

Predicting Severe Coral Reef Bleaching Based on Global Anthropogenic Activity



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Block 1 Oceanography

Introduction

Figure 1: Image from
the Great Barrier Reef
(National Geographic
2020)



Introduction

Figure 2: Image of wildlife in the Great Barrier Reef (Getty Images, 2017)



Introduction

Figure 3: Image of the Great Barrier Reef from above (Britannica, 2020).

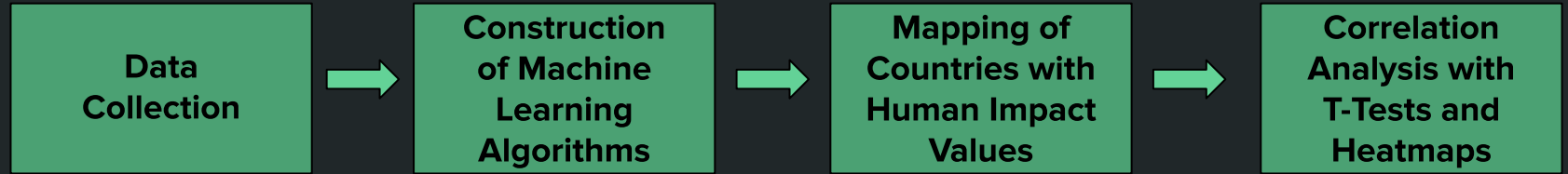


Introduction

Figure 4: Image depicting signs of a bleaching event in the Great Barrier Reef (Arc Coe, 2017)

