

CLUSTERING AND FITTING ANALYSIS

Introduction

This analysis uses clustering and fitting techniques to understand how climate change factors impact economic prosperity and sustainable development of countries. We grouped countries based on factors such as GDP per capita, CO2 emissions, CO2 production per head, and Renewable energy consumption, and compared the results from 1990 and 2015 to understand how the cluster's characteristics changed over time .

Furthermore, we used logistic function to predict GDP per capita growth for the next 10 years.

This poster presents the key findings and insights from our analysis.

Methodology

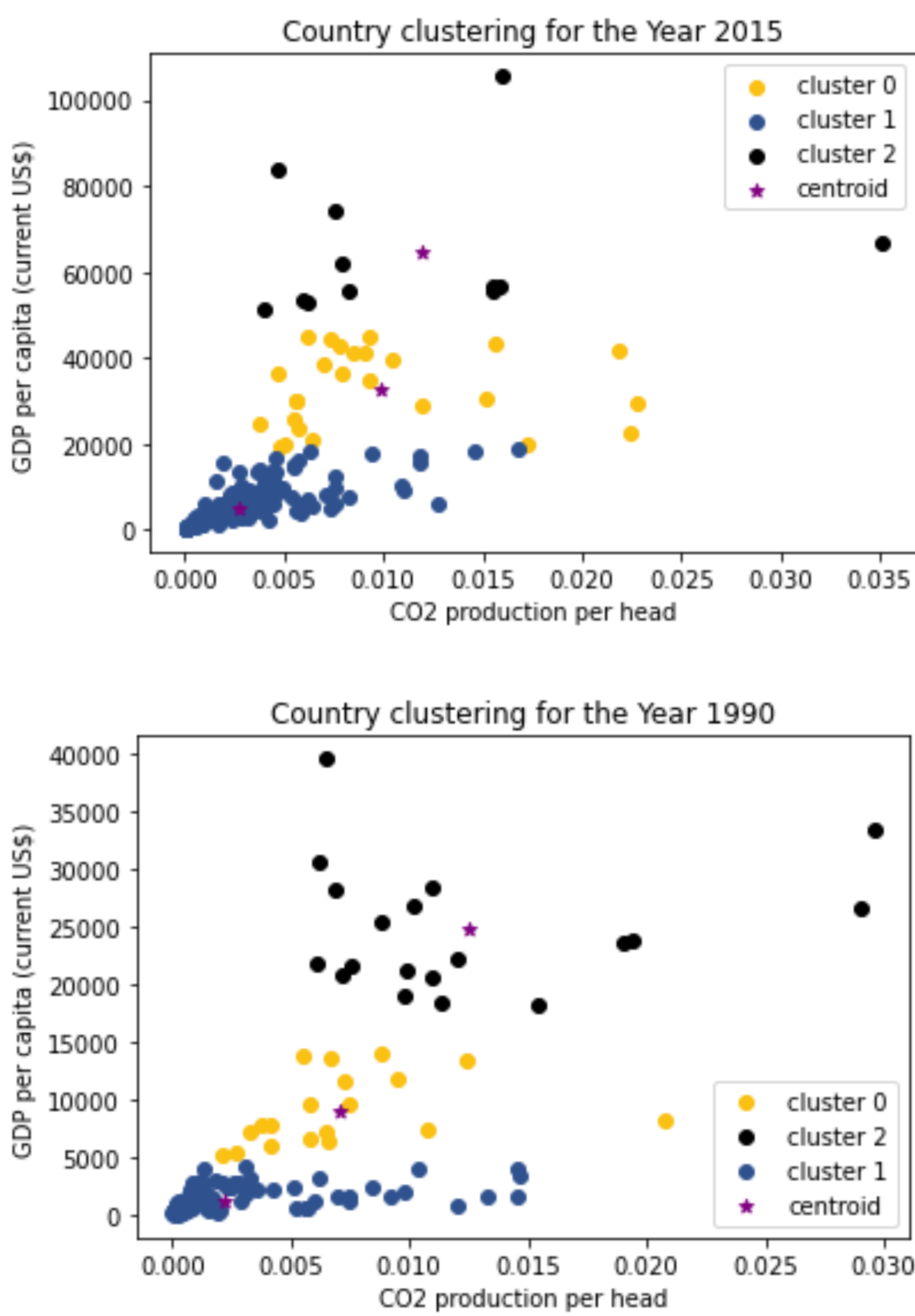
To cluster countries based on climate change factors, we used the K-means clustering algorithm and determined the optimal number of clusters using the elbow method which was 3.

- Afterwards, we preprocessed the data by
- filtering for the years of interest (1990 and 2015),
 - selecting relevant variables, and
 - removing rows with missing values.

