Modeling Climate Change Based On Region

Sethan Cummings

Question

What are the most effective predictors for climate change, are there any differences in these predictors between regions of the world, as well as rural and urban populations? What predictors can reveal how different regions or urban and rural places are uniquely affected by different variables?

Approach

To do this I will explore
- Droughts, floods, extreme temperatures (% of population, average 1990-2009)
- Average precipitation in depth (mm per year)
- Land area where elevation is below 5 meters (% of total land area)
- Urban land area where elevation is below 5 meters (% of total land area)
- Rural land area where elevation is below 5 meters (% of total land area)

Treating them as climate change indicators and I will find predictors to model them.

Motivation

Climate change is a big problem that many countries are trying to fix. They're using different ways, like using clean energy, making rules to protect the environment, and focusing on areas that need it most. How well these things work depends on factors such as where you live, how many people are there, and how wealthy the area is. By knowing how different places are affected, leaders can make better choices and give help where it's needed.

How can this data help decide what different places should be focusing on?
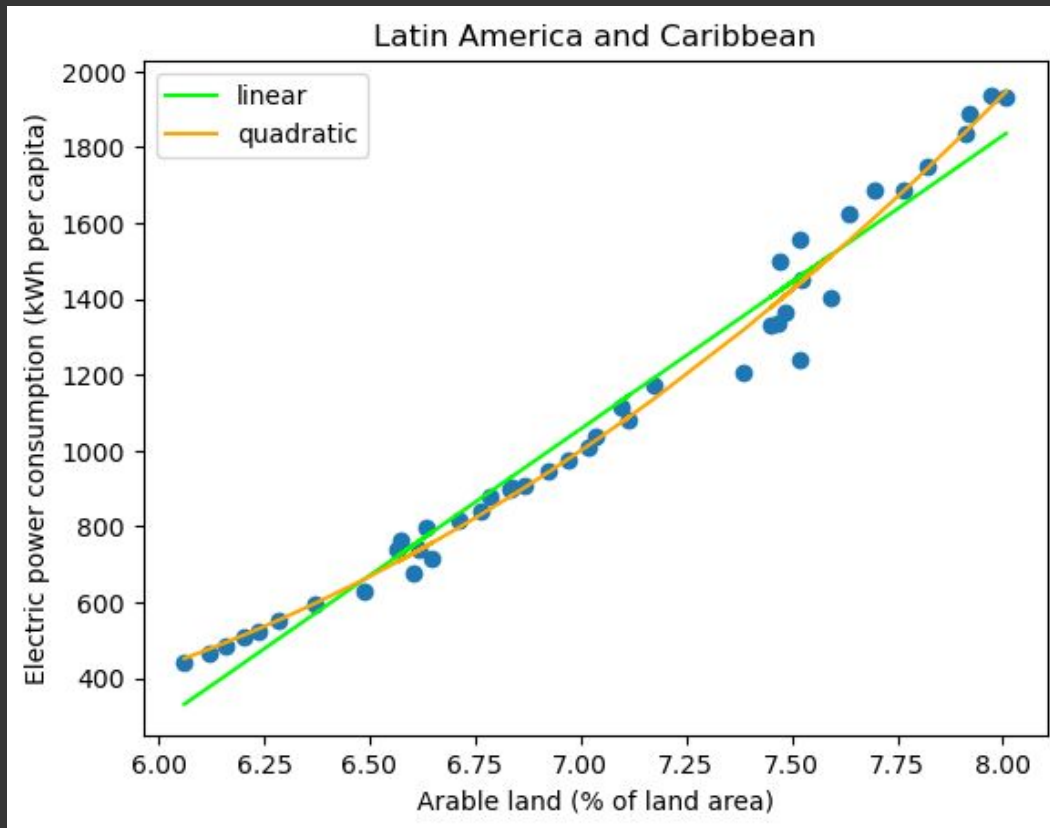
Some figures
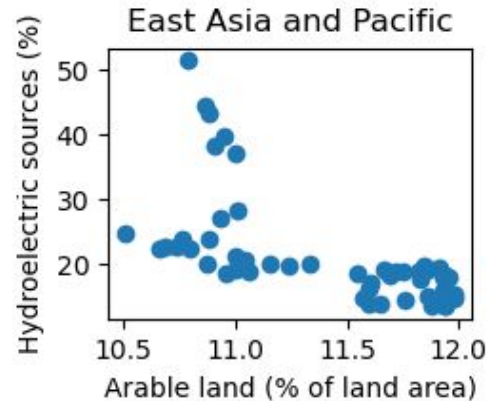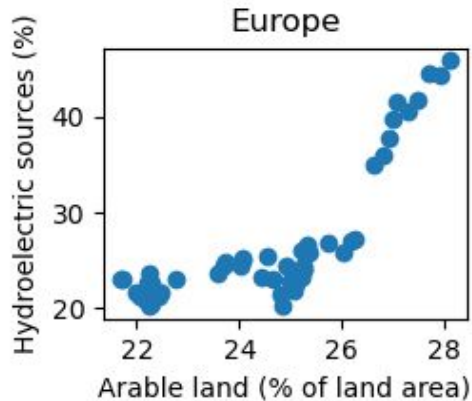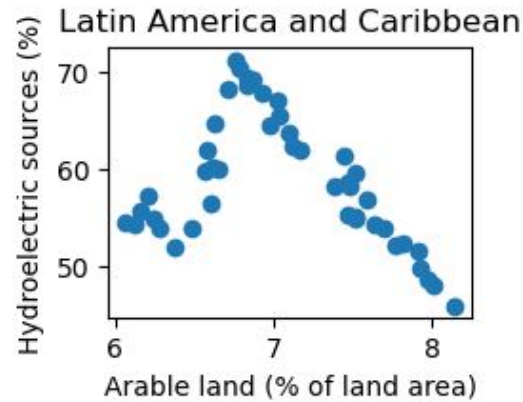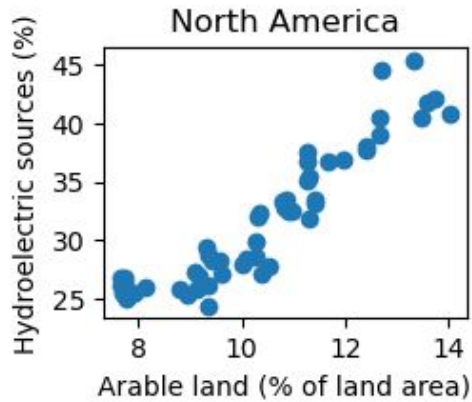
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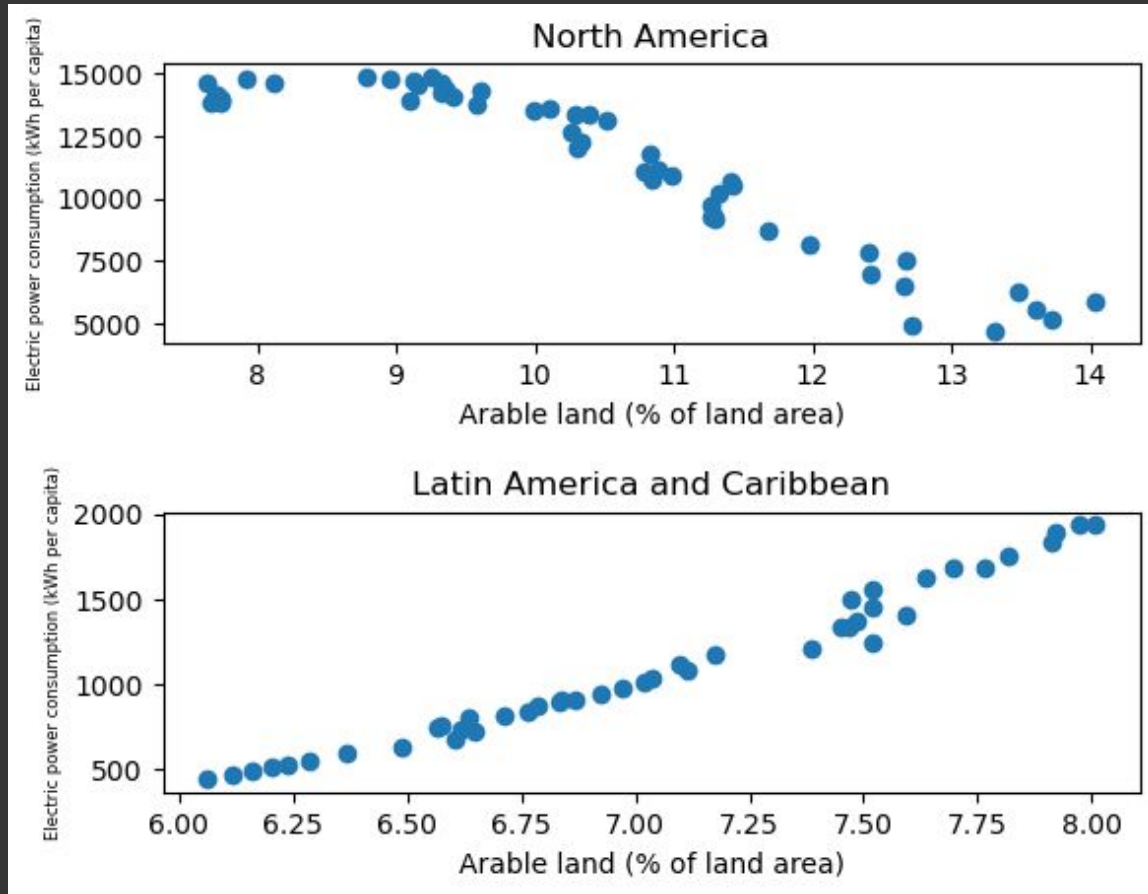
Simple Model

