

Analysis of the indicator GDP per capita (current US\$) benchmarking with 12 countries from 2015 to 2020 (based on data availability)

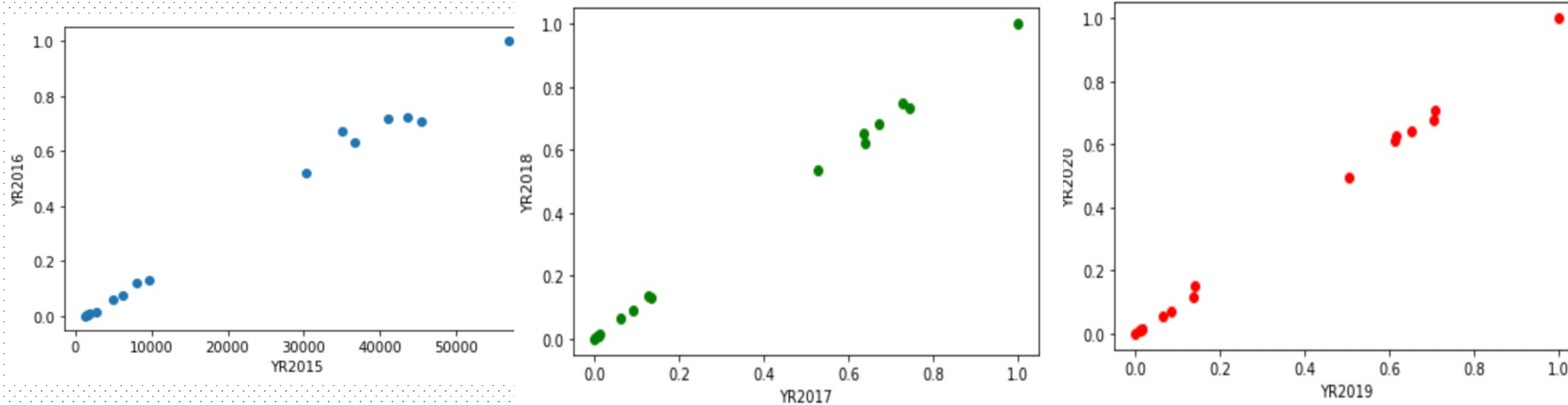
Clustering Analysis Summary

- The dataframe created from the above was Inspected to determine the correlation between the variables across the years of consideration. A close range of values were observed measuring the correlation between the variables in the dataframe across the period of consideration which shows that variables in the dataframe as positively correlated (correlation values ranges between positive value 0.99 to 1).
- A standard technique of rescaling (normalise) data variables at the interval [0, 1] using the formula $(xscale = \frac{x - min}{max - min})$ where the min and max are the minimum and maximum value of the variables in the dataset was used to normalise the dataframe as well as its summary statistics before clustering the data.
- A function was used to create three exploratory plots by splitting the indicator dataframe into 2 consecutive years (YR2015 & YR2016, YR2017 & YR2018, YR2019 & YR2020).
- Clustering using KMean (the elbow method) and AgglomerativeClustering was carried out. A new dataframe (X) was created which extracted the two-variable used for clustering from the dataframe. Fits of time series was created using the range of values 1-6 (5 years) to visualize the cluster plots.
- Upper & lower limits of the fitting were estimated using a fitting and plotting function to produce a curve fit plot of the dataset of consideration.

