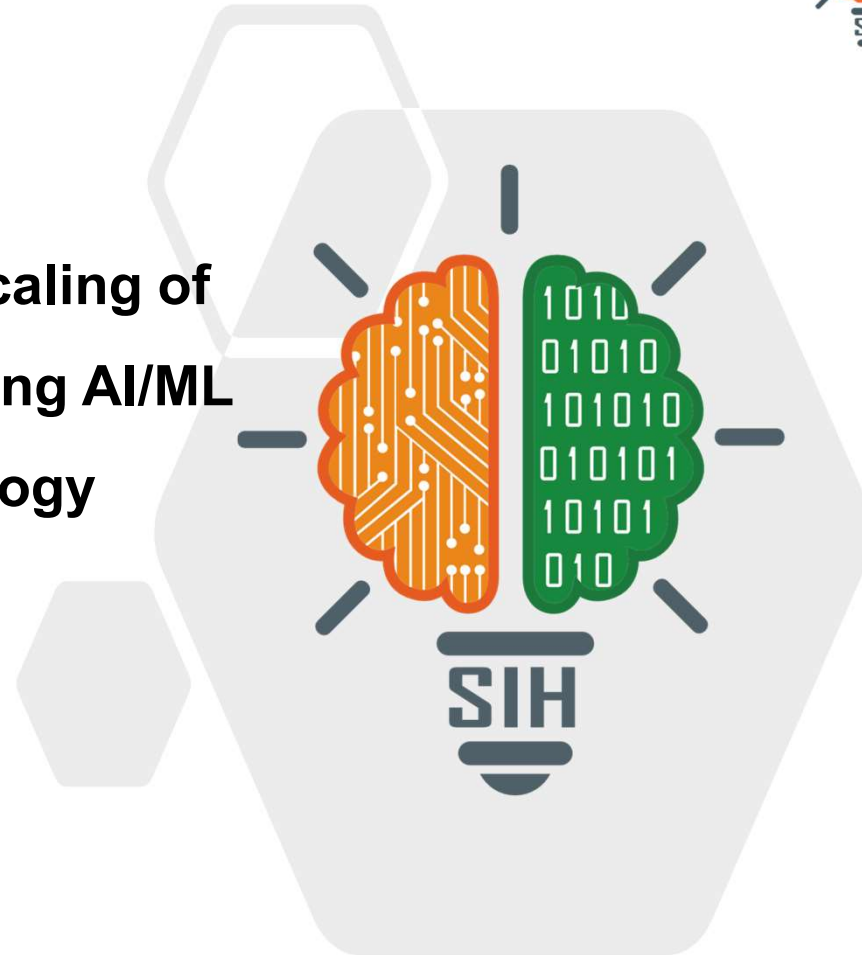


SMART INDIA HACKATHON 2024



- **Problem Statement ID –1734**
- **Problem Statement Title - Downscaling of satellite based air quality map using AI/ML**
- **Theme - Clean and Green technology**
- **PS Category- Software**
- **Team ID-**
- **Team Name - AQ Mappers**



DOWNSCALING OF SATELLITE BASED AIR QUALITY MAP USING AI/ML



- **Problem**:-Satellite imagery provides a global overview of air quality but often suffers from low spatial resolution. This makes it difficult to assess air quality at a local level, especially in densely populated areas.
- **Solution**:-AI/ML techniques can be leveraged to downscale high-resolution satellite imagery, improving its spatial resolution and accuracy for local air quality monitoring. This involves training models on large datasets of satellite imagery and ground-based air quality measurements.

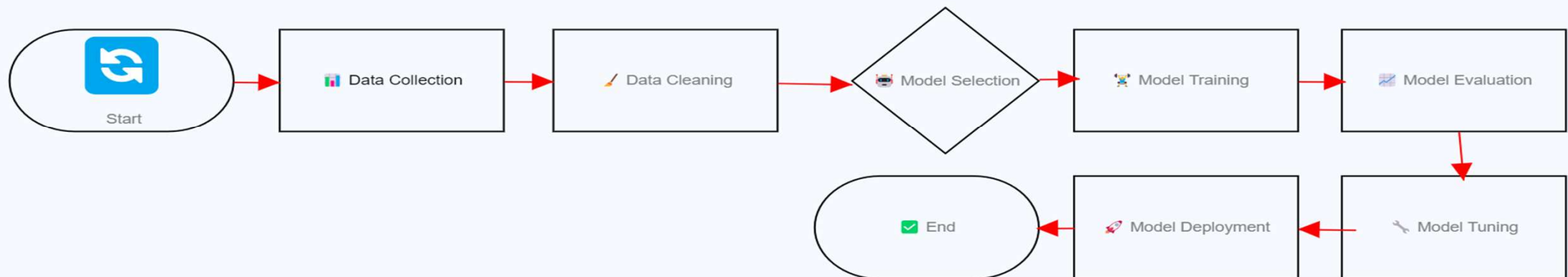
Why This Approach Works:-

We combine satellite data, machine learning models, and weather information to make the model as accurate as possible. The model can handle missing data (due to clouds) and still produce reliable air quality predictions. By validating the model with real-world data, we ensure that it works well in practice, not just in theory.

TECHNICAL APPROACH

Technologies to be used:-

- Programming Language-Python
- Frameworks-Tensorflow and Pytorch
- Libraries-OpenCV,Numpy,Pandas
- AI/MLTechniques:- CNNs and GANs



FEASIBILITY AND VIABILITY



- **Feasibility:-** Yes, The idea of creating an air quality map decompressor is certainly feasible. Given the growing concern for air quality and the increasing availability of air quality data, there is a clear need for efficient methods to store, transmit, and visualize this information.
- **Potential challenges and risks:-** Compression Format, Data Resolution and Accuracy, Data Format and Structure, Visualization Compatibility, Real-time Requirements, Data Privacy and Security.
- **Strategies for overcoming these challenges:-** To develop a versatile decompressor and use efficient algorithms and hardware acceleration techniques to optimize the decompression process and Implement error checking and validation mechanisms during the decompression process and Implement robust security measures.

IMPACT AND BENEFITS

Potential impact on the target audience:-

- Downscaling satellite-based air quality maps using AI/ML has several positive impacts, including:-significantly improved spatial resolution enhanced accuracy in localized areas.
- better identification of pollution hotspots ability to monitor air quality at finer scales .
- facilitating more targeted mitigation strategies by providing detailed air quality information at neighborhood or street level which is not possible with coarse resolution.

Benefits of the solution:-High-resolution mapping, Improved accuracy , Real-time monitoring, Cost-effective analysis, Targeted interventions.

RESEARCH AND REFERENCES



- NASA Earthdata Search: <https://search.earthdata.nasa.gov/>
- European Space Agency (ESA) Earth Observation Portal: https://www.esa.int/Applications/Observing_the_Earth
- National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI): <https://www.ncei.noaa.gov/>
- World Health Organization (WHO) Air Quality Database: <https://www.who.int/data/gho/data/themes/air-pollution/who-air-quality-database>
- OpenStreetMap (OSM): <https://www.openstreetmap.org/>