Department of Computer science - Misr University for Science and Technology - MUST College of Computers and Artificial Intelligence Technology - CAIT

Graduation project : Sea Level Rise Prediction System

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Abstract

The rise in global sea levels is a pressing environmental concern with far-reaching implications for coastal communities and ecosystems. In this study, we present a machine learning-based approach for predicting future sea level rise. By leveraging historical sea level data and relevant environmental factors, our model aims to provide accurate forecasts, enabling proactive mitigation and adaptation measures. We employ various regression algorithms, including linear regression, random forest, decision tree, K-nearest neighbors, lasso regression, and ridge regression, to analyze the complex relationships between sea level and contributing factors. Our findings reveal the predictive power of these models and their potential to assist policymakers, urban planners, and coastal communities in making informed decisions to mitigate the adverse effects of rising sea levels.

Introduction

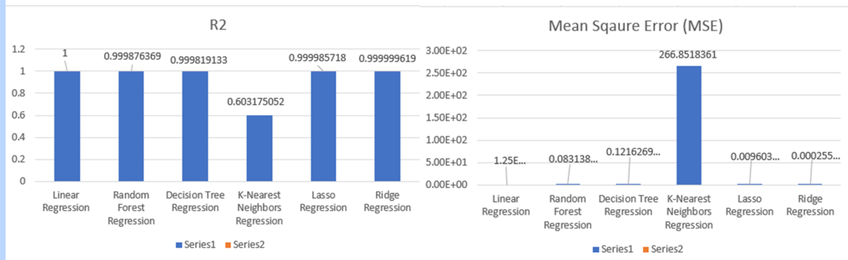
Climate change represents one of the major global issues to be addressed in the coming years [1] . It can be considered as the “issue of our time”. The Sea level rises for several reasons like heatwaves, heavy rain, fires, coastal flooding, and as temperature increases, ice melts and it contributes in increasing the sea level and those events are happening all over the world and they are increasing not decreasing. The accelerating rise in global sea levels has shown as a critical issue for both human societies and natural ecosystems in our world.

Our approach centers around the utilization of various regression algorithms, such as linear regression [2], random forest [3] , decision tree [4] , K-nearest neighbors [5] , lasso regression [6] , and ridge regression [7] . By incorporating a diverse set of variables such as temperature, precipitation, humidity, wind speed. we aim to capture the complex dynamics driving sea level changes.

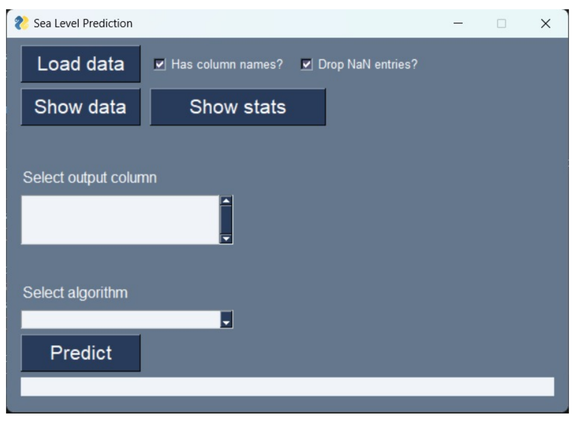
our predictive models can provide valuable insights into future sea level rise scenarios, enabling policymakers, urban planners, and coastal communities to anticipate and plan for the associated impacts.

Result

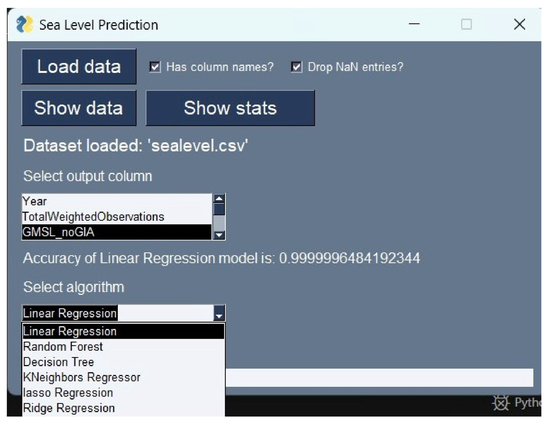
R2 and MSE Graph



Desktop Application's Main Screen

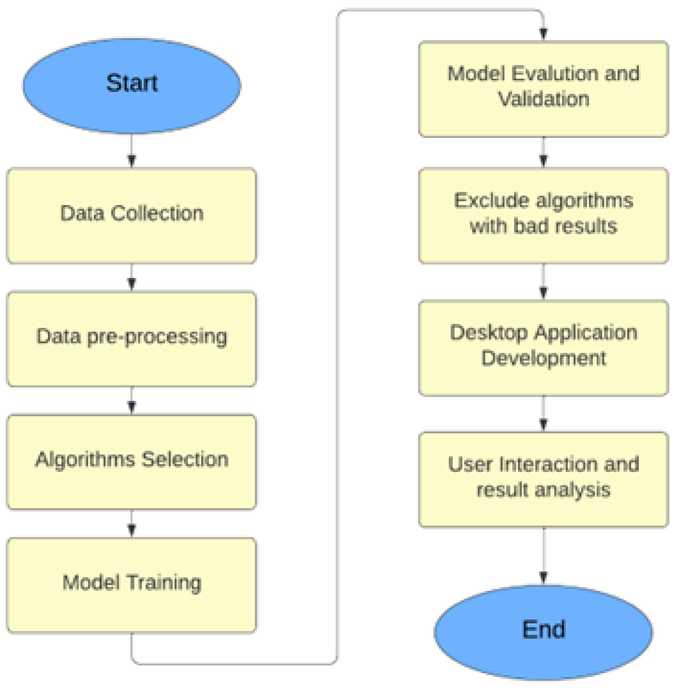


Desktop Application's Main Screen with Algorithms and uploaded dataset



Used tools

Methodologies



Conclusion

In this project, we applied machine learning algorithms to predict sea level rise. Our results demonstrate the effectiveness of machine learning in predicting sea level rise. Linear Regression, Random Forest Regression, Decision Tree Regression, Ridge Regression, and Lasso Regression showed promising performance in capturing the underlying patterns and predicting future sea level changes. Particularly, Linear Regression achieved the best performance with perfect R2 score and an extremely low MSE, indicating a close fit between the predicted and actual sea level values.

Overall, this project emphasizes the importance of using machine learning techniques into sea level prediction models, and it underscores the potential for these models to contribute to proactive measures in tackling the challenges posed by sea level rise.

Reference

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