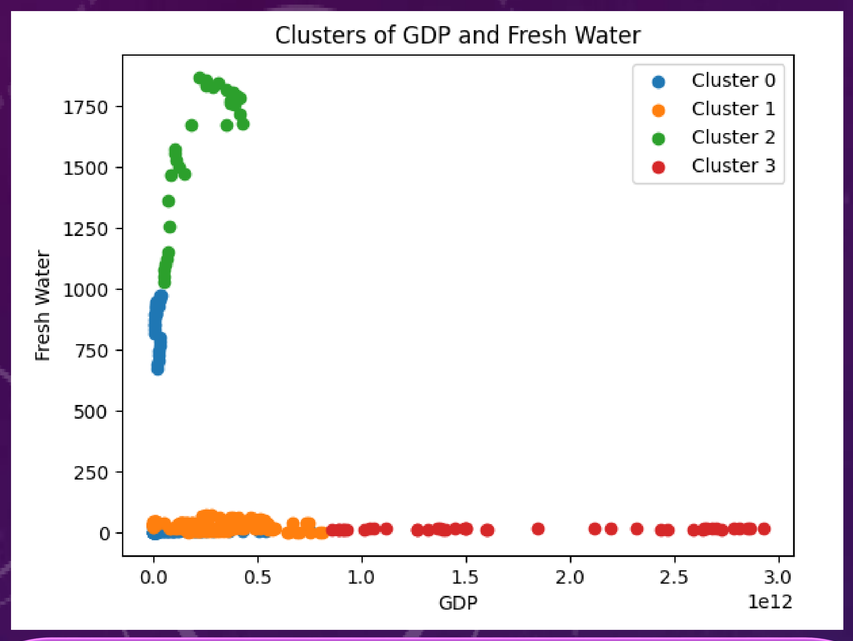
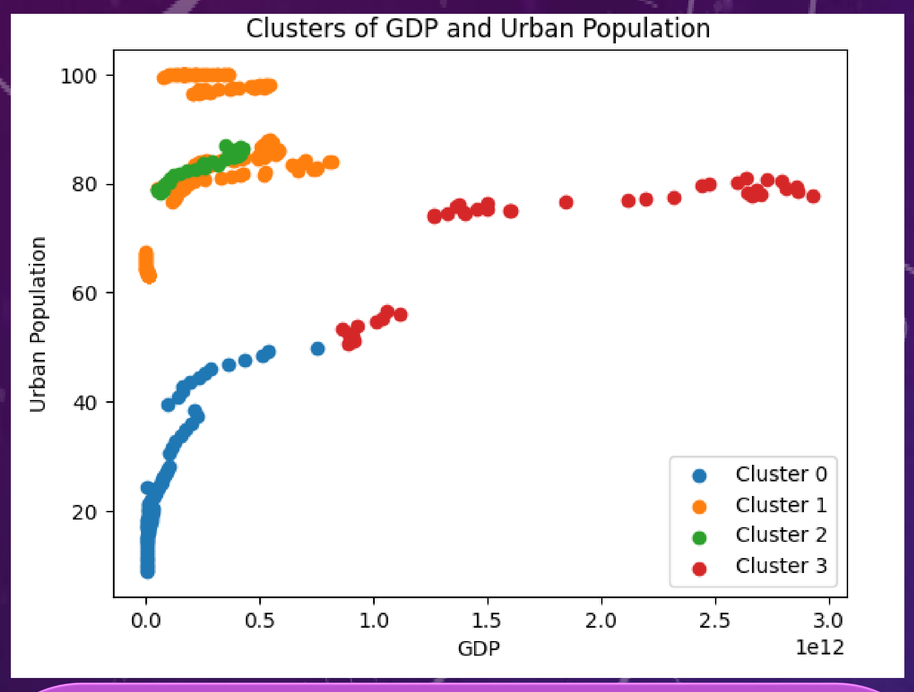
Introduction