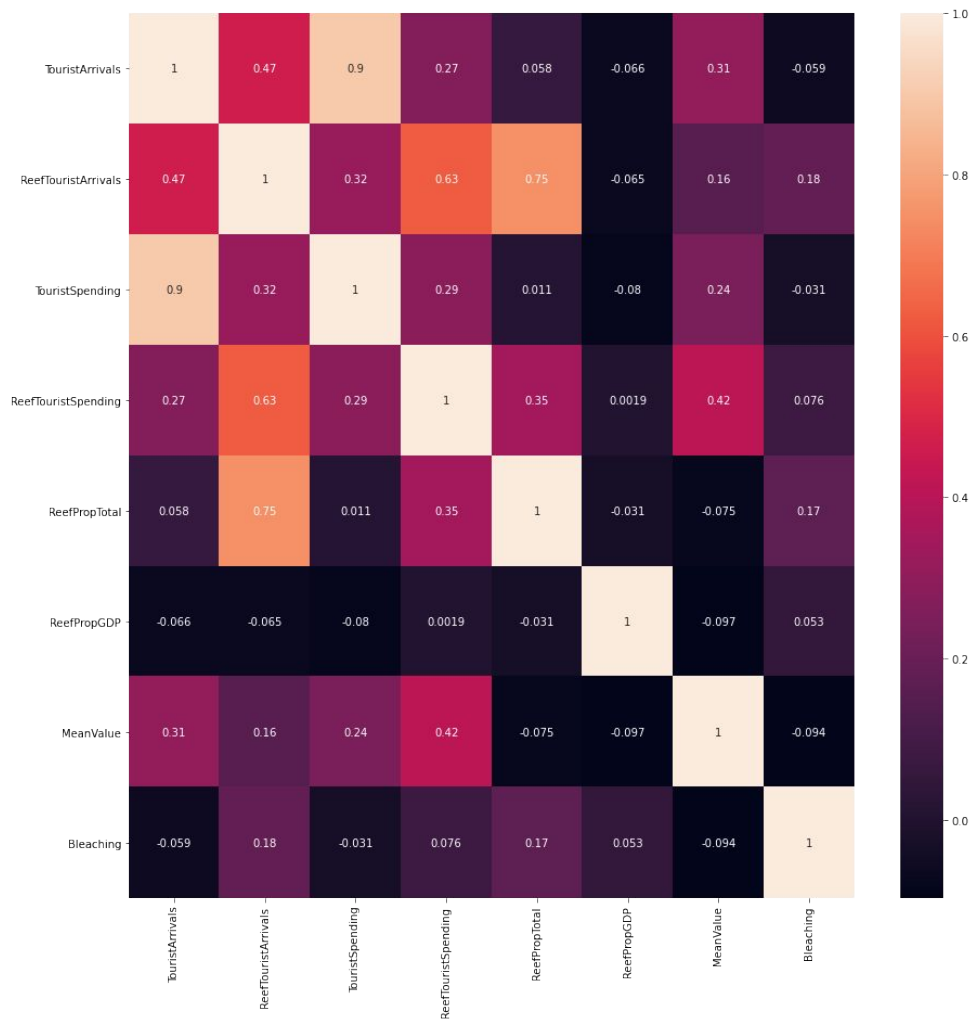


Methodology



Results

Figure 5: Heatmap depicting the correlations between various economic parameters, and the income produced by reefs. Values closer to 1 indicate strong direct correlations. Constructed using Numpy and Seaborn packages.



Results

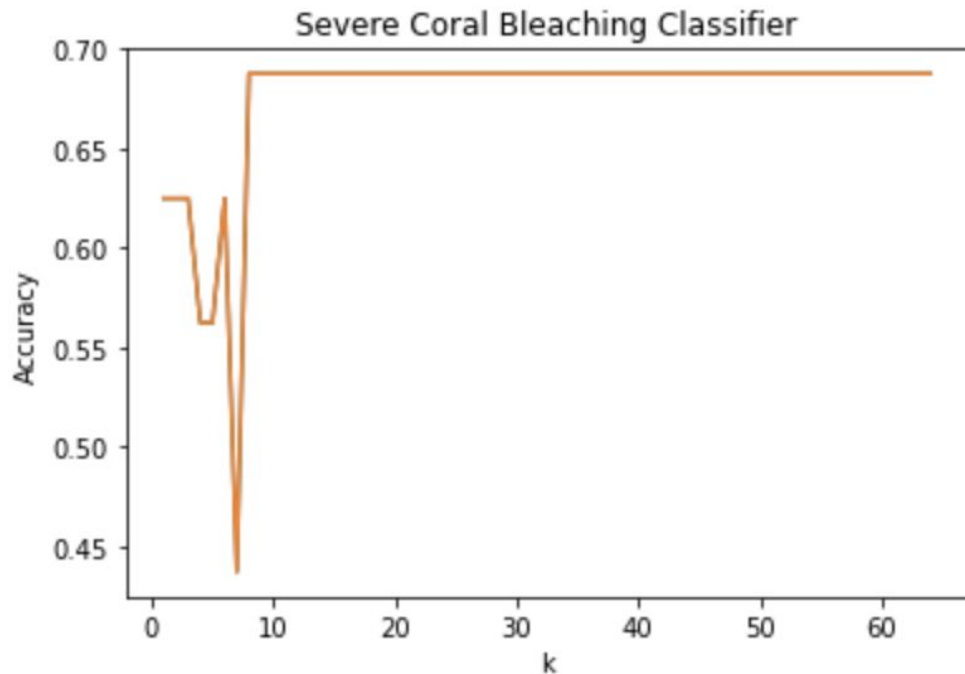
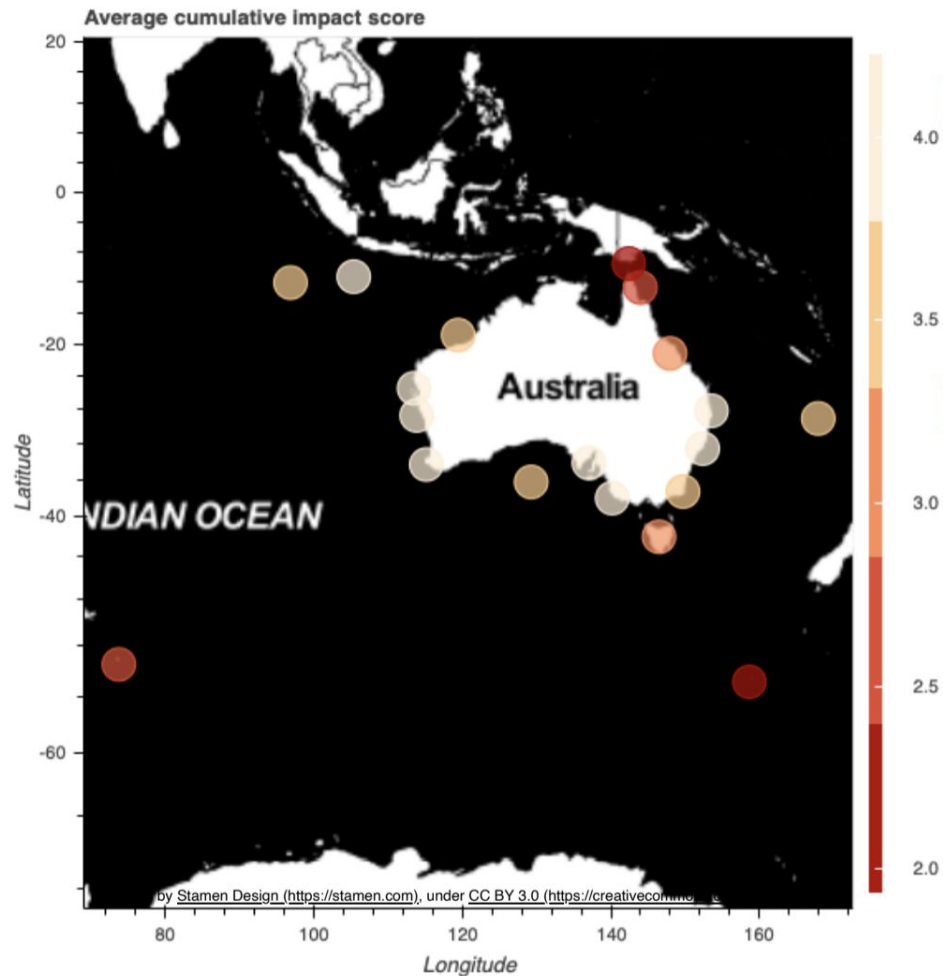


