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INTRODUCTION

A lengthy shift in the normal weather conditions that have come to characterize Humanity's local, continental, and global ecosystems is referred to as climate change. Human emissions, notably fossil fuel consumption, have increased heat-trapping greenhouse gas levels in Greenhouse effect, elevating Average global surface temperatures, as shown in changes in the climate from the early twentieth century. Global warming is the term used to describe the warming caused by humans. Evaporation, CO₂, methane, nitrogen oxide, and carbons all contribute to the greenhouse effect, thus according NASA. Industrial emissions have raised the concentration of this naturally greenhouses during the last decade.

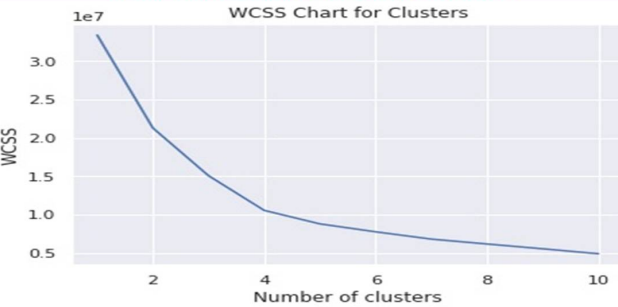
The dataset from the World Bank Climate Change Data on global surface temperature changes is open to the public. This data set includes some supplementary information, such as Area names, from the Plain colored Temperature Change domain. Because nation names are a significant component in my research.

METHODOLOGY

Indicators needed for the research were picked from the world bank, cleaning the datasets to get the needed data to produce dataframe. We then create functions to categorize the variable. The pre-determined number of clusters that the Algorithm will produce is K. It signifies that the number of clusters to be created from the dataset. The following stages will explain how the K-Means algorithm works:

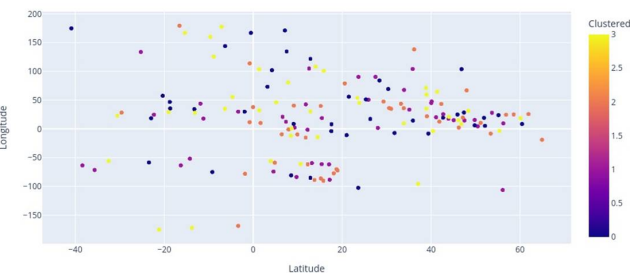
- Step 1: Determine the number of clusters to be produced by changing the value of K.
- Step 2: Choose K random spots to function as centroids.
- Step 3: Assign each data point to the nearest/closest centroid, depending on their distance from the randomly picked points (Centroid), which will create the preset clusters.
- Step 4: Reposition each cluster's centroid. And producing four(4) clusters
- Step 5: Repetition of step 3, which is the reassigning each data point to the cluster's new nearest centroid.

DETERMINING THE NUMBER OF CLUSTERS



we use the elbow method to determine the number of optimized clusters to use for our modeling. The number of connecting points discovered on the WCSS chart will determine the number of clusters to use for an optimal result. From the above chart we observed that the number of clusters to be produced is four(4)

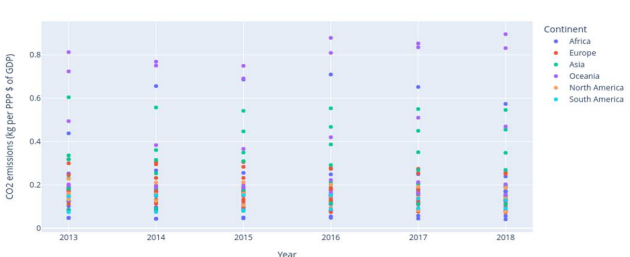
Scattered Plot of Clustered Data



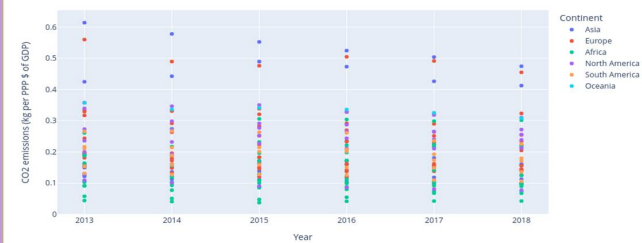
From the scattered plot above we were able to discover using a function the cluster 2 had the most observations

VISUALIZATION OF CLUSTERS

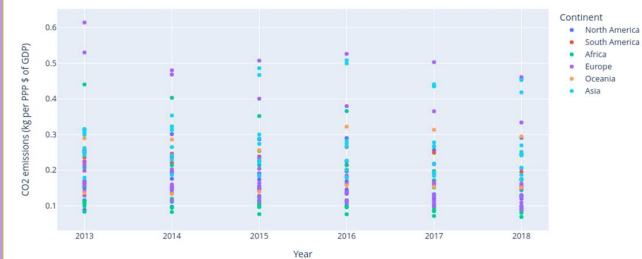
Scatter plot for Clustered 1



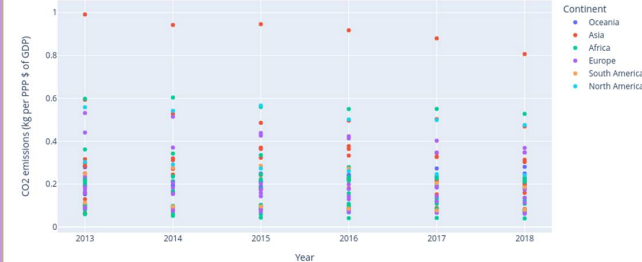
Scatter plot for Clustered 2



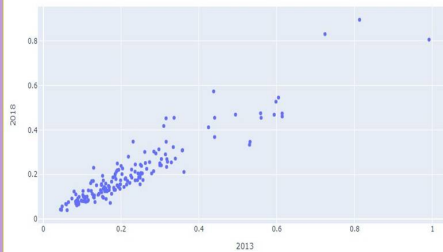
Scatter plot for Clustered 3



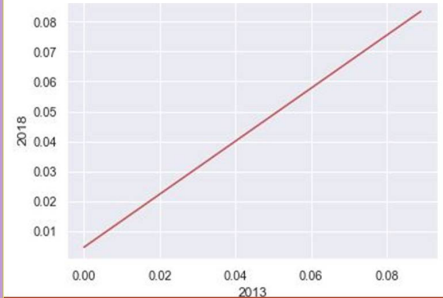
Scatter plot for Clustered 4



Scatter plot of fitted data



Fitting curve



DISCUSSION

Prior to the merging of the two datasets (WDI and countries), there are 266 unique countries in the WDI dataset, and 242 unique countries in the countries datasets. However, upon the merging, we had 181 unique countries. What informed our decision of merging an additional dataset (countries) is the fact that we observed that there were some aggregated data (such as Africa Eastern and Western, and more). Using the raw data (WDI) will give a misleading result and would affect whatever decision/judgement made on the data. From the scatter plot for cluster 1 chart, we found that CO₂ emissions (kg per PPP \$ of GDP) has increased over the years in countries that fell in cluster 1, except for the year 2016 where we had the highest record.

CONCLUSION

The above chart shows a linear growth in CO₂ emissions between year 2013 and 2018

REFERENCES

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