

# METHODOLOGY



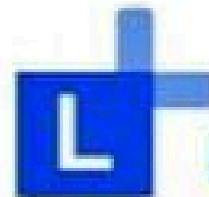
## Python Language

Python is a rich language for Data Science and AI



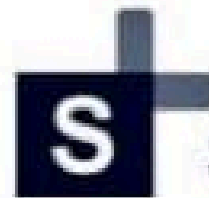
## Algorithm

Long Short Term Memory ( LSTM )



## Libraries

Pandas, Numpy, Sklearn, Tensorflow, etc



## Streamlit UI

Provided User Interface using Streamlit

# Prediction of Air Quality in Urban Area, Chennai

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**Abstract**— The quality of air in Alandur, Chennai is polluted by Particulate Matter ( $PM_{2.5}$ ) over the years. Reports prove that particulates affect the health of humans and environment. Development of accurate forecasting models to find  $PM_{2.5}$  concentration in air helps to take control measures, early warning and mitigative measures. In this study, the performance of non-linear model (Feed Forward Back Propagation using LEARNGD function) with meteorological data and gaseous pollutants as input parameters from the year 2015–2019 at Alandur with different surrounding activities of urban area. In this paper, the prediction of  $PM_{2.5}$  in the study area is mainly focused to find the effects of harmful emissions. To predict  $PM_{2.5}$ , an artificial neural network (ANN) prediction model is developed. The data obtained from the monitoring station on the Alandur Bus depot of Alandur area in Chennai is given as input variable. The prediction model is validated and evaluated by statistical calculations, and then it was found that it performed well in the prediction of  $PM_{2.5}$ . The performance of the developed model was evaluated by Mean Square Error (MSE) and value of  $R^2$ . The best prediction performance was observed in the model for Purelin transfer function with  $R^2$  value of 0.96 and MSE of 0.094 and for Tansig transfer function with  $R^2$  value of 0.97 and MSE of 0.103 from the framed networks.

**Keywords**— Air quality prediction, Artificial neural network,  $PM_{2.5}$  Prediction, MATLAB.

## I. INTRODUCTION

Technological advancements lead to the emissions of air pollutants over the decades. Major concerns in industrial cities which experience air pollution, can be harmful not only for the environment but also for human health. Due to this urban resident are more likely to live in less polluted neighborhoods to avoid the health impact of air pollution. Atmospheric pollution can be classified into three types based on the sources mobile, stationery and area sources. Mobile sources are due to the motor vehicles, airplanes, locomotives and other engines and equipment that are able to move to different locations. Stationary sources include foundries, fossil fuel burning, food processing plants, power plants, refineries and other industrial sources. Area sources is caused by certain local actions. Air pollution can be caused due to the pollutants which are emitted directly from a source or which are not directly emitted as such. It can result in the degradation of ambient air quality in the industrial cities. Also daily exposure of people to air pollution results in diseases like asthma, wheezing, and bronchitis.

Air pollutants such as sulphur dioxide ( $SO_2$ ), nitrogen oxide ( $NO_x$ ), nitric oxide (NO), nitrogen dioxide ( $NO_2$ ), carbon monoxide (CO), Ozone ( $O_3$ ), respirable suspended particulates (RSPs) are some of the major airborne pollutants which exerts impact on physical and biological environment.

Air quality monitoring data are used to check the concentration with the ambient air quality standards provided by the government. The purpose of prediction is to develop effective emission control strategies and also helps to find the contribution of each source causing pollution.

There are two types of prediction methods, deterministic and stochastic. In this work, deterministic method is used for the prediction. This methods works on the basis of physical and chemical transportation process of pollutants with the influences of meteorological variables, by mathematical models.

Artificial neural networks help to forecast the pollutants in complicated non-linear functions. The accuracy of prediction by artificial neural networks is higher than other methods. The learning process of ANN is similar to animal brain and it can process nonlinear and complex data. It can learn and identify correlated patterns for input data sets to corresponding target values. After training, ANN is used to predict the output of new independent input data.

In this research, feed-forward back propagation neural network model is used for prediction of air quality where data collected for the last five years is prediction. This research is done due to the lack of awareness about the real time air quality status among the society. The prediction model by ANN is done by MATLAB software.

The objective is to collect the  $PM_{2.5}$  and meteorological data that play a major role in ambient air pollution and to predict the concentration of  $PM_{2.5}$  by ANN.

### A. Study Area

Chennai, the capital of Tamil Nadu in India is located on the Coromandel Coast off the Bay of Bengal. It is the economic and educational centre of south India. Chennai lies on the south-eastern coast of India.

# INTRODUCTION

- ❖ Air pollution take place due to burning of fossil fuels in Electricity, Transportation, Industrial Emission. In order to reduce and prevent further cause to the globe warming, predict the air quality index to know the particle present in air.
- ❖ Pollutants in the air cannot be seen with our naked eyes, we don't realize the sources of the increasing pollution level. In order to understand the sources of air pollution, we need to first go through the basic causes of air pollution.
- ❖ PM2.5 is hazardous for the environment around the globe. Long term exposure by individuals to these tiny particles which can easily pass through deep into respiratory organs can cause a lot of disease.

# STOCK PRICE PREDICTION





# AIR QUALITY PREDICTION

USING MACHINE LEARNING TECHNIQUE

1Bfreedu