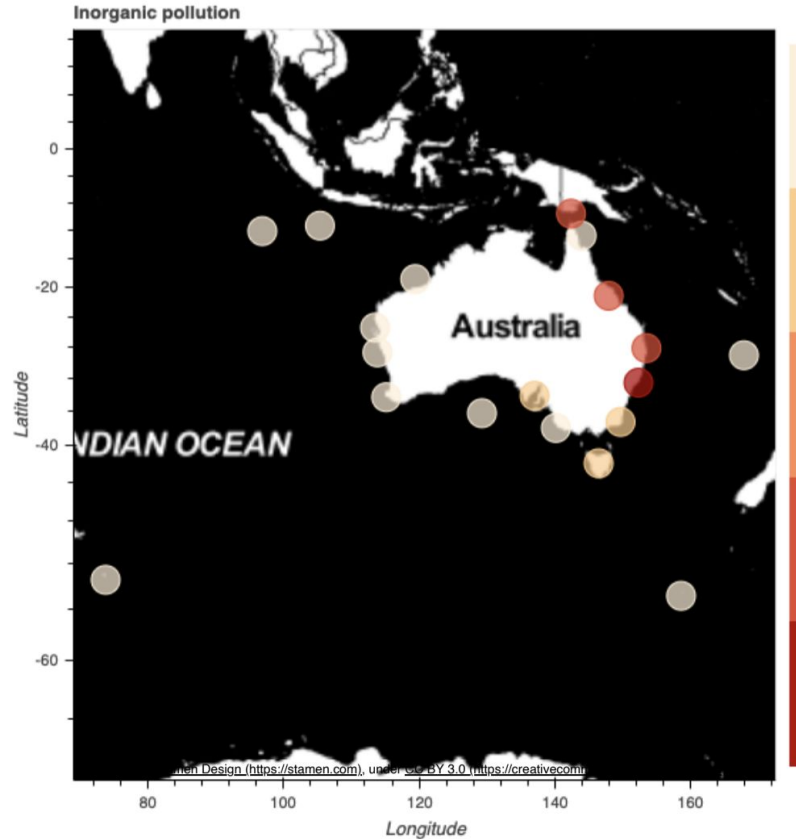
Figure 6: Line plot displaying the accuracy of the machine learning program. K refers to the number of nearest neighbors in a KNN algorithm. As illustrated by the line plot, the accuracy of the program fluctuates until the number of nearest neighbors nears 10, where it then stabilizes at ~69%.

