Comparative Analysis of Artificial Neural Network and Long Short-term Memory Techniques for Predicting Air Quality in Smart Cities: Ahmadabad City

⬇ **Full Text**

D.J. Varia[1]* and A.M. Kothari[2]

1. Gujarat Technological University, Ahmedabad- 382 424, Gujarat, India
2. Atmiya University, Rajkot- 360 005, Gujarat, India

Abstract

Over the last few decades, air quality has turned into a critical environmental issue which has made more prominent effect on human health. Because air quality greatly affects the everyday existence of human, it is essential to examine the changes in air quality and predict them precisely. Our investigation focused on gauging and foreseeing the air quality of 145 crossways/intersections for smart urban communities, like Ahmedabad, Gujarat in India independently because air quality varies from intersection to intersection as it depends on several parameters, like traffic, industrial area, time of the day, etc. The significant issue with this investigation is the accessibility of the dataset for every crossway of the city. To address the issue we have created the estimation information for the air quality index (AQI) for Ahmedabad city from a similar approach as the dataset produced for Aarhus city, Denmark. The aftereffect of this examination is promising to foresee the air quality index for the intersections, utilizing artificial neural network (ANN) and long short-term memory (LSTM). At last, we examine and compare the correctness of different configurations using root mean square error in the prediction of the actual vs predicted AQI using the proposed configuration. In this paper air quality index for Ahmedabad city is generated from the same methodology as the data of Aarhus city, Denmark generated for the period of 1/8/2018 to 1/10/2018. The previous studies were based on predicting an AQI for the whole city. The novel part of this study is to develop a dataset for the Ahmedabad city, Gujarat, India and junctionwise prediction of the AQI. Moreover, the paper has proposed the client-server model to get the prediction of AQI for different 145 crossways in the city. Paper derives the conclusion that for the given dataset, the LSTM predicts AQI more accurately than the ANN. This paper is a critical inspiration for inquiring into urban air quality as well as to help the administration to design gainful strategies

Keywords

Air pollution, Air quality prediction, Machine learning, Artificial neural network, Long short-term memory, Ahmedabad, Gujarat, India

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