Oceanography (Beach Erosion Detection)

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1. Aim:

To develop a MATLAB-based image analysis system for accurate detection and monitoring of beach erosion

2. Software Tools:

1. MATLAB
2. Google Earth Pro

3. Algorithms Used:

1. Edge Detection
2. Image Thresholding
3. Image Fusion

4. Results:

1. The implemented project successfully visualizes the erosion that has taken place on the beach. The output images clearly depict the differences between the two images, pinpointing the precise locations of erosion occurrence.
2. It also provides valuable quantitative information regarding the erosion. It calculates and presents the erosion length in both pixels and feet, enabling a better understanding of the extent of erosion.

3. Additionally, the percentage of shoreline change gives insights into the proportional alteration of the shoreline while, the average retreat rate in feet per year is determined, shedding light on the rate at which the shoreline is receding.
4. It is very easy to find out the highly erosion-affected areas.

5. Conclusion

In summary, this project aimed to detect beach erosion using image processing techniques. The algorithms utilized in the code included edge detection using the Canny method and thresholding to identify areas of erosion. The results obtained from the code were significant in assessing the impact of erosion on the coastal areas. The output images clearly showcased the differences between the two input images, highlighting the exact locations where erosion had occurred. Additionally, the code provided useful metrics such as the erosion length in pixels and feet, percentage of shoreline change, and average retreat rate. These metrics offered quantitative insights into the extent of erosion and its implications for the coastline. In conclusion, this project contributes to the field of coastal management by providing a tool for visualizing and quantifying beach erosion.