Results

Figure 7: Average cumulative impact score for coral reefs near and around Australia. Darker red spots indicate higher rates of cumulative anthropogenic effect (e.g. pollution, coral bleaching, destructive fishing, and nutrient runoff).

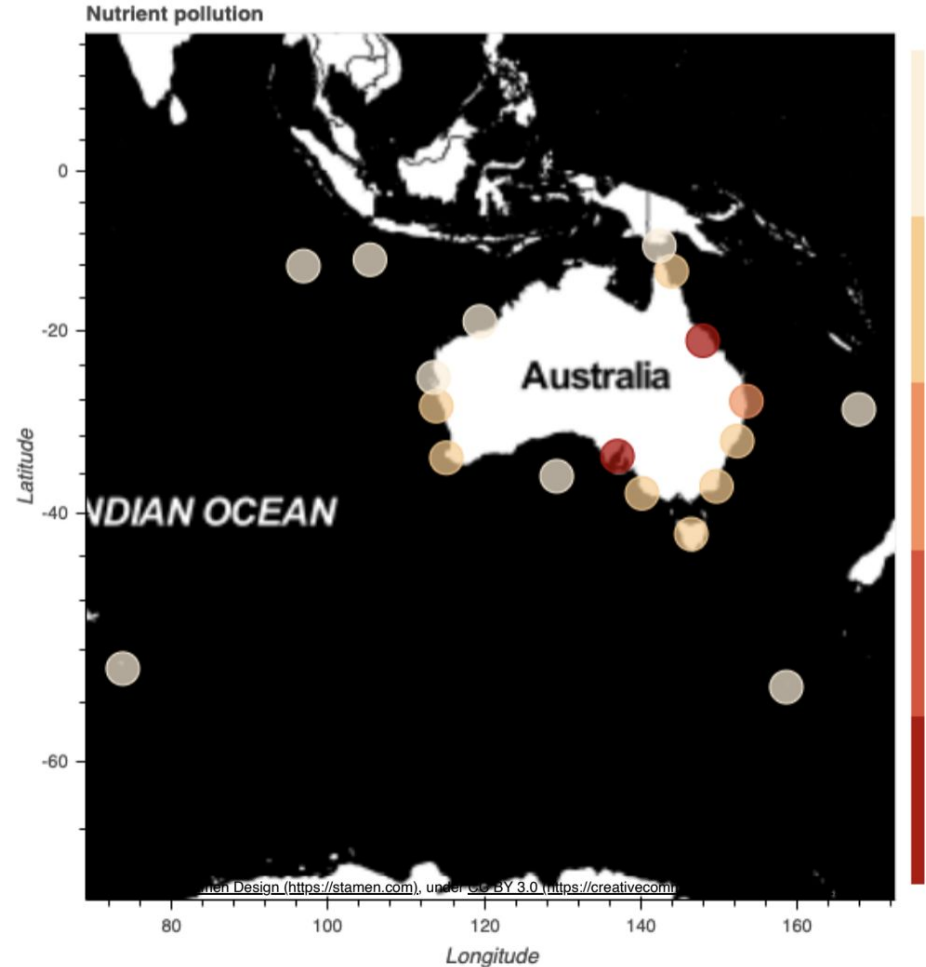


Results



Results

Figure 9: A map generated to show the areas surrounding the Great Barrier Reef that are the most affected by nutrient loading and nutrient pollution. The excess of nutrients in these area put coral species at risk of bleaching.