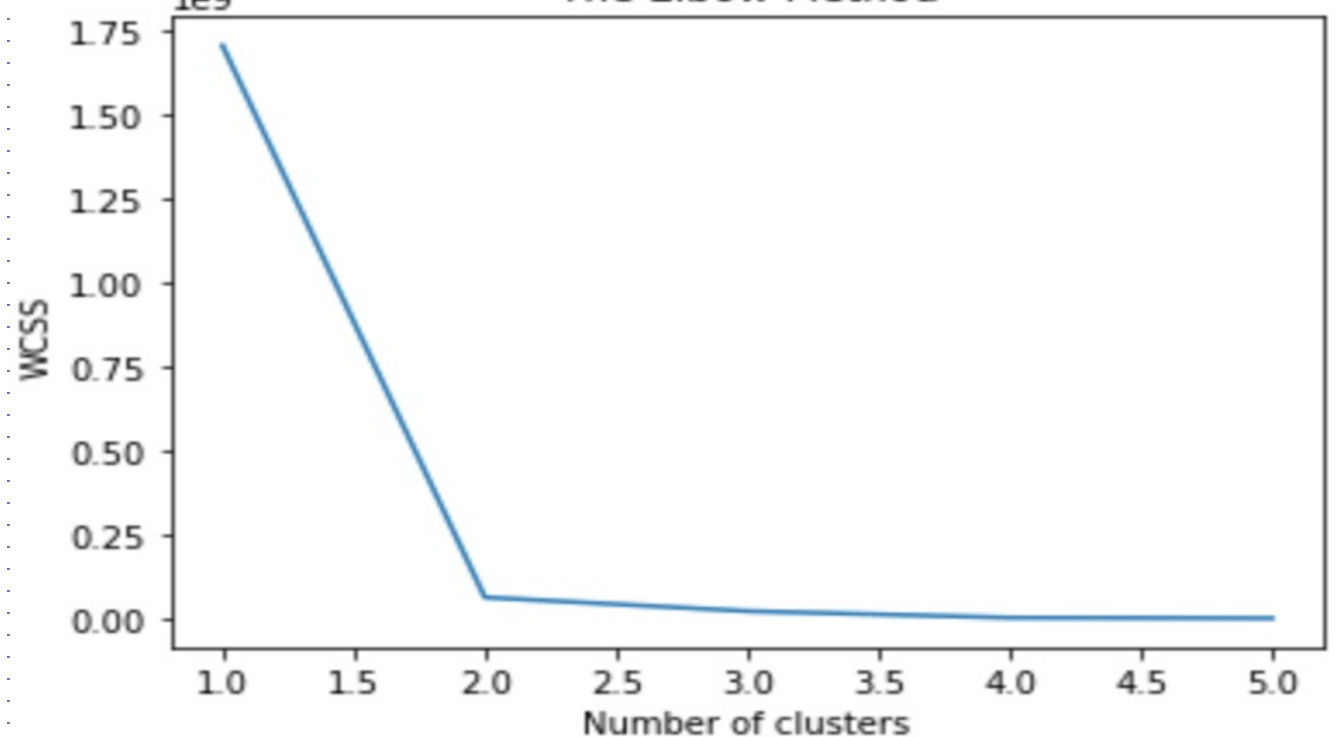
Comparative Analysis Summary

- This was done by grouping the country of consideration by continent (four countries per continent) and comparing each country's GDP per capita (current US\$) for relevant inferences as follows.
- On the overall dataframe:
- Amongst the 12 countries, USA top the chart, being the country with the highest GDP per capita (current US\$) across the years of consideration.
 - Although United Kingdom (GBR) recorded the second highest in 2015, Canada took over the second country with highest GDP per capita (current US\$) amongst the 12 countries, in 2016 & 2017
 - Belgium However, took over the second highest GDP per capita (current US\$) from 2018 to 2020 of the investigated data
 - On the grouped dataframe,
 - South Africa (ZAF) top the chart as the country with the highest GDP per capita (current US\$) amongst the four grouped African countries. Nigeria on the other hand, emerged the second African country with highest GDP per capita (current US\$) in 2015 & 2016 before Ghana took over from 2017 to 2020
 - With an aggregated sum of the GDP per capita (current US\$) for the period in view, USA has the highest, followed by Canada (as earlier confirmed by the overall observation above).
 - For European grouped countries, United Kingdom top the chart in 2015 which, however, was taken over by Belgium across the years of consideration
 - Japan tops the chart as the highest GDP per capita (current US\$) amongst the Asian grouped countries followed by China