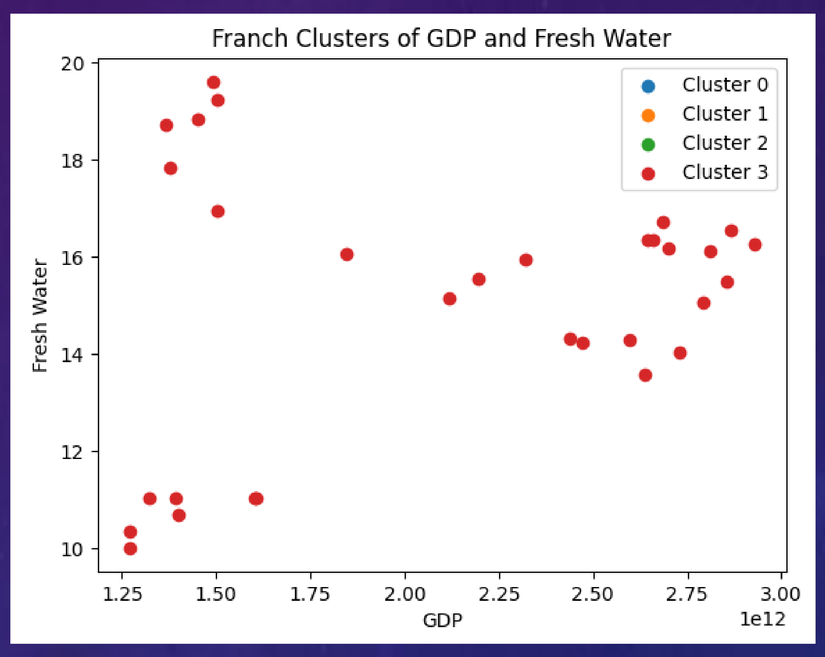
In this analysis, we aim to explore the relationship between two crucial factors that are essential for a country's development - GDP and fresh water, and GDP and urban population. The study is based on data from multiple countries, and we'll be using clustering, a machine-learning technique, to organize these countries based on how closely these elements relate to one another. Fresh water availability and urbanization are important indicators of a country's economic and social progress We may learn a lot about the opportunities and problems that different countries confront economically by comprehending how these variables differ between other nations and how they are related. Moreover, the study will focus on clusters of countries with similar GDP and fresh water and GDP and urban population, and we will analyze their specific characteristics to gain a better understanding of their economic development. Last but not least, we will use curve fitting methods with an exponential function to fit a line to the cluster data, which will aid in trend prediction. This analysis's main objective is to find patterns and trends in the data that can help with policy and decision-making for sustainable economic growth.



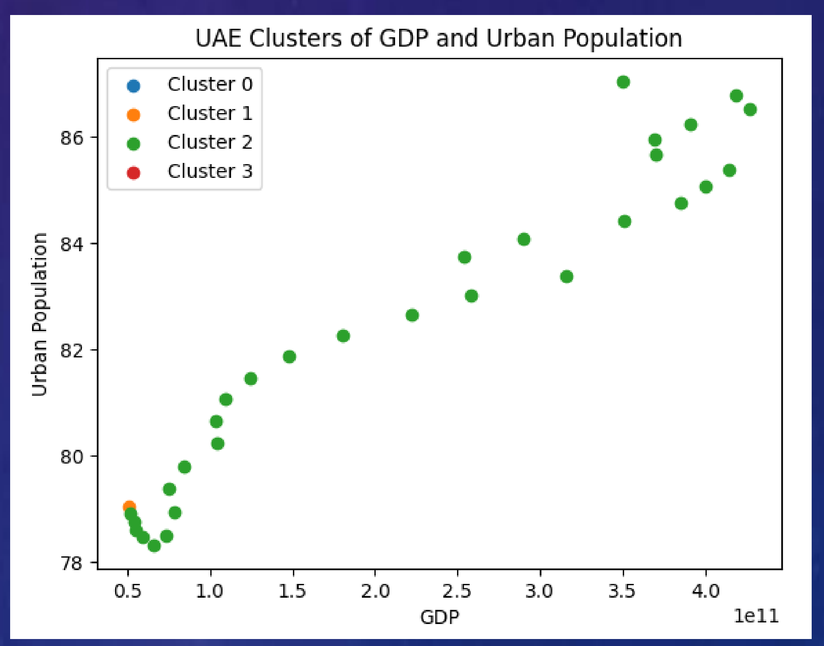
The scatter plot shows that there are four distinct clusters of countries based on their GDP and fresh water availability. Cluster 0 and Cluster 1 have a relatively balanced distribution of GDP and fresh water availability. Cluster 2 has a low GDP but has relatively high fresh water availability. Finally, Cluster 3 stands out with high GDP but has 0 fresh water availability. This indicates that despite having a high GDP, the countries in Cluster 3 are facing significant challenges in terms of water availability, which could have a negative impact on their economy and development. This analysis highlights the importance of fresh water availability for economic development and shows how clustering can be used to group countries based on their similarities in GDP and fresh water availability.



Based on the scatter plot of GDP and urban population, we can observe that there are four distinct clusters. Cluster 0 represents countries with low GDP and low urban population, with GDP ranging from 0 to 0.5 and urban population ranging from 0 to 45. Cluster 1, on the other hand, consists of countries with high urban population but low GDP, with GDP ranging from 0.0 to 1.0 and urban population ranging from 60 to 100. Cluster 2 also has low GDP but high urban population, with GDP ranging from 0 to 1.0 and urban population ranging from 80 to 100. Finally, cluster 3 has high GDP between 1.0 to 3.0 and urban population ranging from 40 to 80. By understanding these clusters, we can gain insights into the relationship between a country's GDP and urban population and how they vary among the countries in our analysis.



