

# Investigating Clusters and Trends in Country-level Data

**Abstract:** In this study, we use clustering techniques and curve fitting models to investigate interesting clusters and trends in country-level data. We normalize the data using various factors like

- 'CO2 emissions (metric tons per capita)'
- ('CO2 emission (KG per PPP \$ of GDP)').

**Implement this method since 2009 to 2019**

## Methods:

For clustering, we use the K-Means algorithm and produce a plot showing cluster membership and cluster centers.

Furthermore,

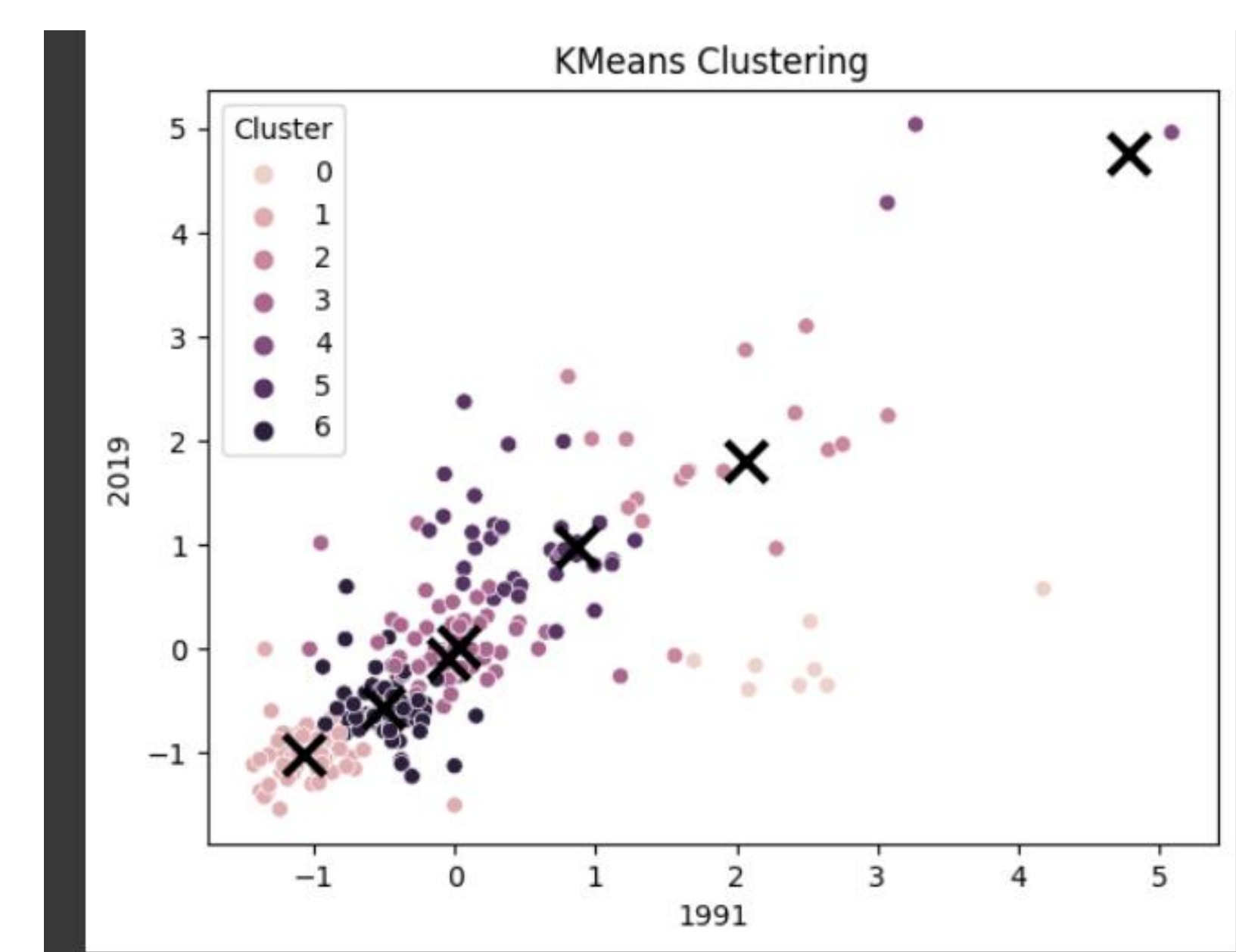
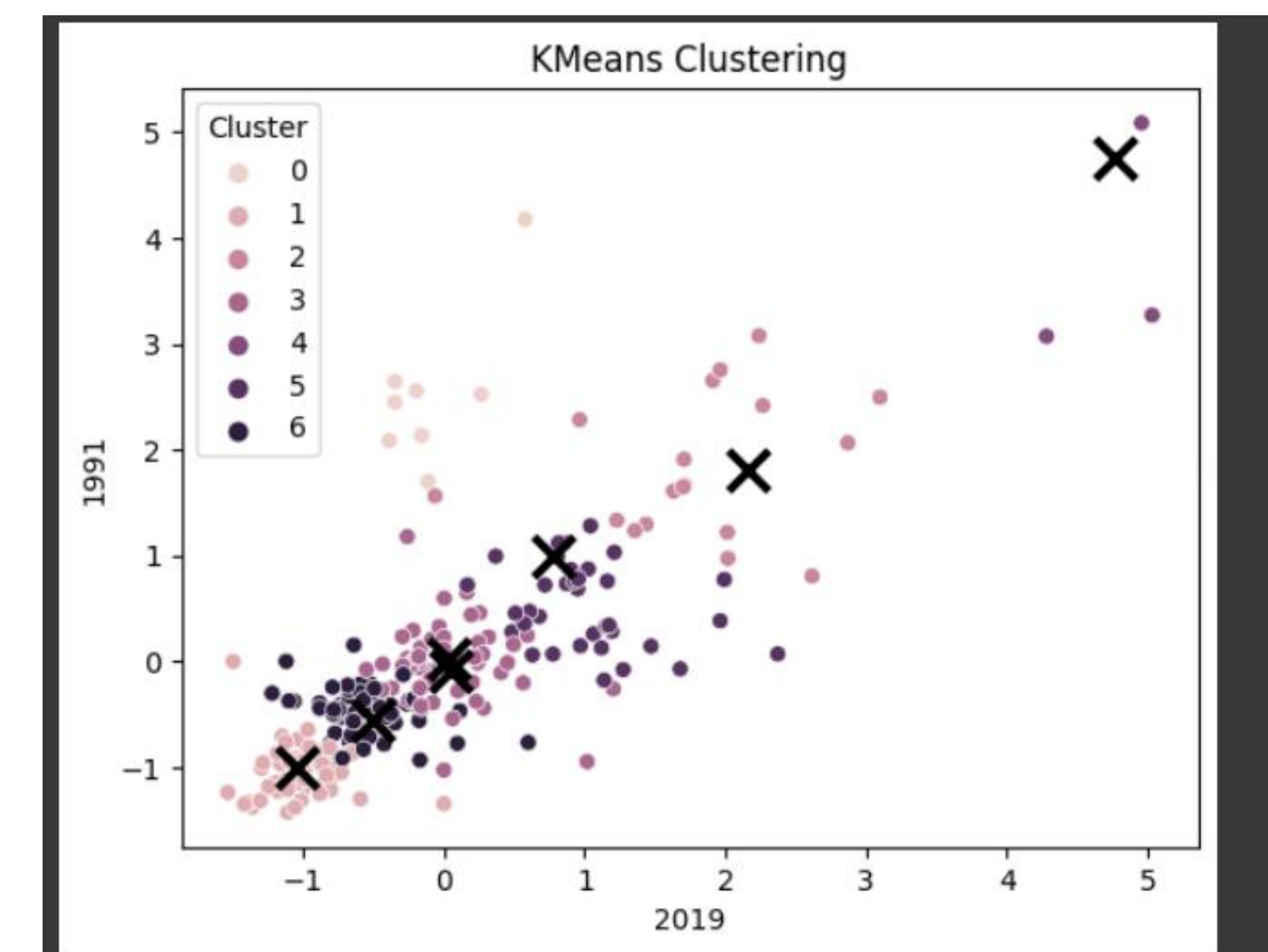
we fit data sets with simple models using curve fit and use these models for future predictions.

We keep the models simple, using low-order exponential growth function.

