Assignment-01: GIS Internship

Introduction to our company: You can check out our page: https://www.dfy-graviti.com and https://in.linkedin.com/company/dfy-graviti-technologies-private-ltd

Objective:

The goal of this assignment is to identify instances where a vessel comes into close proximity with anothervessel in a marine region. This activity is referred to as *'vessel proximity'*.

Background:

Marine vessels, including container ships, cargo ships, passenger ships, and others, are assigned a unique 9-digit number called the ***Maritime Mobile Service Identity (MMSI)***. This number is used to uniquely identify each vessel.

Input Data:

The provided csv contains rows that contains the positions (latitude and longitude), timestamps, and MMSI numbers of all vessels in the designated marine region.

Task:

Develop an algorithm to determine all vessel proximity events (two vessels having different MMSIs come within a threshold distance) during a given time frame. The algorithm should be efficient and use the Haversine formula for distance calculation (link). Consider using one or more of the following methods to enhance efficiency:

- Vectorization (reference link)
- Quadtree-based approach

> **NOTE:** You may use any novel technique also, if it suits.

Tools and Technologies:

- Use Python programming languages for data processing and analysis.

- Geographic Information System (GIS) tools or libraries (e.g., Geopandas, QGIS) may be helpfulfor spatial analysis.

- Data visualization tools (e.g., Matplotlib, Plotly) for creating maps and charts.

Output:

A data frame containing following columns:

mmsi: int
vessel_proximity: list of mmsi with which it interacts
timestamp: timestamp

Submission:

Share a link to your Git repository containing the source code and any additional documentation or instructions needed to evaluate the project. The repository should be public so that we can evaluate.

Time to deliver the assignment: 2 days after receiving the email.