A Minor Project Synopsis on

**Indian AQI Analysis**

Submitted to Manipal University, Jaipur

Towards the partial fulfilment for the Award of the Degree of

**BACHELORS OF TECHNOLOGY**

In Information Technology

2015-2019

By

Saif Karigar (159102106)

Sakshi Goel(159102109)

Nitish Bhadauria (159102165)

Kota Mehul Pratyush (159103080)



Under the guidance of

Mr. Venkatesh Gauri Shankar

**Department of Information Technology**

**School of Computing and Information Technology**

**Manipal University Jaipur, Rajasthan**

**Objective of work:**

To analyze and predict the level of Air and Water Index level over the years from 1990 to 2015 to get a better understanding of the trends and analyze how major government policies have affected the Quality Index.

The project aims to achieve the following:

1. Inform public regarding overall status of air quality through a summation parameter that is easy to understand.
2. Inform citizens about associated health impacts of air pollution exposure; and
3. Rank cities/towns for prioritizing actions based on measure of AQI.

The overall objective of the project can be stated as under:

1. “To adopt/develop an Air Quality Index (AQI) based on national air quality standards, health impacts and monitoring program which represents perceivable air quality for general public in easy to understand terms and assist in Data Interpretation and decision making processes related to pollution mitigation measures.”
2. The project investigates the concentration of the pollutants sulphur dioxide (SO2), nitrogen Dioxide (NO2), particulate matter (PM10) generated from various sources of industries over the ambient Air Quality of the GIDA (Gorakhpur).The major pollutants as suggested by the Central Pollution Control Board (CPCB) in an industrial area are sulphur dioxide (SO2), oxides of nitrogen (NOX) and Particulate matter (PM10).

**Motivation:**

1. Air pollution due to anthropogenic sources is a matter of concern in whole world.
2. The urban areas may be viewed as dense sources of enormous anthropogenic emissions of pollutants, which can alter the atmospheric composition, chemistry and life cycles in it’s down wind regimes, extending over several hundred kilometres.
3. Air Pollution is one of the serious problems faced by the people globally, especially in urban areas of developing countries, which is not only rapid growth of population but also industrialization.
4. Sulphur dioxide (SO2), Nitrogen dioxide (NO2) and RSPM are regarded as major air pollutants in India. India, a developing country, is one of the first ten Industrial countries of the world Because of the enhanced anthropogenic activities in India, air pollution problems have become a topic of intense debate at all platforms.
5. According to a study released by World Economic Forum in Davos, India has the worst air pollution in the entire world, beating China, Pakistan, Nepal and Bangladesh. Of the total 132 countries whose environmental assets were surveyed, India ranked dead last in the ‘Air (effects on human health)’ ranking.
6. The relationship between environment and the development is one of the most burning issues of the present times.
7. Developmental activities e.g. industrial transportation, constructional work etc cause degradation and drastic changes in every component of environment namely, hydrosphere, lithosphere, atmosphere and biosphere through pollution.
8. Air pollution has emerged in the past few decades as the most crucial problem to mankind.

**Target Specifications:**

1. To analyze the AQI of multiple cities all over India.
2. Developing a uniform AQI considering objectives, health impacts, air quality standards, existing and future monitoring scenario including parameters, method and frequency of measurements, and other relevant aspects.
3. Suggest qualitative description of air quality and associated likely health impacts for different AQI values.
4. Evaluate proposed AQI with data from a few major cities and towns.
5. Propose predictions for AQI in the future.

**Methodology:**

A number of methods are used to calculate AQI in different countries. Some of the common methods are listed below:

Oak Ridge Air Quality Index (ORAQI Method) -

The Oak Ridge National Air Quality Index (ORNAQI) can be considered for the relative ranking of an overall air quality status at different locations of the study area.AQI for each location in the study area has been estimated with the help of a mathematical equation developed by the Oak Ridge National Laboratory (ORNL), USA as given below:

**AQI = [39.02 Σ Xi /Xs] 0.967**

Where,

Xi= value of air quality parameters (RSPM, SO2 and NO2)

Xs= Standard and prescribed for Air quality parameters.

AQI then measured and compared relative ORAQI value given in Table I

**TABLE I (Relative AQI and Scale)**

|  |  |  |
| --- | --- | --- |
| **Value** | **Description** | **Health Effects** |
| 0-25 | Clean air | None, or minimal health effects |
| 26-50 | Light air pollution | Possible respiratory or cardiac effect for most sensitive individuals |
| 51-75 | Moderate air pollution | Increasing like hood of respiratory and cardiovascular symptoms and illnesses |
| 76-100 | Heavy air pollution | Aggravation of heart or lung disease. Increased risk of death in children ( heart and lung disease) increased effects in general population |
| >100 | Severe air pollution | Serious aggravation of heart or lung disease, Increased risk of premature death. Serious risk of cardio respiratory symptoms in general population. |

**(Source: USEPA, 2014)**

**Tools Required:**

1. Anaconda, IDE
2. Python 3.6
3. Libraries- numpy, matplotlib, pandas, scikit, seaborn
4. Data Sets

**Bibliography/References:**

[1]V. Ivanov and I. Georgieva, “Air quality index evaluations for Sofia city,” IEEE EUROCON 2017 – 17th International Conference on Smart Technologies, Ohrid, 2017, pp. 920-925

[2] USEPA, Air Quality Index: A Guide to Air Quality and Your Health. February 2014, EPA- 456/F-14-002.

[3] <https://www.kaggle.com/shrutibhargava94/india-air-quality-data>

[4] Chelani A. B., Chalapati Rao C. V., Phadke K. M. And Hasan M. Z. (2002), Formation of an Air Quality Index for India, International Journal of Environmental Studies

[5] <https://shrutibhargava94.github.io/india_air_quality_map/>

[6] <https://www.kaggle.com/chetansuwade/air-quality-india-an-overview>

Online Python Coruses from codeacademy and Udemy.

Introduction to ‘Data Science’ from Forsk Technologies.