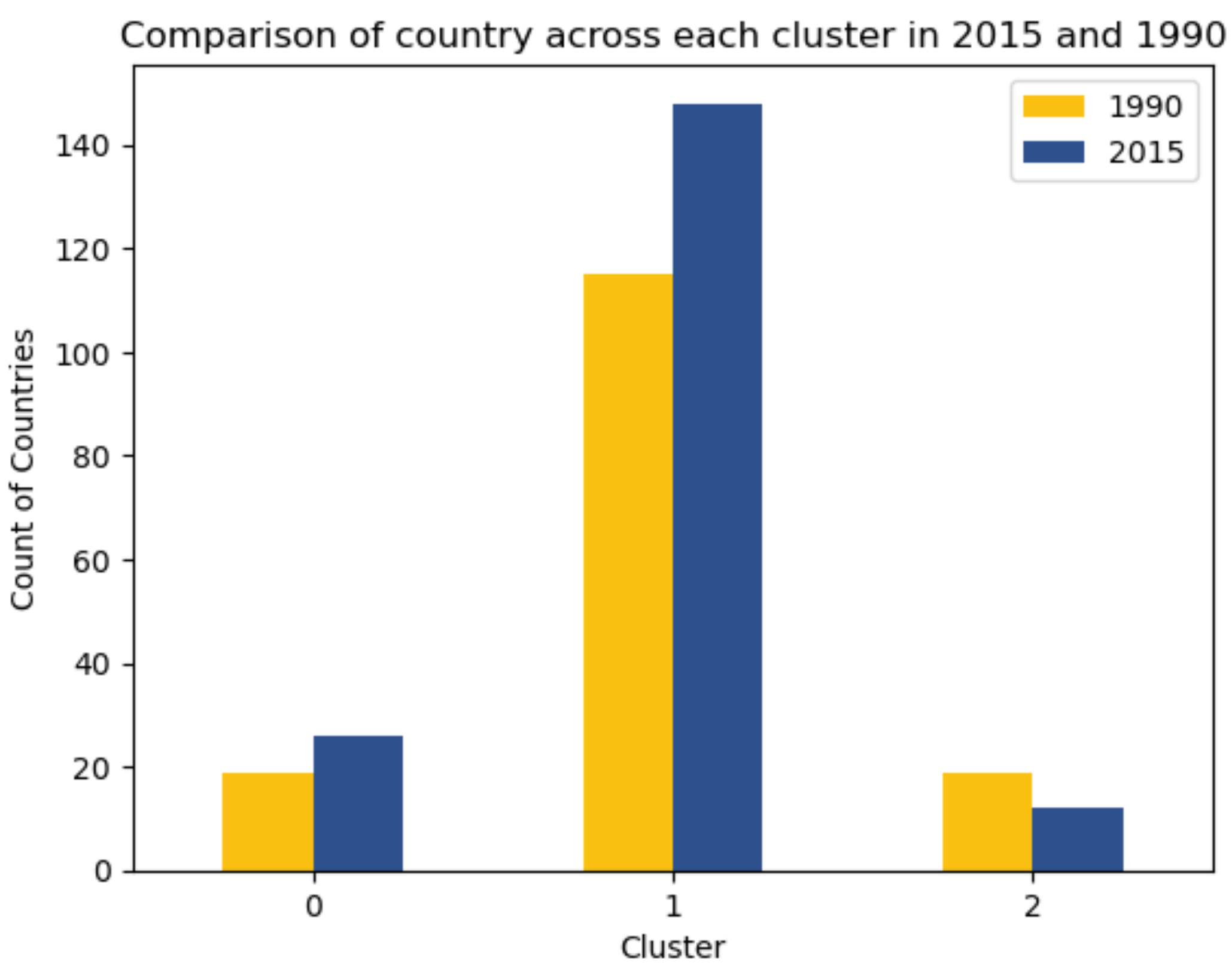
The same process was applied to the data before fitting to predict the GDP trend for a selected country in the next 10 years with a lower and upper limit of confidence range.

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GitHubLink:<https://github.com/femi23/Applied-Data-Science---Assignmnet-3>

Result (Clusters)



