Detailed Reflections and Summary on the Paper: Detection of Coastal Erosion and Progradation in the Colombian 'Atrato River' Delta by Using Sentinel-1 Synthetic Aperture Radar Data

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MIDTERM ASSIGNMENT

1.Summery

1.1: Motivation

The goal of the project is to monitor coastal erosion and progradation in the Colombian 'Atrato River' Delta with Sentinel-1 SAR data. As we know erosion is a natural process we can't prevent it but we can monitor it before it happens so the study mainly monitors coastline erosion based on real time data

1.2 Contribution

The proposal is using SAR data for detecting and quantifying coastal changes from 2016 to 2023. The data were downloaded from copernicus website which is a website used for geospatical analysis.

1.3 Methodology

The main methods of this study image composition, registration, classification, and multitemporal analysis of SAR images. mainly it uses some deep learning model for classification. The model will monitor coastal erosion based on some parameters such as devegetation,water level wind, rips and some climate change.

1.4 Conclusion

Studies show that progradation, erosion, and climate variables like ONI are correlated, making SAR imaging a valuable tool for monitoring changes along the shore. We can get the SAR images from Copernicus website or google earth engine to get real time data which will help monitoring erosion. As the model needs to predict erosion before the erosion happens the model is trained on real time data.

2. Criticism and Limitations

2.1 First Critique/Limitation

The study's accuracy may be impacted by the resolution of the SAR data that are currently accessible.

The another problem SAR data is its colors as green sometimes shows blackish green in most SAR data it's hard to determine devegetation.

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2.2 Second Critique/Limitation

The analysis has restricts as it has limitations to data from 2016 only. As the data isn't updated the model might not give actual results based on current image and time.

2.3 Third Criticism/Limitation

To better preserve image features and borders, the despeckling procedure needs to be improved.

3. Synthesis (2 pts): Potential Applications/Future Possibilities/Scopes/Implications/Complexities/Applicability to the Same/Different Domains

3.1 First Potential/Idea for a New/Follow-Up/Extension Paper

Use cutting-edge deep learning models to improve the despeckling procedure. also use ARCGIS for doing segmentation so that we can label certain areas based on their environment and nature.

3.2 Potential Second Idea for New/Follow-Up/Extension Paper

Use SAR data to extend the methodology to additional geographies and environmental issues. Use SAR for monitoring changes in land cover (e.g., urban expansion, forest degradation) by analyzing multi-temporal SAR images. SAR data is excellent for detecting water presence and flood mapping, as it penetrates cloud cover and detects changes in surface water levels.

3.3 Potential third Idea for New/Follow-Up/Extension Paper

Getting a real time data and merging it with time series data will give a more accurate geographical analysis by training the deep learning models. Detect rising water levels and combine this with historical flood patterns to forecast where future floods are likely. Use historical land-use data to predict urban expansion and its effects on infrastructure and natural resources.

4. Reference

For more details, refer to the full paper: Detection of Coastal Erosion and Progradation in the Colombian 'Atrato River' Delta by Using Sentinel-1 Synthetic Aperture Radar Data.