Based on the GDP and Fresh Water cluster analysis, the country France belongs to cluster 3 which has a GDP range of 1.25 to 3.00 and fresh water availability between 10 to 20. This suggests that France has relatively high GDP and moderate fresh water availability compared to the other countries in the analysis.



The scatter plot analysis of the UAE for GDP and urban population shows that the country belongs to cluster 2, which is characterized by a high urban population and high GDP. The plot shows that the UAE has a GDP between 0.5 to above 4.0, which indicates a relatively high level of economic activity. Additionally, the urban population of UAE is between 78 to above 86, which indicates a highly urbanized country with a significant population living in cities.

Conclusion

Based on the analysis of the scatter plots of GDP and fresh water, and GDP and urban population, we can observe that the countries in our dataset exhibit a wide range of characteristics with respect to these factors. Clustering analysis has allowed us to group these countries based on their similarity in these factors.

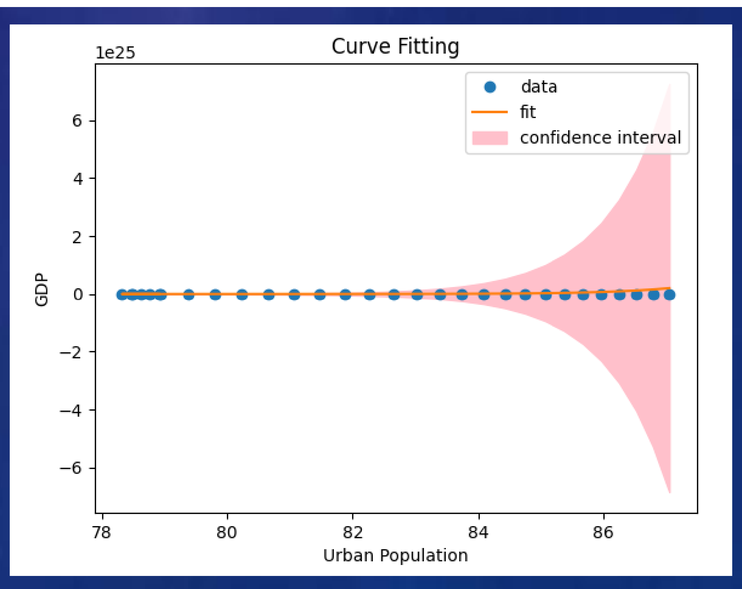
For the GDP and fresh water scatter plot, we have identified four distinct clusters. Cluster 3 stands out as having a high GDP but zero fresh water availability. This highlights the challenge of balancing economic development with environmental sustainability and resource management. Cluster 2, on the other hand, shows low GDP but has access to fresh water, suggesting potential for agricultural development.

Similarly, for the GDP and urban population scatter plot, we have identified four clusters. Cluster 0 has low levels of both GDP and urbanization, while clusters 1 and 2 have low GDP but high urban population, highlighting the challenges facing urbanization and economic development. Cluster 3 has high GDP and moderate levels of urbanization, suggesting a potential for economic growth and development.

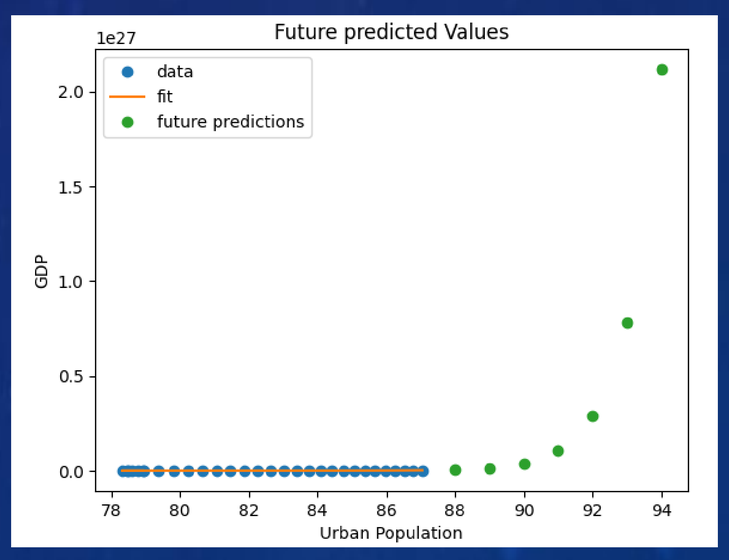
Furthermore, we have conducted individual analyses of France and the United Arab Emirates, showing their position in the respective scatter plots and providing insights into their characteristics with respect to these factors.

In addition, using the curve fitting technique, we were able to make predictions about future trends in GDP and Urban Population. These predictions provide useful information for policymakers and decision-makers to understand the potential economic growth and urbanization in these countries.

Overall, the analysis has provided valuable insights into the relationship between GDP, fresh water, and urban population, which can inform policy and decision making in the countries under consideration.



The above plot shows curve fitting, confidence interval and data points



The values in the green house the predicted values for the curve fitting