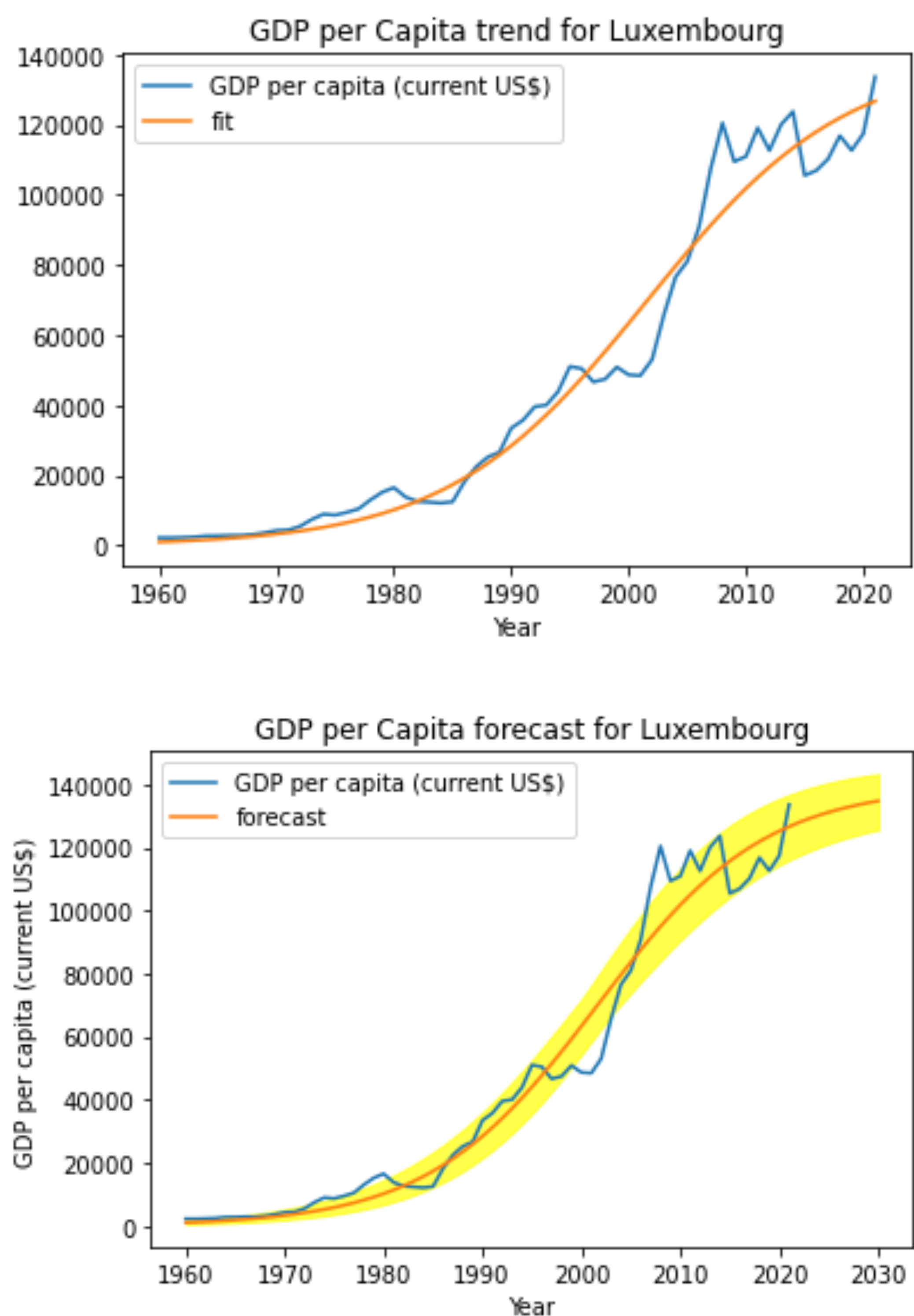
Result (Sum up of countries)



Result (Average values for each clusters)

Clusters	2015				1990			
	GDP /Capita (\$)	CO2 (kg / PPP \$ of GDP)	Renewable energy consumption (% of total)	CO2 production / head	GDP /Capita (\$)	CO2 (kg / PPP \$ of GDP)	Renewable energy consumption (% of total)	CO2 production / head
0	32963.1	0.23	11.88	0.0099	9113.64	0.44	11.69	0.00705
1	5291.93	0.22	35.87	0.0027	1241.50	0.49	45.50	0.00219
2	64582.3	0.18	24.34	0.01189	24795.9	0.55	11.44	0.01246

Result (Fitting)



Discussion and Conclusion

- The GDP per capita in all clusters increased over the years, indicating overall economic growth among the countries analyzed.
- Cluster 1 had the lowest GDP per capita and most countries, implying that majority of countries are underdeveloped.
- In cluster 0 and 2, the CO2 emissions per GDP decreased while renewable increased from 1990 to 2015, which may indicate that these countries are becoming more efficient in their use of fossil fuels and are investing more in clean energy.
- GDP per Capita of Luxembourg is expected to grow to just under \$14000.

7The analysis revealed that most countries are underdeveloped and have a low capacity to invest in clean energy and reduce their carbon footprint. Although, developed countries are becoming richer they may not be reducing their carbon footprint as much as they could.

To improve on this, other variables can be added to the clustering, and other techniques of clustering can be explored.