Results

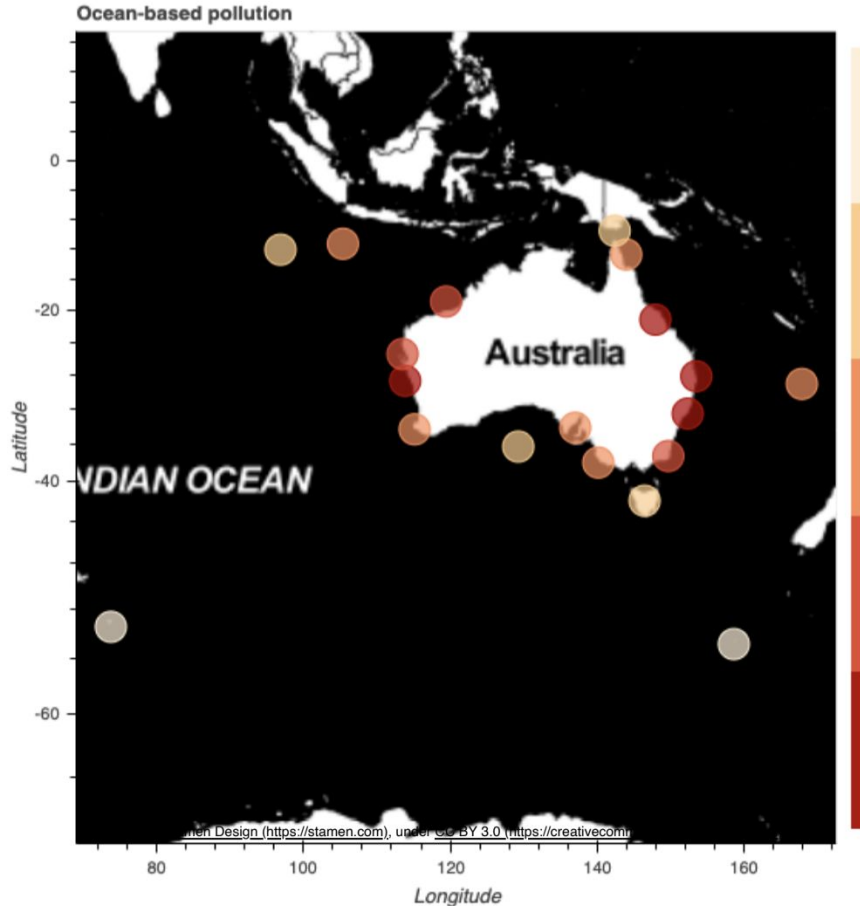
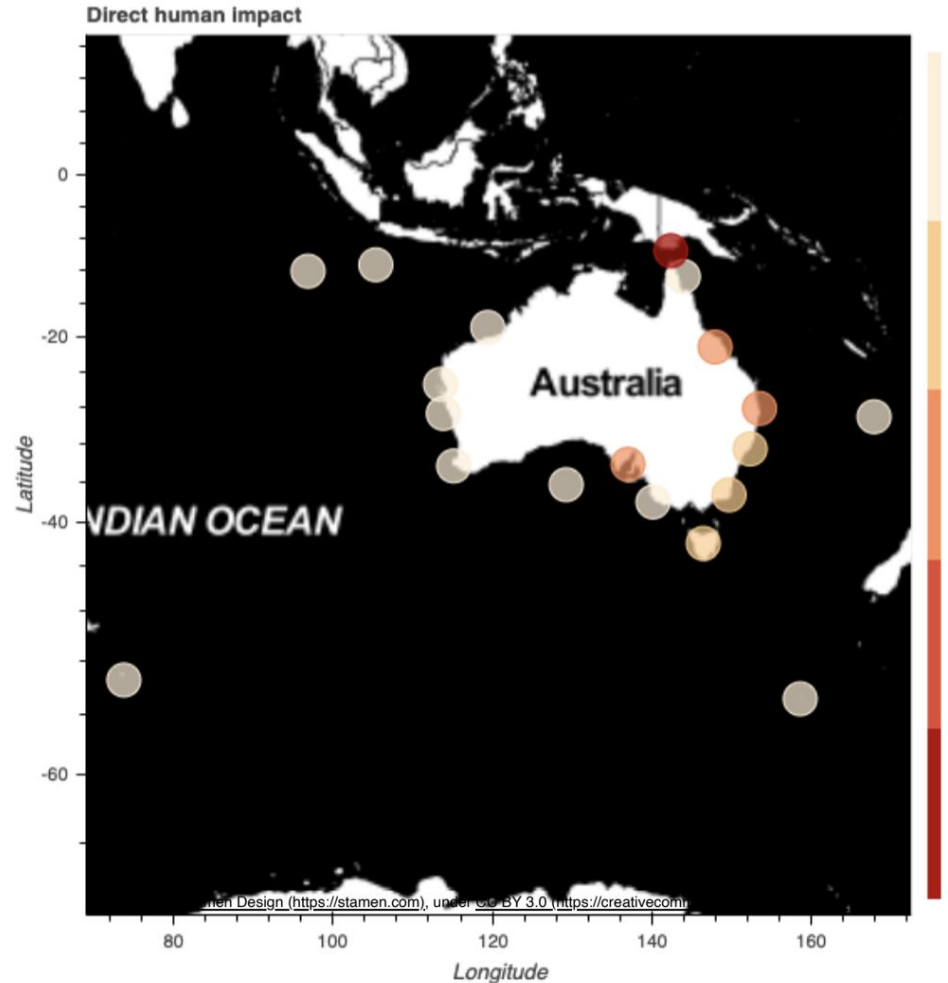


