Programme	B.Tech	**Semester**	WINSEM 25-26
Course	Software Lab	**Code**	BCSE301P
Faculty	Dr. Sakthivel Velusamy	**Slot**	L15+L16
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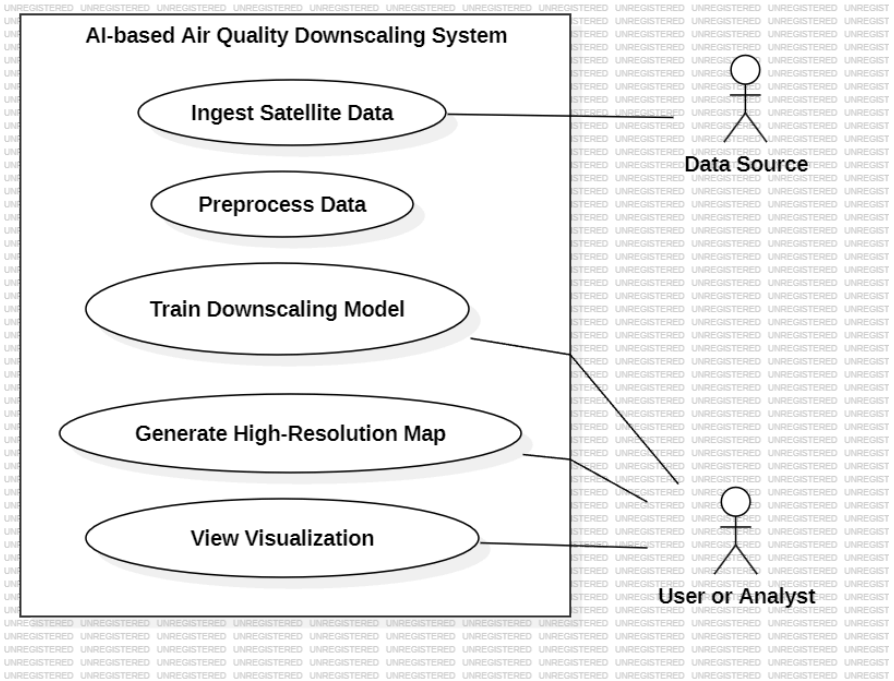
UML Diagrams – Use Case & Class

UML diagrams are used to represent both the functional behaviour and internal structure of the AI-based Air Quality Downscaling System. The Use Case Diagram explains system functionality from a user perspective, while the Class Diagram describes internal structure and data flow.

Use Case Diagram

The Use Case Diagram represents the interaction between external actors and the system. The **Data Source** supplies satellite and auxiliary data, while the **User / Analyst** trains the model, generates high-resolution air quality maps, and views visualizations within the AI-based Air Quality Downscaling System.



Class Diagram

- **SatelliteData**: Stores low-resolution satellite air quality data and related metadata.
- **AuxiliaryData**: Holds supporting data such as meteorological and land-use information.
- **Preprocessor**: Cleans and normalizes raw input data for further processing.
- **FeatureEngineer**: Extracts relevant features from preprocessed data.
- **DownscalingModel**: Trains the ML model and predicts high-resolution air quality values.
- **Evaluator**: Calculates error metrics and provides feedback for model improvement.
- **Visualizer**: Generates maps and visual outputs from model predictions.