About us:

We predict floods using AI and we are on a mission of protecting people and assets from floods by building resilient cities and infrastructure that can withstand the devastating effects of climate change.

Watch our Demo: https://www.youtube.com/watch?v=BCmwOPvIp_I

Visit our website: www.fluvialycs.com

Project Objective:

Create a script or process to merge multiple flood map files (GeoJSON or GeoTIFF format) generated by different Fluvialycs Predictors (area-specific flood predictive models) into a single, unified flood map file for each predicted time horizon.

Flood Map Aggregator Script for Multi-Predictor Integration

Overview of Project Processes

1. **Input**:
    - Multiple flood map files in GeoJSON or GeoTIFF format generated by different predictors, each covering a specific geographic area.
    - Each predictor runs at different time horizons (e.g., 24 hours, 2 days, etc.) and produces separate flood prediction files.
2. **Output**:
    - A single flood map file (GeoJSON or GeoTIFF) per time horizon (24 hrs, 2 days, etc.) that combines outputs from all area-specific predictors.
    - The merged files should be compatible with the existing Fluvialycs web map platform.
3. **Trigger**:
    - The merger script should be triggered automatically once all predictors have produced their files, or at a specific interval (e.g., hourly at 00 minutes).
4. **Deployment**:
    - To be developed in AWS.

Key Tasks

1. **Requirements Analysis and Introduction to Project (Week 1-2)**

- Meet with the team to understand technical requirements, file formats, and constraints.
- Review existing data pipeline and structure of flood map files.

2. **Development of the Merger Script (Week 3-5)**
   - **File Parsing**: Develop functions to parse input files (GeoJSON/GeoTIFF).
   - **Merging Logic**: Implement merging logic for flood data.
   - **File Output**: Structure the final merged file format to ensure compatibility with Fluvialycs' mapping software.
3. **Error Handling and Robustness (Week 6-7)**
   - Add error handling to ensure the script can handle missing files or data inconsistencies and the addition of other predictors.
   - Implement logging for diagnostic purposes (e.g., when files are missing or improperly formatted).
   - Considerations on file sizes and difficulties of loading and visualising very big flood map files.
4. **Trigger and Automation Setup (Week 8)**
   - Implement a trigger mechanism that initiates the merger script after all predictors have run.
   - Set up automation in AWS, possibly using CloudWatch to monitor predictor output files and trigger the merger.
5. **Testing and Validation (Week 9)**
   - Test file compatibility with Fluvialycs' map visualization tools.
6. **Documentation and Handover (Week 10)**
   - Prepare a final report summarizing the project and provide recommendations for potential future improvements.

Deliverables

1. **Functional Merger Script**:
   - A Python script capable of merging multiple GeoJSON/GeoTIFF files into a single flood map per time horizon.
2. **Automated Trigger Setup**:
   - An automated deployment process in AWS (e.g., AWS Lambda function, cron job) that triggers the merger script after predictors complete or at a fixed interval.

3. **Technical Documentation**:
    - Clear instructions for running and maintaining the merger script, including dependencies, troubleshooting, and error logging.
4. **Final Report**:
    - A concise presentation of the project, including the process overview, key findings, and recommendations for further development. Clear instructions for running and maintaining the merger script.

Required Skills and Tools

- **Skills**:
    - Proficiency in Python and working with geospatial data libraries (e.g., Geopandas, Rasterio).
    - Familiarity with AWS EC2, CloudWatch, and automation.
    - Understanding of geospatial data formats (GeoJSON, GeoTIFF).
- **Tools**:
    - Python libraries: Geopandas, Rasterio (for GeoJSON and GeoTIFF manipulation).
    - AWS (EC2, CloudWatch, S3 for storage).
    - Version control (GitHub) for code management.

Future Involvement and Career Opportunities

This project offers students the chance to gain practical experience in geospatial data science and cloud-based automation, with potential for future involvement at Fluvialycs.