Cluster analysis and forecast of GDP and greenhouse gas emission.

Tanvir Ahmed

Overview

The emission of greenhouse gases has been a major environmental concern for many years. The adverse impacts of climate change and global warming is affecting all countries in the world. This analysis investigates possible clusters of emission and forecast the trend in 2030, 2040 and 2050 of a representative country from one cluster of interest. The methodology can be applied to other clusters and countries to find insights and courses of action to be taken to minimise the risk of excessive emissions.

Methodology

Data of year 2015 from 150 countries in the world was selected for the cluster analysis. The interrelations between population, per capita GDP, greenhouse gas emissions, urban population, arable land and forest area were investigated.

The k-means clustering algorithm was used.

Cluster A from Fig. 1 was chosen and Germany was selected as a representative country of the group to do data fitting.

Finally, forecast was done on both GDP and emissions for year: 2030, 2040, 2050

Results

GDP growth was forecasted with an average of 7% uncertainty.

Emission is expected to reduce at an average 8% between 2030 and 2050.

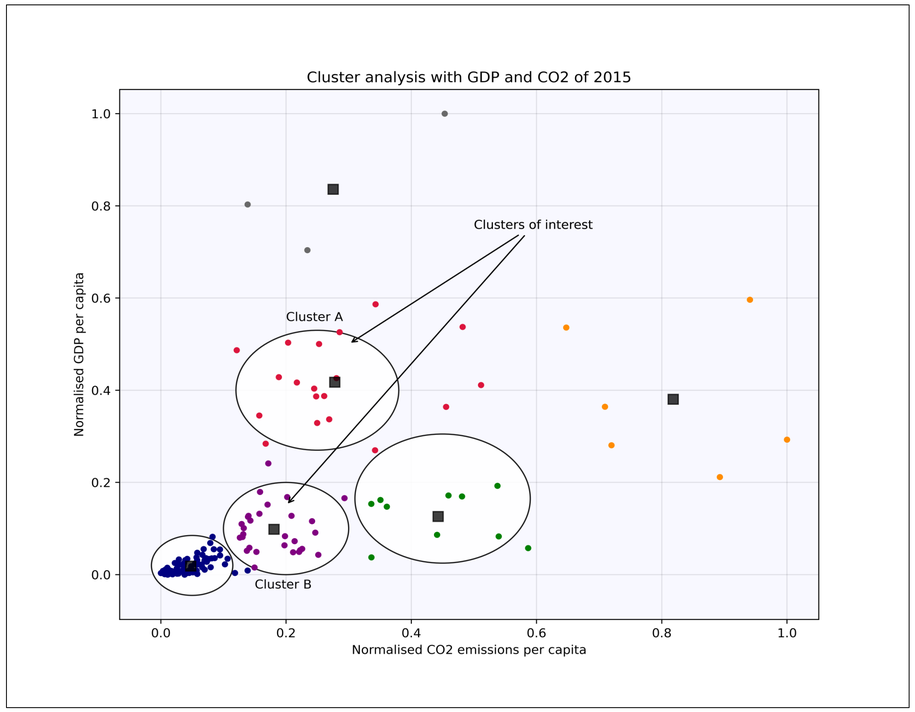

Fig. 1: K-Means Clustering

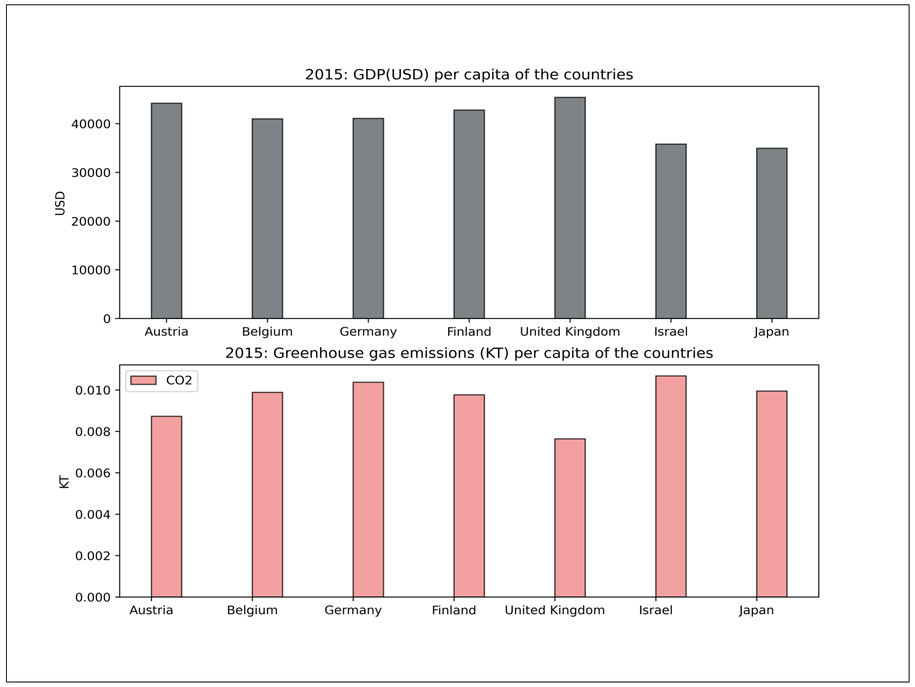

Fig. 2: Cluster A countries

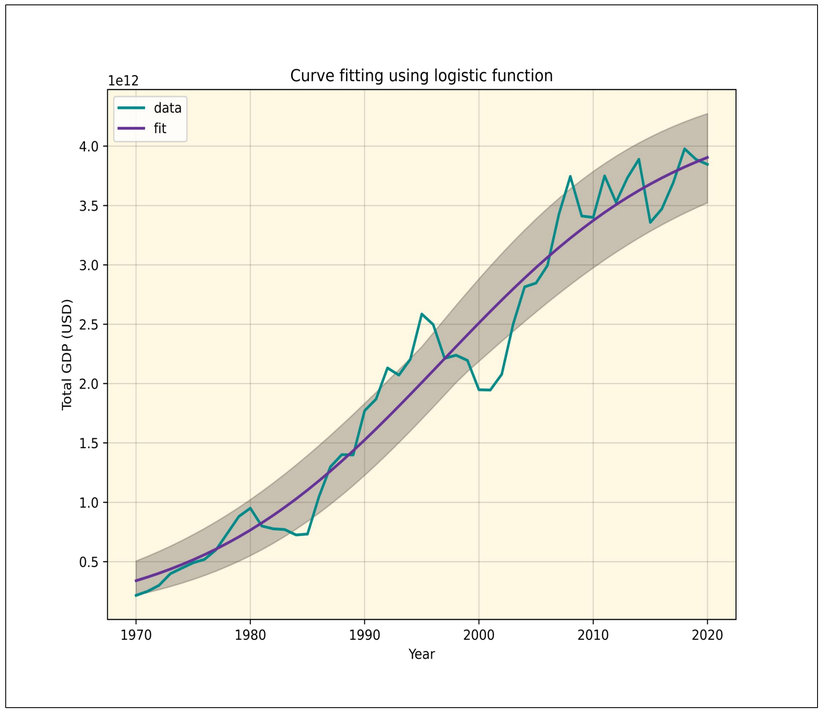

Fig. 3: Curve fitting and error range for GDP of Germany

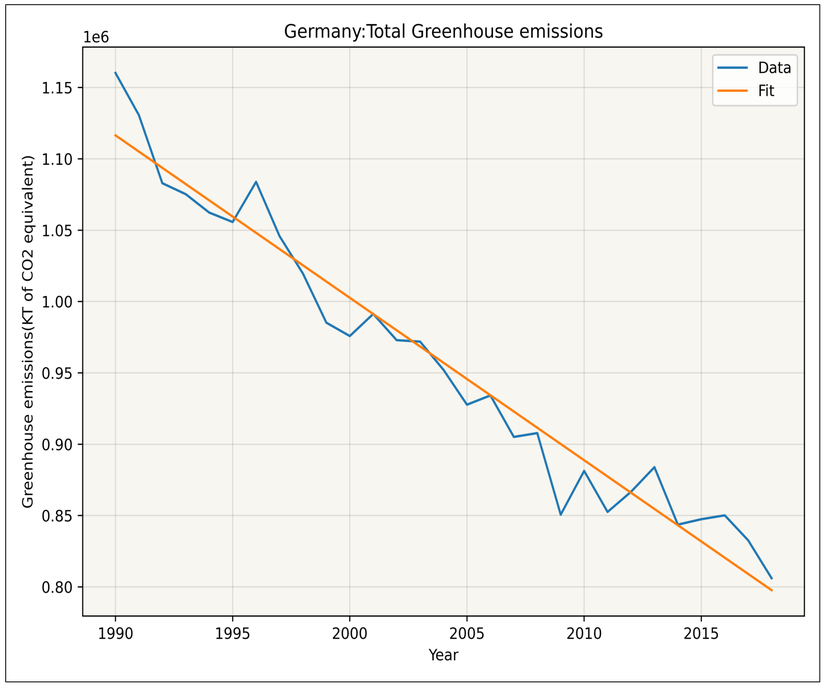

Fig. 4: Gas emissions of Germany has a downward linear trend.