Problem Statement & Objectives

Problem Statement:

Detecting oil spills at marine environment using Automatic Identification System (AIS) and satellite datasets

Objectives :

1. Develop an intelligent oil spill detection framework that integrates AIS data and satellite imagery (Sentinel-1 SAR data) to enable real-time and reliable identification of oil spill events in marine environments.
2. Extract behavioral features from AIS data, such as Speed Over Ground (SOG), Course Over Ground (COG), heading deviation, loitering patterns, and changes in speed/course, to detect anomalous vessel behavior that may be indicative of oil spills or illegal discharges.
3. Implement a machine learning-based anomaly detection model, particularly using classifier, to classify vessel behaviors as either normal or potentially related to oil spills based on engineered AIS features.
4. Preprocess and utilize Sentinel-1 SAR satellite imagery to verify suspected oil spill regions through segmentation and comparison with AIS-indicated anomalies, enhancing the spatial and visual confirmation of spill areas.
5. Enable real-time prediction and alerting, allowing the system to monitor new AIS data points and flag potential oil spill events immediately through an automated inference pipeline.
6. Design the system to be scalable and adaptable for deployment in coastal surveillance systems, maritime authorities, and environmental monitoring applications.