Module Name:

Applied Data Science

Module Code:

7PAM2000

Assignment 2:

Statistics and trend

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Assessment title:

Exploring Statistics and Trends in Climate Change Indicators: A Data Analysis Report

GitHub Repository:

https://github.com/muhammadadeel22/7PAM2000_Statistics-and-trend_Assignment_2

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Abstract - Using open data from the World Bank, this report analyses climate change indicators for each nation. The objective of this study is to investigate the statistical characteristics, correlations, and trends in a subset of indicators to provide light on how various variables relate to climate change. Pandas data frames are used to import and edit the data, allowing for the examination of summary statistics, correlations, and visualisations. The findings reveal significant patterns and connections that shed light on how climate change has affected various nations throughout time. The code file is available at Git Hub.

Forest Area: the time series forest area of the UK, Nigeria, China, Brazil, USA, and Germany is shown in the graph below from 1997 to 215. The graph shows that Germany has maximum forest are as compared to other countries. Whereas USA has the lowest % of forest area in square kilometres.

Forest Area % in square kilometers
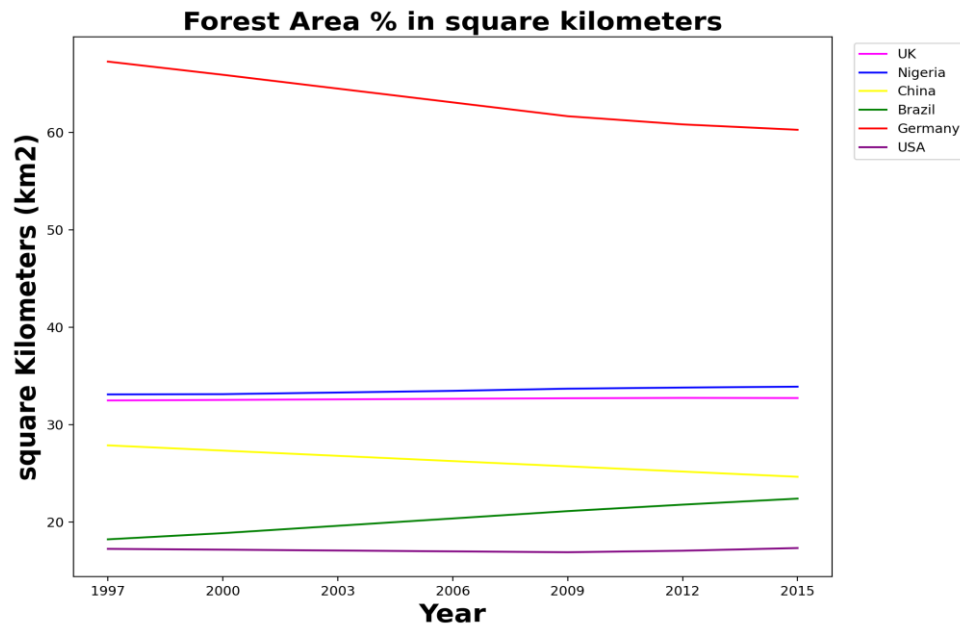
Production of electricity: the graph inserted below presents the total production of electricity from fossil fuels for the labelled countries from 1997 to 2015. Brazil's 95% of electricity production is based on fossil fuels. On the other hand china has lowest rate of electricity prduction from fossil fuels.

### Electricity production from oil, gas and coal sources (% of total)
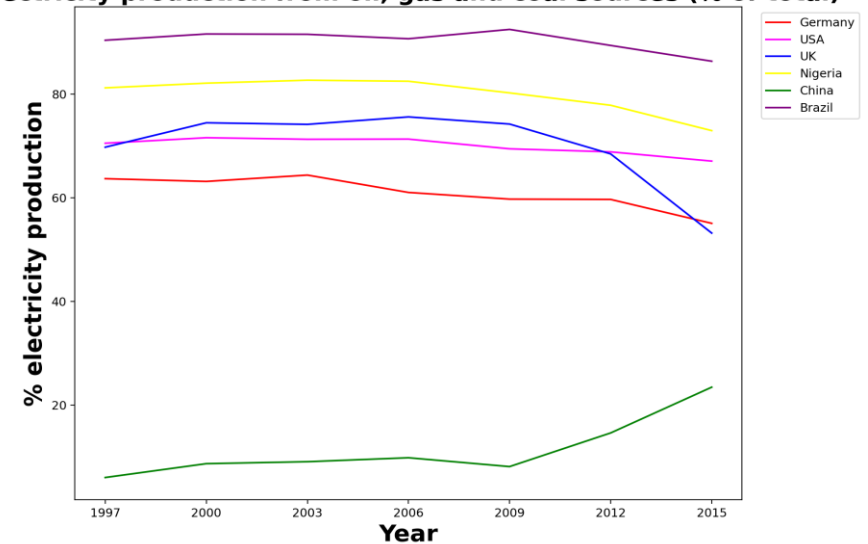
CO₂ Emission: the CO_2 emission per capita of countries (Uk, China, USA, Brazil, and Nigeria) from 1997 to 2015 is shown in metric tons.

