# Capstone Project Concept Note and Implementation Plan

## Project Title: CO2 Emissions from Vehicles Reduction

### Team Members


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### Concept Note

#### 1. Project Overview

• This project aligns with **SDG 13: Climate Action** by contributing to the reduction of greenhouse gas emissions. By integrating geospatial analysis, the project not only predicts emissions but also identifies high-risk areas, enabling targeted interventions that support sustainable transportation and climate action.

• The project aims to address the challenge of high CO2 emissions from vehicles by developing a predictive model to estimate emissions based on various factors and by using geospatial data to identify areas with high emission levels. The goal is to provide targeted recommendations for reducing emissions in specific regions, thereby enhancing mitigation

#### 2. Objectives

- the investing what type of vehicles which emit a lot of co2
- To know the location which has high emission of co2
- To provide mitigation strategies for high emission co2 areas
- Key point of where to introduce green technology in transport

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• they will defined algorithm which will track they Areas with high emission and which kind of vehicles that contribute to High emission, after alert of co2 emission institution will have to apply mitigation of reducing co2 emission ?

#### 3. Background

- Offer a comprehensive background that contextualizes the problem your project seeks to solve.
- Discuss any existing solutions or initiatives related to the issue, and explain why a machine learning approach is beneficial or necessary.

## 4. Methodology

- we will use the Supervised Learning such as regression models like linear regression ,Ridge and Unsupervised learning for segmentation of Areas and vehicle type with high emissions .

- Sckiti learn for regression and Unsupervised

Geopandas for Geospatial analysis

Streamlit for model deployment and web app for user interaction

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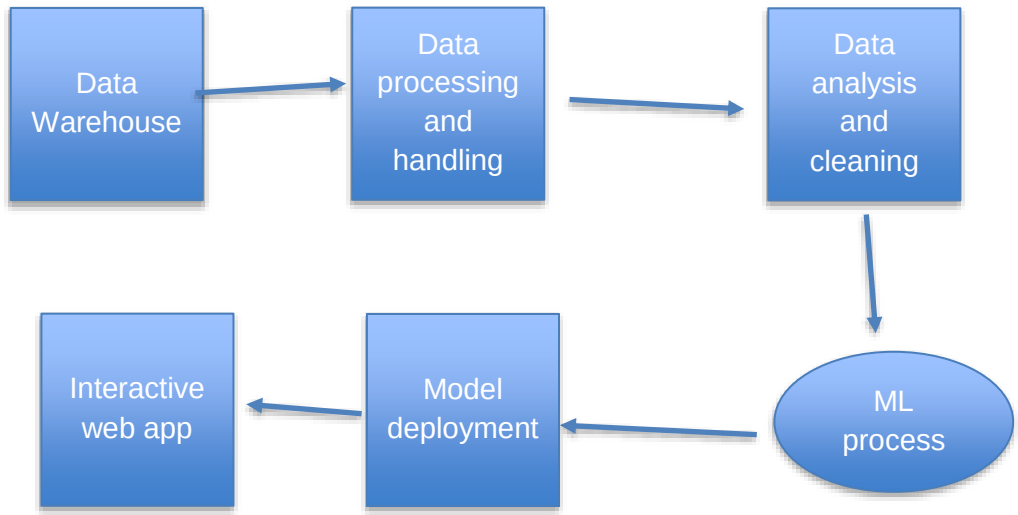
## 5. Architecture Design Diagram

- Provide a high-level overview of the architecture of your project.
    - Use a diagram to illustrate the key components and their interactions.

- Briefly describe each component shown in the diagram
    - Highlighting their roles and functionalities within the overall system.



### 6. Data Sources

- kaggle here.
- European Environment Agency here

### 7. Literature Review

1. • **Example 1**: A study on predicting vehicle emissions using machine learning algorithms showed the effectiveness of regression models in estimating CO2 emissions (Smith et al., 2020).
2. **Example 2**: Research on geospatial segmentation for environmental monitoring demonstrated how geographic information systems (GIS) can be used to map and analyze pollution levels, allowing for targeted environmental management (Doe et al., 2022).

## Implementation Plan

### 1. Technology Stack

- List the technologies and tools you plan to use for the implementation of your project.
    - Python,SQL ,json
    - Pandas,Numpy ,Geopandas, ,matplotlib,seaborn,skiti learn
    - FLASK
    - Google colab, Anaconda, Streamlit.

### 2. Timeline

- Provide a detailed timeline for the different stages of your project,
    - Data collection and preprocessing
    - Model development
    - Training, and evaluation
    - Deployment
- Break down the timeline into manageable tasks with corresponding deadlines. You can use Gantt chart.
    - If you have pair you should add **task distribution matrix** to clarify each

members responsibility.

| Name | Start | Finish | Duration | % Complete | Resource Names |
|---|---|---|---|---|---|
| data collection and prepa | 29/08/2024 | 01/09/2024 | 3 | 80 | Dukundimana Toussaint |
| data cleaning and preproc | 03/09/2024 | 04/09/2024 | 1 | 40 | Ziaurrahman Hemat |
| modeling development | 04/09/2024 | 06/09/2024 | 2 | 0 | GAI AWUOU KWAI ALIER |
| training and evaluation | 06/09/2024 | 08/09/2024 | 2 | 0 | Abdelrazig Mustafa |
| Model depolyment | 06/09/2024 | 09/09/2024 | 3 | 30 | Dukundimana Toussaint |

**3. Milestones**

- Identify key milestones in your project's development.
  - ✓ Dataset collection
  - ✓ Data preparation
  - Feature engineering
  - Model phase
  - Deployment

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**4. Challenges and Mitigations**

- Anticipate potential challenges that may arise during the project and propose strategies for mitigating them.
  - Data quality : the source of data and to find dataset to use in Geospatial analysis is biggest challenge
  - Model performance
  - Technical constraints. :

**5. Ethical Considerations**

- to get dataset of all country is difficulty and according to policies of not using their data in personal project .

To Utilize dataset it require to ask the permission to use as in own research which is also difficulties

**6. References**