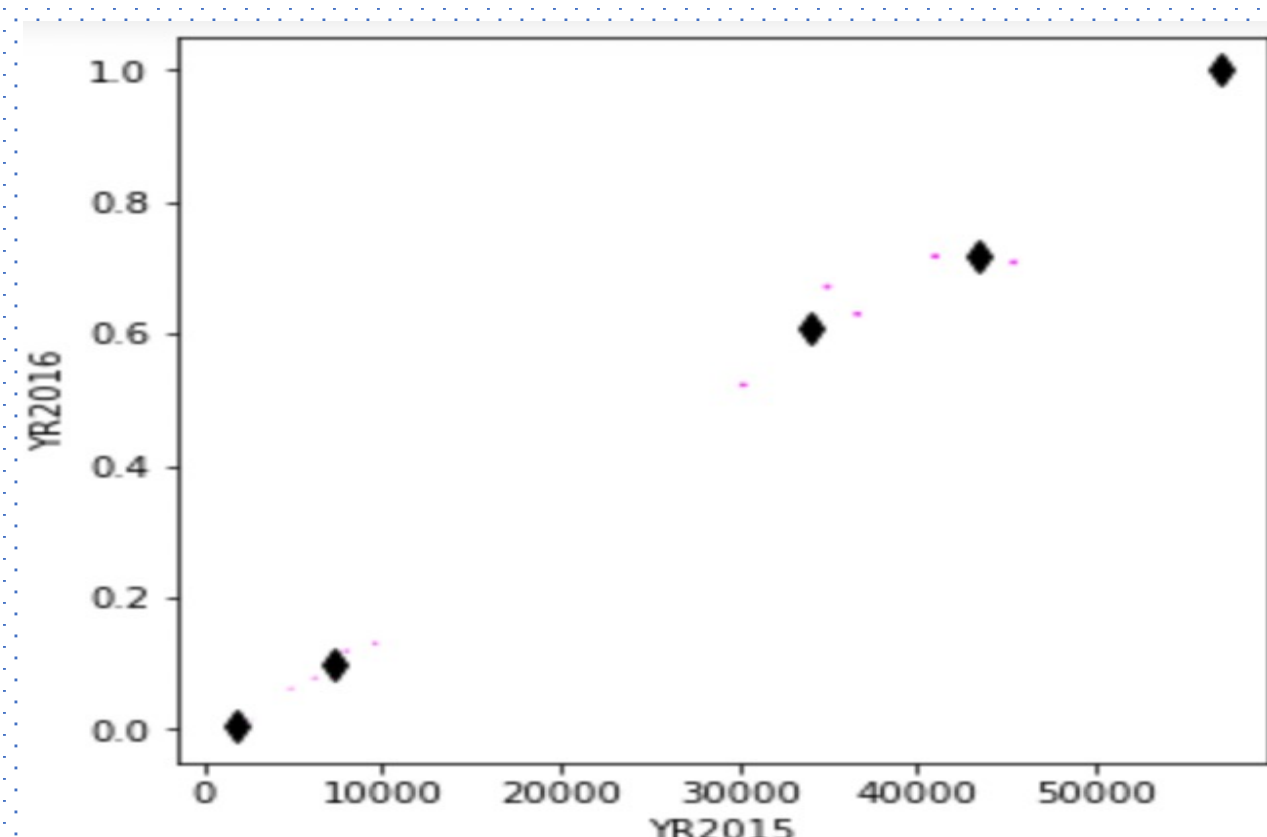
Three exploratory plots



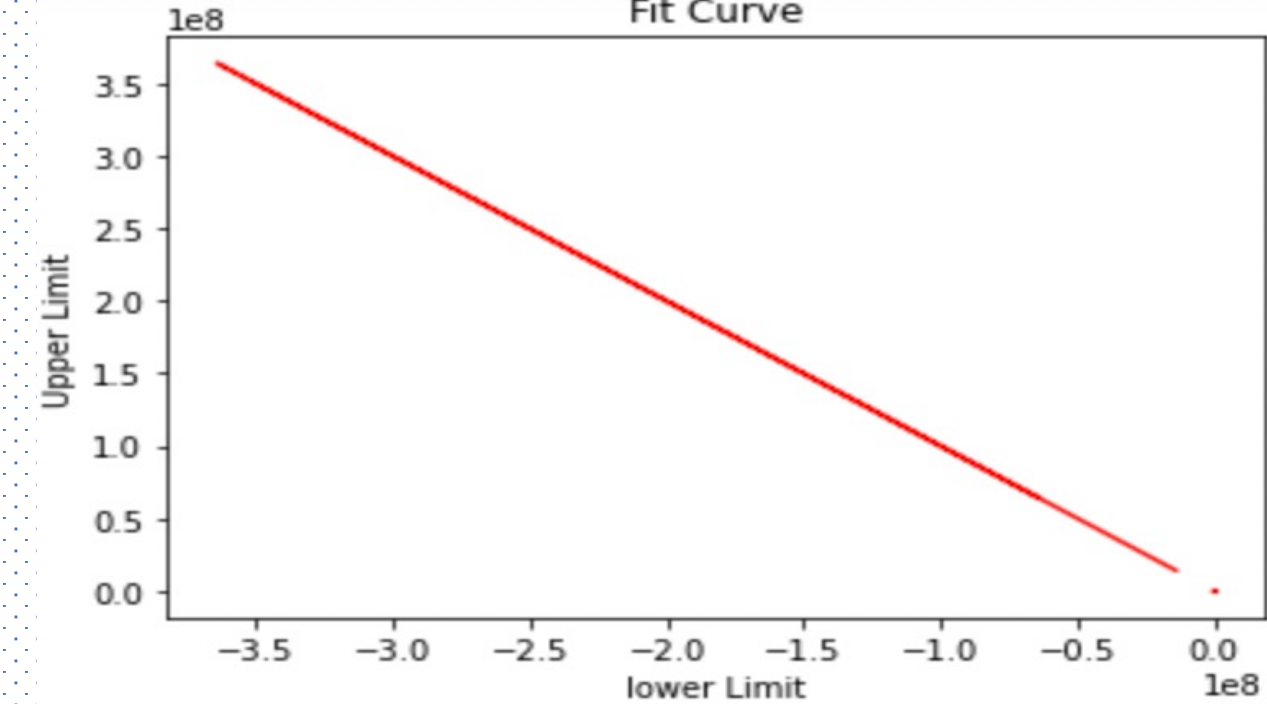
Kmeans Clustering plot using the elbow method



