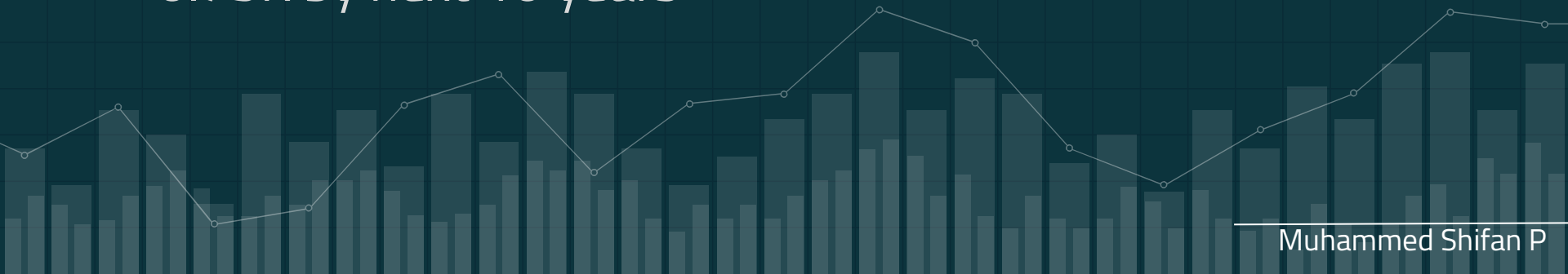
Muhammed Shifan P

PREDICTED TEMPERATURE AND CARBON-MONOXIDE CORRELATION



CONCLUSION

From our analysis of last 10 year temperature data from NCEP NCAR surface temperature dataset. According to our prediction, the temperature is going to increase in the coming years In the next decade, the average temperature across indian cities will raise by 0.75K by next 10 years



Muhammed Shifan P

OUR DATA STORY

From the Univariate analysis its clear that, the temperature during quarter-2 and quarter-4 is highest and lowest respectively in every year. It is obvious that the temperature is highest during summer and lowest during winter.

There was a decrease in Carbon monoxide during 2020 quarter -2 than expected this is due to the lock-down caused by the covid -19 pandemic,thereby resulting in a great decrease in temperature.

FADI NOUSHAD

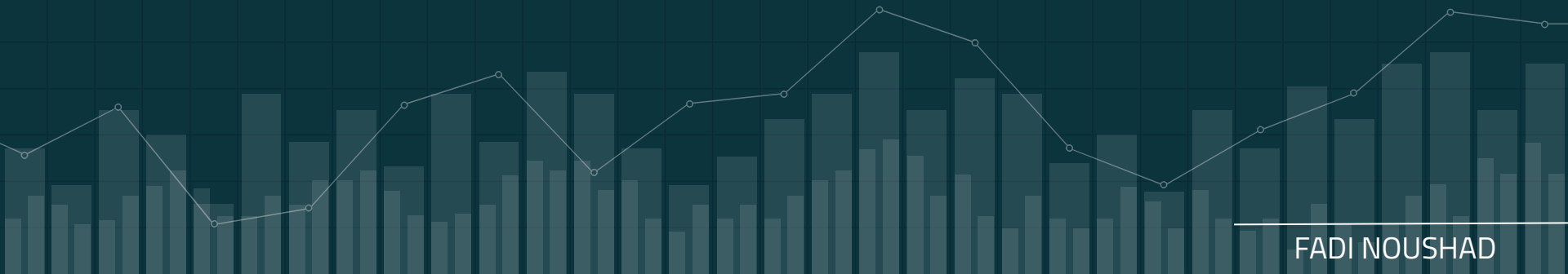
OUR DATA STORY

But there is a gradual increase in Carbon monoxide during 2020 quarter-3 and quarter-4. Similarly we have seen a gradual increase in temperature. This confirm a greater dependency of temperature on Carbon monoxide.

Dependency of Temperature on Sulphur dioxide is not that apparent as there are other effects coming into play which causes a fluctuation in that regard.

OUR DATA STORY

From the machine learning analysis we came to a conclusion that temperature change is not a myth but it's a reality and the average temperature across indian cities will raise by 0.75 K in next 10 years



FADI NOUSHAD