CO2 emissions (metric tons per capita)
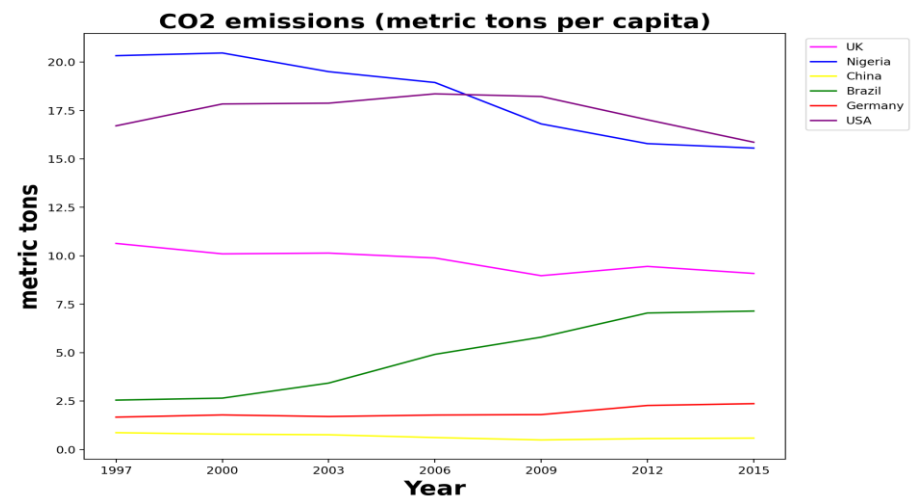
MultiVariot Plots: the plots shown below represent the Urban population growth of each country for years (1997, 2003, 2009, and 2015) in different colours.

Whereas the second plot presents the % of GDP from Agriculture, forestry, and fishing. The blue, orange, green, and red colours present the year 1997, 2003, 2009, and 2015 respectively. Per anum urban pop. Growth in Niegeria is highest.
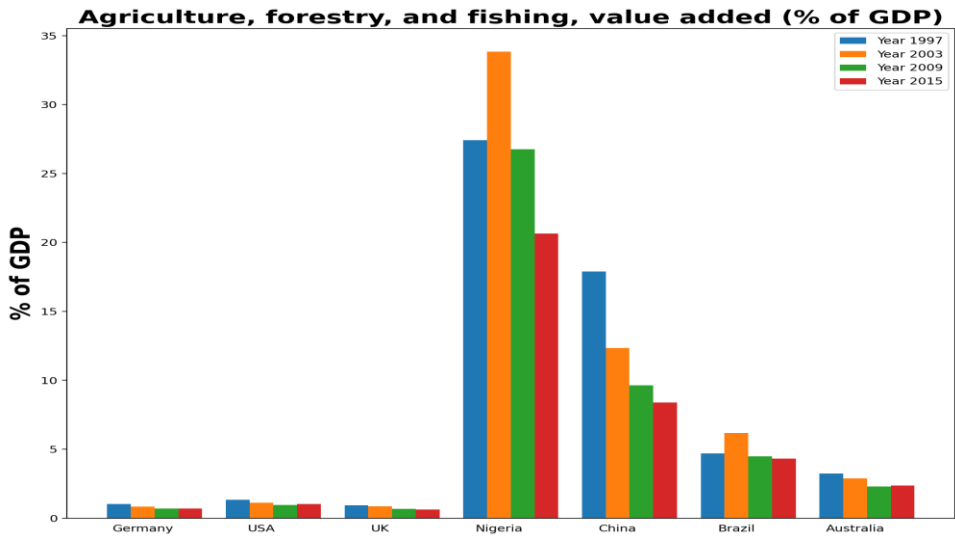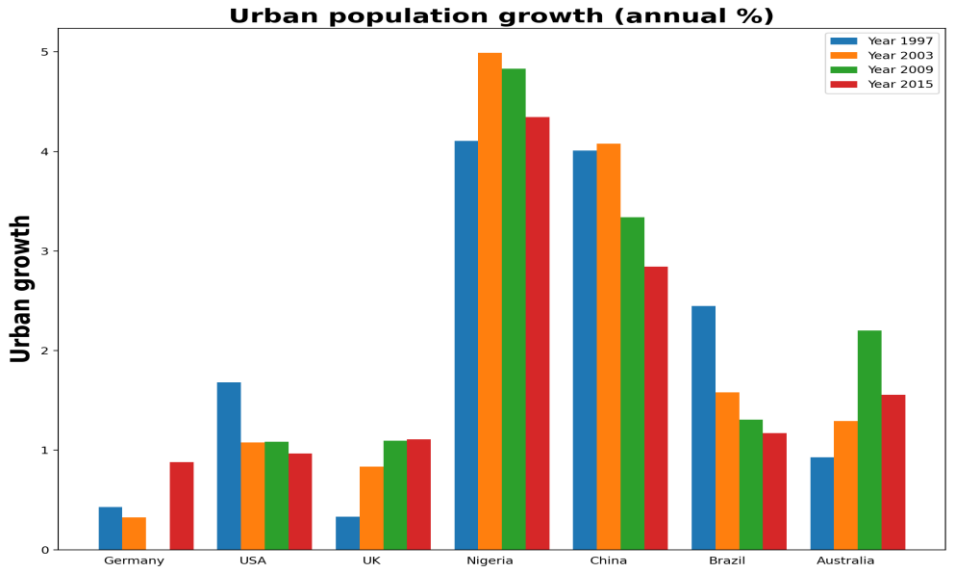
Correlation: the correlation matrix for China is shown using a heatmap from 0 to 1 for variables Urban population growth, Forest area, CO_2 emission, electricity production, agriculture and fisheries, forest area, and GDP annual growth. The blue color shows the lowest correlation whereas the red color sshows the highest correlation. From corrlation matrix it is clear that same variable have 100%correlation and some variables with negative values shown in blue color have least correlation. The matrix depicts that Forest area and CO_2 emission have 98% correlation, whereas agriculture, fisheries and forestry, electricity production, and urban population have negative correlation with CO2 emission and forest are. This means higher the one value is, CO_2 emission will be higher, whereas a high forest area means that CO_2 emission will be less.