**AIR Q ASSESSMENT TN**

1. **Empathize**:

- Understand the needs of stakeholders, including government agencies, environmental organizations, and the public.

- Conduct surveys or interviews to gather information about what specific insights they seek from air quality data and how it can be useful.

2. **Define**:

- Define the project objectives in detail:

- Analyze Air Quality Trends: Understand how air quality parameters vary over time and identify any long-term trends or seasonality.

- Identify Pollution Hotspots: Determine geographic areas with consistently high pollution levels and explore potential causes.

- Build a Predictive Model: Develop a machine learning model to estimate RSPM/PM10 levels based on SO2 and NO2 levels.

3. **Ideate**:

- Brainstorm potential data sources: Consider sources like government monitoring stations, satellite data, and weather data.

- Explore different algorithms for your predictive model: Regression algorithms (e.g., linear regression, random forests) may be suitable for predicting RSPM/PM10 levels.

4. **Prototype:**

- Set up data pipelines to acquire and preprocess the air quality data. Ensure data cleaning, handling missing values, and feature engineering as needed.

- Begin building your predictive model using Python and relevant libraries like pandas, scikit-learn, and XGBoost.

5. **Test**:

- Validate your initial data preprocessing and modeling steps with a small subset of the data.

- Seek feedback from stakeholders to ensure that your project aligns with their expectations and needs.

6. **Implement**:

- Develop a full-fledged data processing pipeline to handle large datasets efficiently.

- Implement chosen visualization techniques to represent air quality trends and pollution levels. Consider interactive dashboards using libraries like Matplotlib, Seaborn, or Plotly for Python.

7. **Iterate**:

- Continuously refine your analysis and modeling approach based on emerging insights and feedback.

- Fine-tune your predictive model's hyperparameters and evaluate its performance using appropriate metrics.

8. **Evaluate**:

- Assess the performance of your predictive model using evaluation metrics (e.g., RMSE, MAE) and cross-validation techniques.

- Evaluate the effectiveness of your visualizations in conveying air quality trends and pollution levels.

9. **Refine**:

- Refine your project based on evaluation results and stakeholder feedback.

- Make adjustments to your analysis methods, visualization techniques, or predictive model as needed.

10. **Deliver**:

- Prepare a comprehensive report or presentation that communicates your findings, insights, and the predictive model's performance.

- Provide actionable recommendations for addressing air quality issues based on your analysis.

11. **Scale** (if applicable):

- Consider scaling up your project to cover more monitoring stations or expand it to cover a larger geographical area if initial results are promising.

- Explore partnerships with organizations that can help deploy monitoring stations in critical pollution hotspots.

12. **Sustain**:

- Document your code, data sources, and methodologies for future reference and maintenance.

- Establish a plan for regular data updates, model retraining, and visualization updates as new data becomes available.