SPECIMEN FORMAT FOR THESES OF MONTH

Faculty	**:**	**School of Engineering**
Department	**:**	**Computer Science and Engineering**
Branch/ Area:	**:**	**Artificial intelligence**
Sub Subject Heading:	**:**	**Deep learning**
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Title of the thesis	**:**	**Air quality Prediction using Deep learning Techniques**
(i) In Roman Script (ii) In roman Script		**AIR QUALITY PREDICTION USING DEEP LEARNING TECHNIQUES** **Air quality Prediction using Deep learning Techniques**
Nomenclature of Degree:	**:**	**Ph.D**
Month & Year of Enrolment:	**:**	**1.07.2019**
Month & Year of Registration:	**:**	**July and 2019**
Month &Year of Submission:	**:**	**June and 2025**
Month &Year of Award	**:**	**April and 2025**

Name of Supervisor	**:**	**Dr.P.Amudha**
Designation of Supervisor	**:**	**Professor**
Centre/department/school in which research was conducted	**:**	**Computer Science and Engineering**
University's Name & Address	**:**	**Avinashilingam institute for home science and Higher education for women**

Abstract within 300 words: Machine Learning models and Deep Learning models have been widely used to predict the air quality. Monitoring air quality involves both regulatory measures and public awareness campaigns to reduce emissions from various sources such as vehicles, industrial activities, agriculture, and household combustion. Air pollution predict is very useful for informing about the pollution level that allow policy makers to adopt measures for reducing its impact. Over the past few decades, due to human activities, industrialization, and urbanization, air quality condition has become a life-threatening factor in many countries around the world. It causes various illnesses such as respiratory tract and cardiovascular diseases. Hence, it is necessary to accurately predict the PM2.5 concentrations in order to prevent the citizens from the dangerous impact of air pollution. Air pollution refers to the presence of harmful or excessive quantities of substances in the air we breathe, which can be detrimental to human health, the environment and ecosystems. These substances, known as pollutants, can come from various sources, including industrial activities, vehicle emissions, agricultural practices, and natural phenomena. Common air pollutants include particulate matter (PM), nitrogen oxides (NOx), sulfur dioxide (SO2), carbon monoxide (CO), volatile organic compounds (VOCs), and ozone (O3). The air quality prediction is used to predict the future state of air quality in a particular location based on the existing data, such as historical air quality data. Finally, the developed approaches like Improved Sparse Auto Encoder Using Deep Learning (ISAE-DL), Voronoi Clustering Sparse Auto Encoder Using Deep Learning (VCSAE-DL), Transferred Stacked Bidirectional and Unidirectional Using Long Short Term Memory Algorithm (T-SBU-LSTM) and Wasserstein distance using Deep Transfer Learning (WD-DTL) based air quality prediction system were

compared using the performance metrics, Accuracy, Precision, Specificity, Sensitivity, AUC, MCC and MAER. The experimental results proved that WD-DTL based air quality prediction system accomplishes Efficient.

i) Major objectives :

- To develop deep learning-based models for air quality prediction.
- To identify the temporal and spatial features using long-time delay-based locations for better air quality prediction model.
- To minimize the learning from long-term dependencies of air quality data using Transferred Stacked Bidirectional and Unidirectional Long Short-Term memory method To optimize the LSTM-based parameters by using Wasserstein distance.

ii) Hypothesis:

Null Hypothesis (H0): This hypothesis states that there is no significant relationship between the input features (e.g., meteorological data, pollutant concentrations) and the AQI, or that the deep learning model's predictions are not significantly different from randomly guessing. In essence, the model is not providing valuable insights or predictions.

Alternative Hypothesis (H1): This hypothesis suggests that a relationship exists between the input features and the AQI, or that the deep learning model's predictions are significantly better than random. This implies that the model has learned meaningful patterns and can accurately predict air quality**.**

iii) Methodology :

The investigation were Involved four Phase

Phase-1: Improved Sparse Auto-encoder with Deep Learning (ISAE-DL)

Phase-2: Voronoi-Based Clustering using Sparse Auto- Encoder with Deep Learning

Phase-3: Transferred Stacked Bidirectional and Unidirectional Long Short-Term Memory

Phase-4: Wasserstein Distance-Deep Transfer Learning

iv) Findings:

Many researchers have concentrated on PM2.5 and PM10 to forecast India's air quality. In the literature review, the analysis was primarily restricted to a single city or region. Conventional air quality prediction models frequently perform less than optimally because they are unable to fully capture the complex patterns and dependencies found in the data. Furthermore, complex sequences can be efficiently extracted, processed, and non- linear features can be extracted using machine learning algorithms. However, they still have issues with over fitting and a tendency toward local optima.

Examiners

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