

# Government College of Technology, Coimbatore-13

## **Project Name:** *Air Quality Assessment TN*

### **Team Members:**

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## **Phase 1: Problem Definition and Design Thinking**

### **Project Definition**

The objective of this project is to analyse and visualize air quality data collected from monitoring stations across Tamil Nadu. The primary goals are as follows:

- 1. Analyse Air Quality Trends:** To gain a comprehensive understanding of air pollution trends over time.
- 2. Identify Pollution Hotspots:** To pinpoint geographical areas with consistently high pollution levels.
- 3. Develop a Predictive Model:** To create a predictive model that estimates RSPM/PM10 levels based on SO2 (Sulphur Dioxide) and NO2 (Nitrogen Dioxide) levels.

The project will employ IBM Cognos Analytics to achieve these objectives.

### **Design Thinking**

### **Project Objectives**

#### **Objective 1:** Analysing Air Quality Trends

To achieve this objective, we will:

- Collect historical air quality data from monitoring stations in Tamil Nadu.
- Preprocess and clean the data to ensure accuracy and consistency.
- Perform statistical analysis to identify trends, seasonal variations, and anomalies.
- Visualize the data using appropriate techniques to present the results effectively.

## Objective 2: Identifying Pollution Hotspots

To identify pollution hotspots, we will:

- Utilize spatial data and GIS (Geographic Information Systems) tools to map pollution levels across different regions.
- Apply clustering and heat mapping techniques to identify areas with consistently high pollution levels.
- Present these findings through interactive visualizations for better understanding.

## Objective 3: Developing a Predictive Model

To create a predictive model for RSPM/PM10 levels, we will:

- Collect historical data on RSPM/PM10 levels, SO2 levels, and NO2 levels.
- Preprocess the data, including handling missing values and outliers.
- Split the dataset into training and testing sets.
- Utilize regression modelling techniques, such as linear regression or machine learning algorithms, to build a predictive model.
- Evaluate the model's performance using appropriate metrics, ensuring its accuracy and reliability.

## **Analysis Approach**

To accomplish the project objectives, we will follow these steps:

1. **Data Collection:** Gather historical air quality data from monitoring stations in Tamil Nadu. This data will include information on pollutants like RSPM/PM10, SO2, and NO2, as well as associated timestamps and geographical coordinates.
2. **Data Preprocessing:** Clean and preprocess the data, addressing issues such as missing values, outliers, and data consistency. This step is crucial to ensure the quality and reliability of the analysis.
3. **Data Analysis:** Apply statistical analysis techniques to uncover air quality trends, seasonal variations, and anomalies. This will involve time-series analysis and hypothesis testing.
4. **Data Visualization:** Select appropriate visualization techniques, such as line charts for trends, heatmaps for geographical patterns, and scatter plots for correlation analysis. Interactive visualizations will be created for dynamic exploration.
5. **GIS Integration:** Utilize GIS tools to geospatially represent air quality data, enabling the identification of pollution hotspots and regional variations.

## Visualization Selection

The choice of visualization techniques will be guided by the following considerations:

- **Line Charts:** For displaying temporal trends in air quality data, allowing us to observe changes over time.
- **Heatmaps:** To visualize geographical variations in pollution levels, highlighting hotspots and regional differences.
- **Scatter Plots:** For exploring relationships and correlations between different pollutants, such as SO<sub>2</sub> and NO<sub>2</sub>, and RSPM/PM<sub>10</sub> levels.
- **Geospatial Mapping:** To provide an interactive map that allows users to explore pollution levels across different regions in Tamil Nadu.

By integrating these visualization techniques, we aim to provide a comprehensive and informative representation of the air quality data, enabling data-driven decision-making and insights into air pollution in Tamil Nadu.

This project will follow a structured approach to achieve its objectives, ensuring that the analysis is robust, the visualizations are informative, and the predictive model is accurate. Regular updates and communication will be maintained to track progress and address any challenges that may arise during the project's execution.