AIR QUALITY INDEX AND POLLUTION FORECASTING

PROJECT GUIDE : Ms . GOPIKA , M .Tech , PHD,.
DEPARTMENT : Artificial Intelligence And Data science
TEAM MEMBERS : KEERTHI ANAND P (720522243023)
MATHIBALA M (720522243027)
MADHAN G (720522243024)

Introduction

- Air pollution is a critical environmental issue affecting both human health and ecosystem.
- Rapid industrialization and urbanization have increased air pollution levels.
- Presence of thermal power plants, oil refineries, ports, and heavy transportation.
- Pollutants such as PM2.5, PM10, SO_2, NO_2, CO are released continuously.
- Air Quality Index (AQI) is a standardized method to measure air pollution.
- Forecasting air pollution helps in early warning and preventive planning.

Problem Statement

•Air pollution has become a **serious environmental and public health issue**, especially in rapidly urbanizing and industrial regions of India.
•The **Air Quality Index (AQI)** is widely used to represent air pollution levels and associated health risks.
•**Accurate AQI forecasting is challenging** due to:
•Nonlinear and complex relationships among multiple pollutants and meteorological parameters
•Strong temporal, seasonal, and regional variations
•Hence, there is a need for a **robust, accurate, and interpretable hybrid deep learning model** for AQI forecasting that can support **environmental monitoring and policy decisions**.

Objectives

- Learns long-term temporal dependencies (LSTM / Bi-LSTM)
- Captures spatial correlations among pollutants (CNN)
- To design a **hybrid deep learning model** (CNN-LSTM / CNN-BiLSTM / Attention-based CNN-LSTM) that:
- To **improve AQI prediction accuracy** compared to traditional statistical and standalone deep learning models.
- To **identify the contribution of individual pollutants** ($PM_{2.5}$, PM_{10}, NO_2, SO_2, O_3, CO) to AQI levels.

Literature Review

Author	Year	Title of the Study	Methodology Used	Key Findings
Gayathiri M, Kavitha V	2024	Forecasting Air Quality with Deep Learning	LSTM, Bi-LSTM	Identified PM2.5 as the major pollutant affecting AQ
Ekata Mohapatra, Mira das	2025	Deep Learning Based AQI Forecasting	CNN,LSTM	To Improve Interperability
Bee Lan Oo	2024	Predicting Air Quality Index using attention hybrid deep learning and quantum inspired particle swarm optimization	ARIMA Model,QPSO,LSTM	Effective for short-term air quality prediction

Tentative Time Line

Description	MONTH-1	MONTH-2	MONTH-3	MONTH-4
Literature Review	★			
Data Collection	★			
Data Cleaning & Analysis		★		
Model Development		★		
Implementation			★	
Testing & Validation			★	
Report writing and Final presentation				★