

Chapter 17

Analyzing AQI before Covid '19: Experimental Study of 3 Years for Intelligent Environment Conducted at North Indian Zone to Extract Knowledge

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ABSTRACT

In the populated and developing countries, governments consider the regulation and protection of environment as a major task and should take into consideration the concept of smart environment monitoring. The main motive of these systems is to enhance the environment with various technology including sensors, processors, data sets, and other devices connected across the globe through a network. This system can help in monitoring air quality. Also, these factors contribute a lot to air pollution. So, forecasting air quality index using an intelligent environment system includes a machine learning model to predict air quality index for NCR (National Capital Region). The values of major pollutants like SO_2 , $PM_{2.5}$, CO , PM_{10} , NO_2 , and O_3 . The authors have implemented different machine learning algorithms of classification and regression techniques. To make their prediction more accurate, mean square error, mean absolute error, and R square errors have been considered. The chapter helps to frame a structured view of air quality prediction methods in the reader's mind and also gives suggestions for other prediction methods as well. The real challenge is to decide which method will be applied in predicting air quality. Hence, it is important to test and use all these methods.

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INTRODUCTION

This research paper discusses the different parameters of air quality and environment using various machine learning algorithms. This paper also introduces us with the reason behind the contamination of air. Pollution can cause harm to not only air but to water bodies as well. It can take the form of noise, heat and even light. The substances which are responsible for pollution can be either foreign substance or they may have been naturally occurred in the nature. Pollution is mostly classified as to be caused by any one single source rather than many.

Intelligent Environment Systems

In this era of globalization, every country in the world is facing problems related to environment. In order to control these problems, it has become a primary concern of thinking for the various organizations and governments. This emerging problem produces a need of monitoring of environment and finding more environment nourishing solutions. And, this need brings smart monitoring techniques into the picture (Dipanda, A. et al., 2016).

Intelligent Environment Systems plays an important role in approximately all sectors. This field is becoming a must have for cities with increased industrialization, high population and massive transportation, as these sectors are the main reason behind increasing pollution (Wilson, T., et al., 2018).

Types of Pollution

Pollution is mainly of four types: water pollution, soil pollution, noise pollution and air pollution. We here elaborate detail about air pollution. A factor which induces air pollution is stubble farming, motor vehicle emission, topological factor, and open construction work. The ordinance of environmental contamination has drawn public examination. NCR(National Capital Region) one of the most contaminated territories in the world (Tripathi, C.B. et al., 2019).

Components in Pollution Particles

Different researches have carried out several experiments and have come to a conclusion that the concentration of pollutants in NCR is alarmingly higher as compared to any other region (Srivastava, C. et al., 2018). This has made the lives of all the residents less for up to 6 years. While some researchers have (Aggarwal, P. et al., 2015) concluded that pollution has affected human fitness. Hence, we enhancing the air quality forecasting is one of the best objectives for civilization. Sulphur dioxide, PM2.5 and NO are major pollutants found in the air. Sulphur Dioxide is a gas, present in air(Gallardo, M. et al., 2017).

This combines easily with different substances to form harmful substances like Sulphur acid, sulphurous acid etc. Sulfur dioxide affects social fitness when it is inhaled in. It causes a burning feeling in the nose, throat, and airways to result into coughing, wheezing, the brevity of breath, or a tense feeling around the chest. The concentration of Sulphur dioxide in the environment affects the places we can live in (Bhalgat, P. et al., 2019). PM2.5 is also known as fine particulate matter (2.5 micrometers is one 400th of a millimeter). Fine particulate matter (PM2.5) is important among the pollutant index because it is a big concern to people's health when its level in the air becomes high (Pandey, G. et al., 2013). So, it has been categorized according to Air quality index table.

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