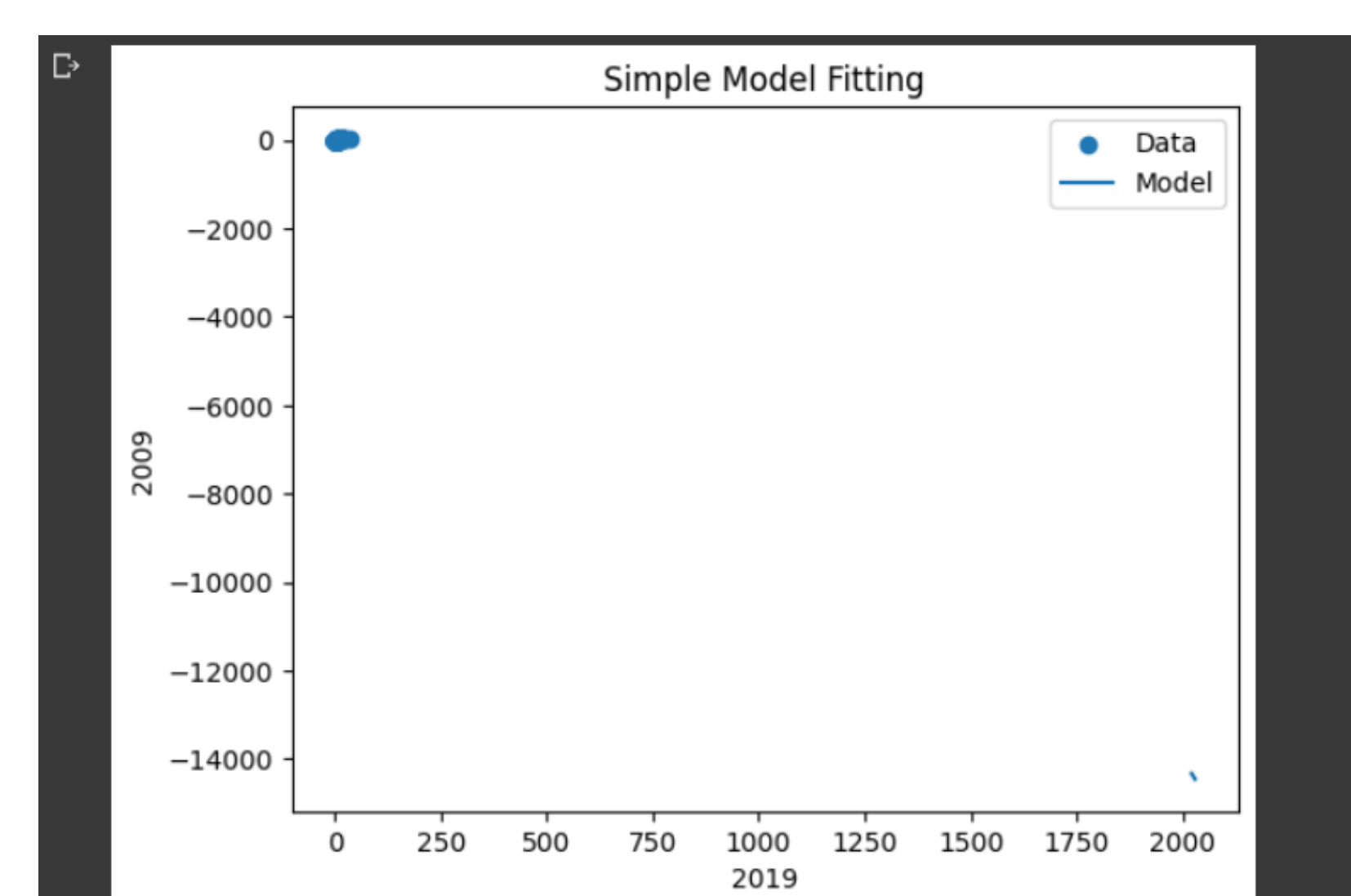
We estimate lower and upper limits of the confidence range using the attached function err ranges and produce a plot showing the best fitting function and confidence range.

## Results:

The Better result I get in kmean algorithm in k=7.



## Simple Model fitting results



**Conclusion:** The available data presents a valuable resource for gaining insights into global patterns in CO2 emissions. Although it has certain limitations, it can still be utilized to identify countries that are successfully making progress in reducing their emissions, as well as those that require further action to mitigate their emissions. Additionally, this data can inform policy-making processes aimed at reducing global emissions and addressing the impacts of climate change more effectively.