Model comparison:
Linear Fit: R² = 0.9705
Quadratic Fit: R² = 0.9853

Results

The results show that it is possible to identify differences in climate change in different regions in the world. In the graphs above It can be seen how Electric power consumption (kWh per capita) affects the Arable land (% of land area) more in Latin America and the Caribbean more than it does in North America. It also shows that you can create models for this as well, the two models above are very efficient, the quadratic fit has an R squared of 0.985 which is very accurate.
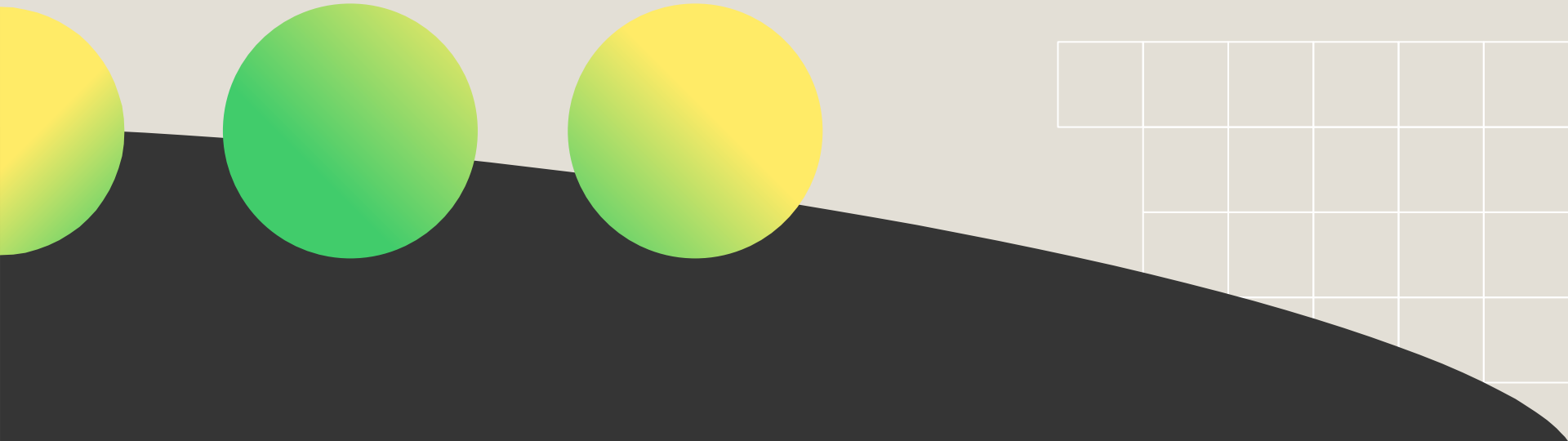
Discussion and Conclusion
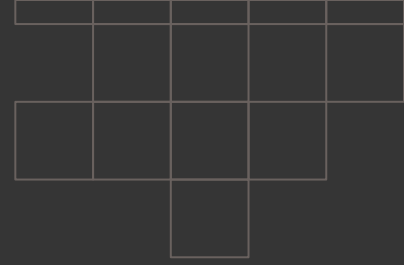
By comparing these graphs, you can take a look into how different regions of the world experience change because of different factors. You can also predict these variables using accurate models. One limitation that the graphs and model might encounter is insufficient data. Another is outdated data, the data spans over a great range of time and the methods used to collect this data could have possibly been inconsistent. It is possible that the model only fits to this dataset but lack real world application. A big limitation of the correlation matrices is that a lot of the darker boxes(more correlated) in them were only dark because of lack of data.

There were a lot of limitations to my project however. The first limitation was the awkwardly structured dataset, a lot of my time and energy in this project went to restructuring the dataset. Another limitation I faced was the absence of the variables I intended to explore, "Droughts, floods, extreme temperatures (% of population, average 1990-2009)" was the perfect climate change indicator but it had nearly no data on it. The same goes for the land elevation variables, there were only a few values to work with, which affected my urban vs rural question. Overall however I believe that it is a good analysis of that data and there is a lot of information to be taken away.