Prediction of Sea Level Rise, Coastal Erosion, and Mangrove Coverage in Micronesia and the Solomon Islands Using Artificial Intelligence

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Abstract: The proposed study aims to predict sea levels, coastal erosion, and mangrove coverage in the Pacific Islands of the Federated States of Micronesia (FSM) and the Solomon Islands using remote sensing technology and artificial intelligence. Using data from tide gauges, satellite imagery (analysed using the Python tool CoastSat), and climate estimates from ERA5, two models, Multilinear Regression and Multilayer Perceptron, will be tested to discover to what extent coastal erosion of these islands is correlated with sea level rise, and to what extent mangrove canopy changes can be explained using climate variables. The major intended outcome is a predictive model which can be used for coastal management, to improve climate change mitigation efforts.

Presentation Outline:

1. Introduction: Problem definition
2. Research aims
    a. To what extent can erosion in Micronesia and the Solomon Islands be correlated with sea level rise?
    b. To what extent can mangrove canopy changes be explained using climate variables?
    c. Which AI model provides the most accurate predictions?
3. Background and related works
    a. Sea level rise
    b. Coastal erosion
    c. Mangroves
4. Research design: Study sites
5. Data sources
    a. Tide gauges
    b. Satellite imagery
    c. Climate estimates
6. Data analysis
    a. Pre-processing
    b. Modelling: Multilinear regression vs. Multilayer perceptron
    c. Benchmarking: Efficiency and error metrics
7. Expected outcomes

Data Sources:

- Pacific Sea Level Monitoring http://www.bom.gov.au/pacific/projects/pslm/index.shtml
- Global Mangrove Watch https://www.globalmangrovewatch.org/
- LandSat https://landsat.gsfc.nasa.gov/data/
- ECMWF https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

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A full bibliography of works used in the preparation of this presentation may be obtained by emailing the student researcher.