SMART INDIA HACKATHON 2022

Basic Details of the Team and Problem Statement

Organization Name : Department of Space, Indian Space Research Organisation (ISRO).

PS Code: SS591

Problem Statement Title: Deep Learning-based Cyclone Intensity estimation using INSAT-3D IR Imagery

Team Name: VORTEX

Team Leader Name: Mr. Indrashis Paul

Institute Code (AISHE): **U-0923**

Institute Name: VIT Bhopal University

Theme Name: Disaster Management

Idea/Approach Details

Idea Pitch Video: https://youtu.be/j4yABuz-Wrw

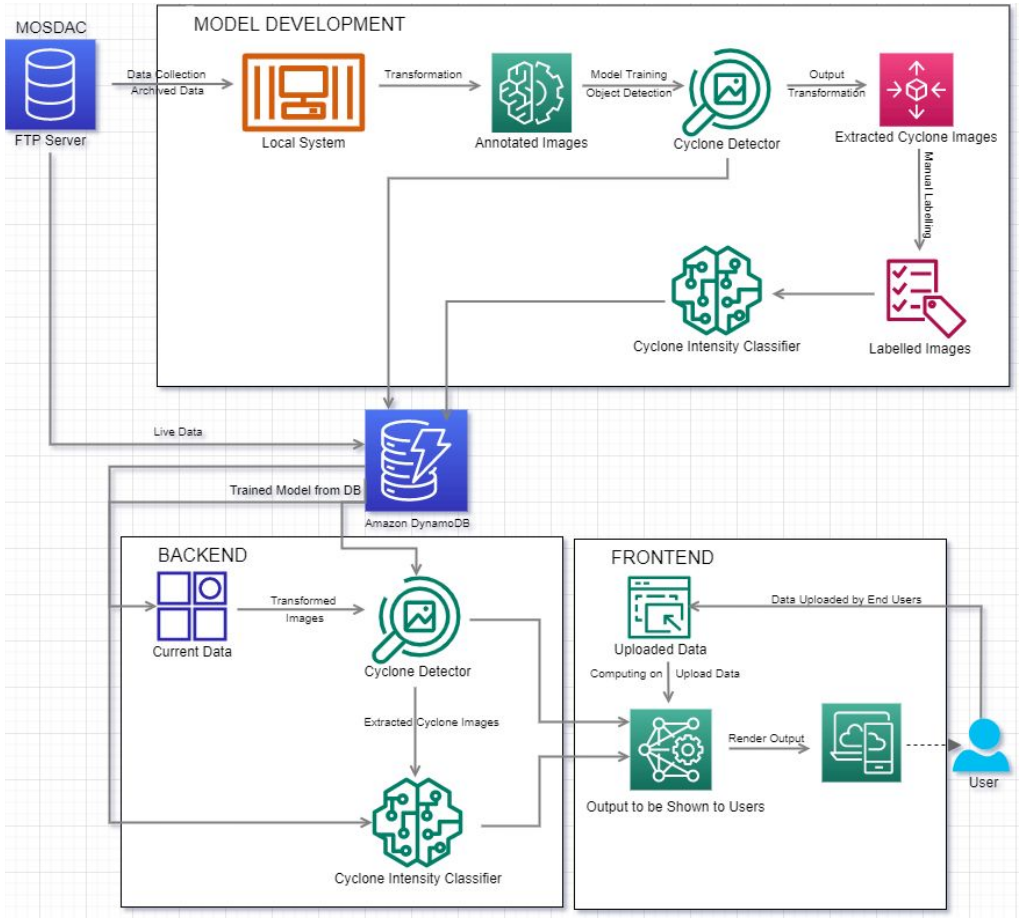
Our Solution Steps:

1. Collecting a set of archived Infrared images captured by the INSAT-3D satellite.
2. Training two State-of-the-Art Vision models: Cyclone Detector and Cyclone Intensity Estimator
3. With the latest data retrieved from MOSDAC Data Archive, the **trained Hybrid Model** will detect the cyclone and then estimate its intensity in real-time.
4. Real-time cyclone detection and cyclone intensity estimation will be visualized on the website.

General Overview of our system:

- ***Model Development***: Data collection, labelling and preprocessing, Building the Cyclone Detector and the Cyclone Intensity Estimator.
- ***Backend***: Fetching and storing the latest data to Amazon DynamoDB, Computing the predictions.
- ***Frontend***: Displaying the results in a Highly Usable and Interpretable UI

Our prototype: https://indrap24.github.io/VORTEX/



Proposed System Architecture

Our Technology stack:

- DL Model Development: Python(OpenCV, TensorFlow)
- Website Development:
  - Database: Amazon DynamoDB
  - Backend: NodeJS(TensorFlowJS)
  - Frontend: HTML / CSS / JS

Idea/Approach Details

Use Cases:

Our model was built taking into consideration the following two use cases:

- **General Public**: Will be subdivided into two categories -
  - Less Severe Cyclones: Only precautionary measures will be taken into consideration. There wouldn't be any need for evacuation.
  - Highly Severe Cyclones: Evacuation of the inhabitants would be necessary.

- **ISRO Monitoring Department**: According to our assessments, experts will be able to continuously monitor the condition of the cyclone.

Dependencies / Show stopper:

- Logical Dependencies:
  - Database
  - Server

- Resource Dependencies:
  - Latest Data
  - Trained Model

- External Dependencies:
  - Extraction of data from ISRO's database
  - Server failure
  - Computational requirements during Model Training

Team Member Details

Team Leader Name: Indrashis Paul | 19MIM10046

Branch (Integrated M.Tech) Stream (CSE spec. In AI ML) Year (III)

Team Member 1 Name: Raghav Agarwal | 19MIM10024

Branch (Integrated M.Tech) Stream (CSE spec. In AI ML) Year (III)

Team Member 2 Name: Soumya Rajadhyaksha | 19BAI10120

Branch (B.Tech) Stream (CSE spec. In AI ML) Year (III)

Team Member 3 Name: Om Paras Rajani | 19MIM10099

Branch (Integrated M.Tech) Stream (CSE spec. In AI ML) Year (III)

Team Member 4 Name: Anfaas Qureshi | 19BCG10017

Branch (B.Tech)) Stream (CSE spec in Gaming Technology)) Year (III)

Team Member 5 Name: Kshitij Singh Chouhan | 19MIM10088

Branch (Integrated M.Tech) Stream (CSE spec. In AI ML) Year (III)

Team Mentor Name: Dr. M. Thangavel

Category : Academic Expertise : Cybersecurity, Cyber Intelligent Systems, Blockchain Domain Experience : 9.5 Years