Figure 10: Ocean-based pollution mapped around Australia. The normalized score of pollution is calculated from coming pollution from commercial shipping and from ports and the combination of shipping and port volume with the volume data plumed to estimate pollution from commercial ports

[need to specify this a more clearly later]

Results

Figure 11: A map displaying instances of direct human impact around Australia. Direct human impact scores were calculated from the sum of the coastal human population defined as the number of people within 10 km of the data point.



Results

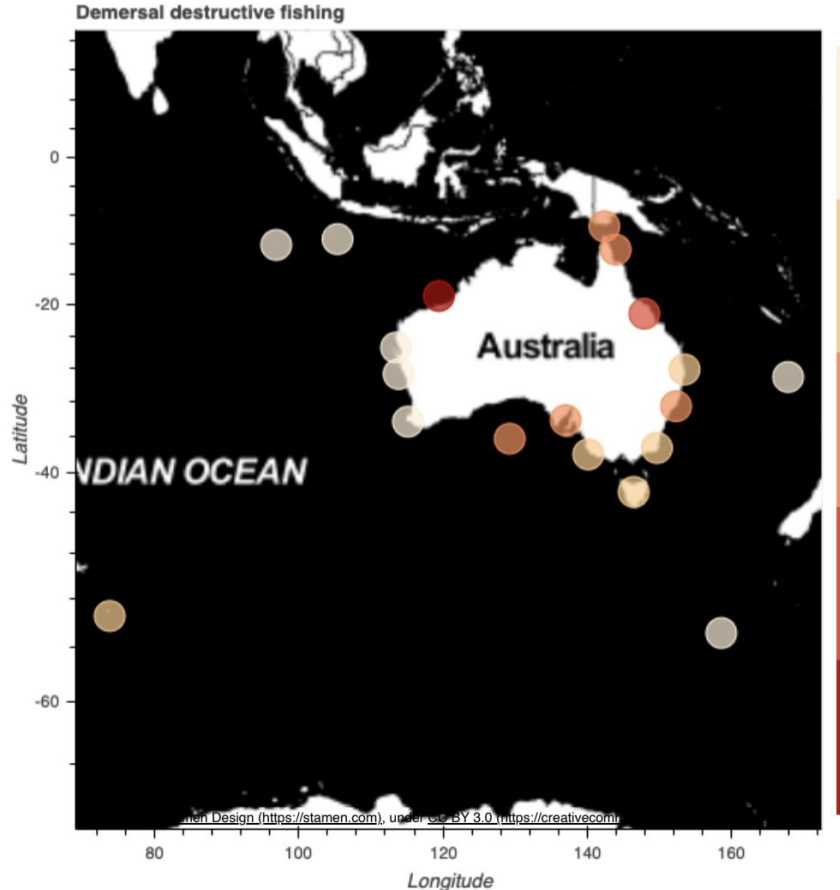


Figure 12: The chart to the left describes the effect of destructive benthic fishing around Australia. Fishing methods such as dredging damage the ecosystem and expedite the rate at which coral bleaching occurs.



Conclusions