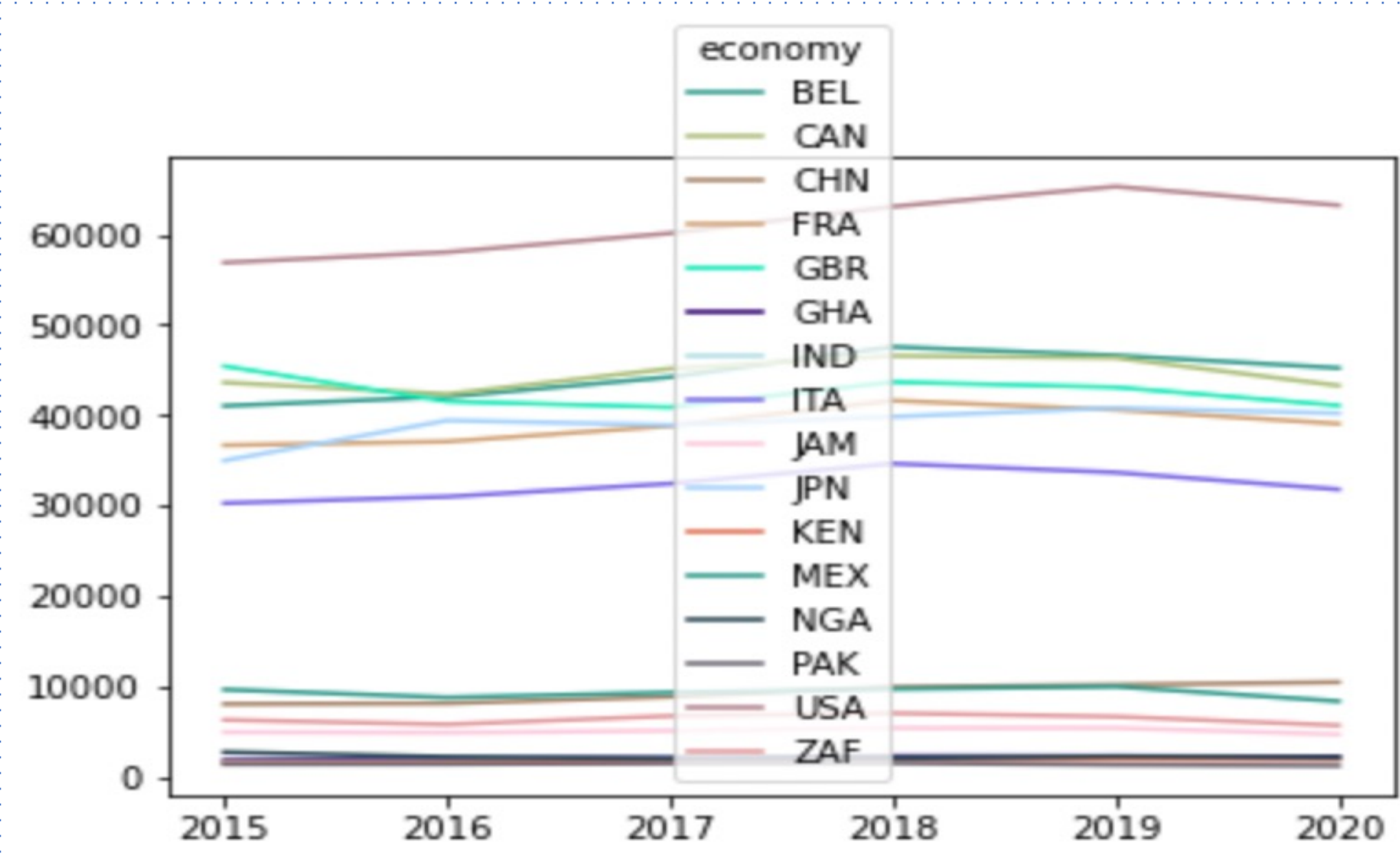
Agglomerative Clustering fits of time series



Upper & lower limits of a curve fit



Overall trend of countries GDP per capita(current us\$)



GDP per capita(current us\$) by Continental grouped countries

