



Project Proposal

Title

AI-Based Estimation of Carbon Emissions Using Satellite Imagery: A
Case Study on Urban and Agricultural Areas in Saudi Arabia

Prepared By

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1. Project Overview

Carbon emissions are a primary contributor to climate change. This project builds an AI-based system that estimates carbon emissions from satellite imagery in urban and agricultural zones of Saudi Arabia. The project addresses the limitations of traditional monitoring methods by providing a scalable and efficient AI-based tool.

2. Project Goal

Develop a machine learning model to estimate & predict carbon emissions for a specific area using satellite imagery.

3. Approach

- **Data Collection:** Satellite images from Sentinel-2 and emissions datasets from EDGAR and Global Carbon Atlas.
- **Data Processing:** Image cleaning, band extraction (NDVI, NDBI), and matching with emissions.
- **Model/Method Selection:** Use Random Forest, Gradient Boosting, or CNN.
- **Model testing and evaluation:** Testing and Evaluation: Metrics include MAE, RMSE, and R^2 .

4. Project Steps and Timeline

- 10 weeks based on the methodology below:
 - Data Collection and Preparation
 - Model Building and Training
 - Testing and Evaluation
 - Final Adjustments and Reporting

5. Expected Results

- A trained model that estimates & Predict emissions in specific area.

6. Resources Needed

Python libraries: TensorFlow, scikit-learn, Rasterio

Satellite imagery: Sentinel-2, Landsat, earth engine

Carbon data: EDGAR, Global Carbon Atlas

Computational resources (GPU)

7. References

1. EDGAR – <https://edgar.jrc.ec.europa.eu/>
2. Copernicus – <https://scihub.copernicus.eu/>
3. Global Carbon Atlas – <https://www.globalcarbonatlas.org/>
4. Zhang et al. (2022), Elsevier
5. NASA Earth Data – <https://earthdata.nasa.gov/>