

**Statistics and trends Analysis of World Bank Climate Change**

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**Link: <https://github.com/anayatawais/ADS1-assignment02>**

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## **1. Introduction**

The World Bank is an international financing organization that offers developing nations technical support, grants, and loans for a variety of development projects. The Bank has prioritized tackling the problems caused by climate change more and more recently.

The long-term modification of local weather patterns brought on by an increase in the atmospheric concentration of greenhouse gases is known as climate change. Rising global temperatures, more frequent and severe natural disasters, water scarcity, and changes in agricultural production are just a few of the many effects of climate change. All of these elements have the potential to stifle economic expansion and jeopardize the welfare of people everywhere, but especially in developing nations.

## **2. Data availability**

You can get the World Bank's publicly available data on climate change country-by-country indicators at <https://data.worldbank.org/topic/climate-change>. Many parameters, such as the total population, agricultural growth, urban population, etc., are pertinent to climate change.

## **3. Statistical properties**

The `describe()` function in the pandas library of Python offers a way to receive an overview of the statistical properties of a dataset. The `describe()` function computes the count, mean, standard deviation, minimum, maximum, and quartile values among other statistical variables. These properties are listed in the table 1 as given below.

Table 1. The statistical properties of the percentage of the total Urbanpopulation

Country Name	Pakistan	France	Sweden	Malaysia	United Kingdom
count	62.000000	62.000000	62.000000	62.000000	62.000000
mean	30.287258	74.204403	82.898710	52.078823	79.243355
std	4.533477	4.459021	3.372179	16.262315	1.941311
min	22.104000	61.880000	72.490000	26.598000	77.030000
25%	26.426000	72.943750	82.748000	37.868750	78.119000
50%	30.701000	74.142500	83.152000	50.185000	78.426500
75%	34.133500	77.315250	84.402250	67.260750	80.128000
max	37.440000	81.242000	88.238000	77.696000	84.152000

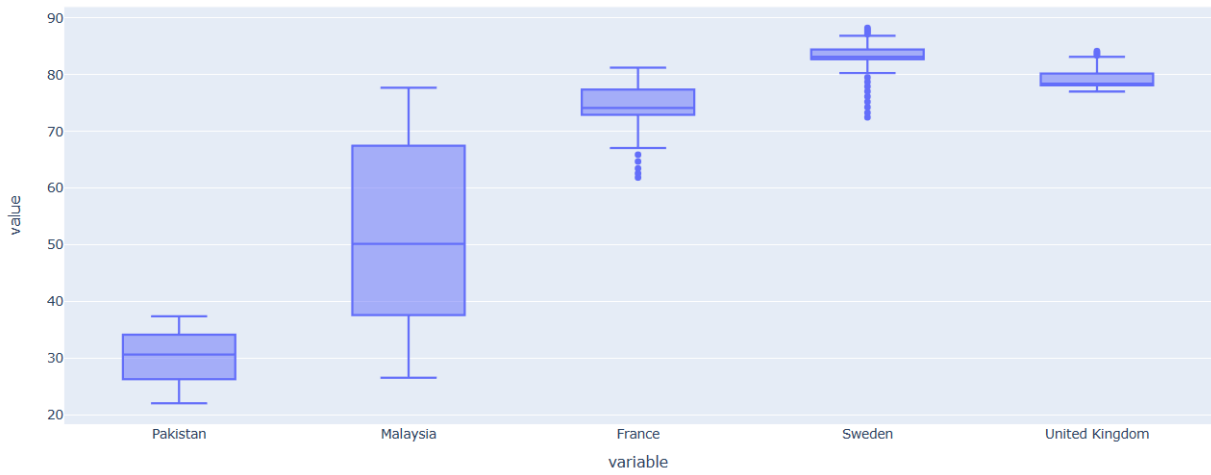


Figure 1. Outlier detection of the percentage of the total Urban population

#### 4. Correlations

A useful tool for comparing the coefficients of correlation between several features in a dataset is a correlation matrix. It enables us to see how strongly (or weakly) distinct variables are correlated. In statistical approaches, the p-value is employed to test a hypothesis. In-depth statistical and probability expertise is needed to interpret the p-value. In this work, we used seaborn library to generate these heatmaps. Figure 2. Shows the correlation of the indicators for Pakistan, while Figure 3 for Malaysia.

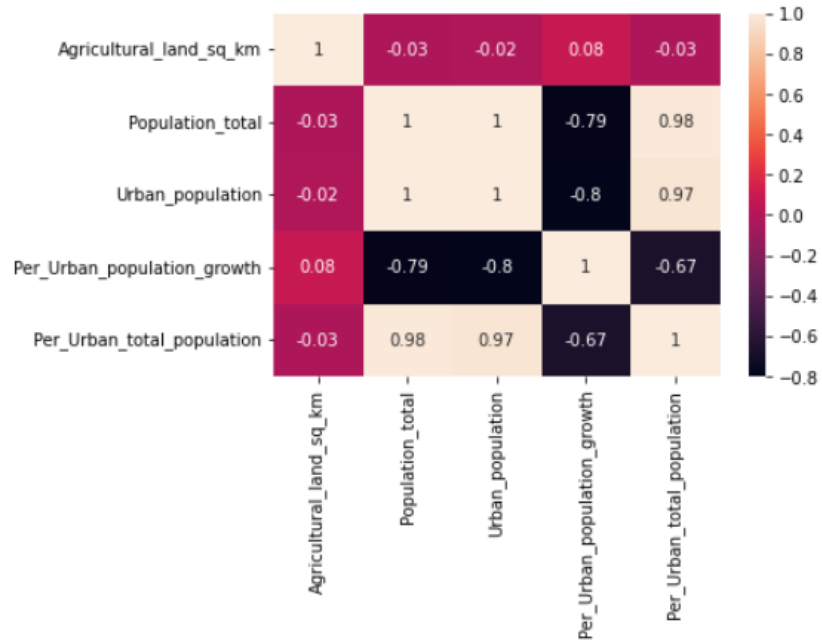


Figure 2. Correlation heatmap for indicators in Pakistan

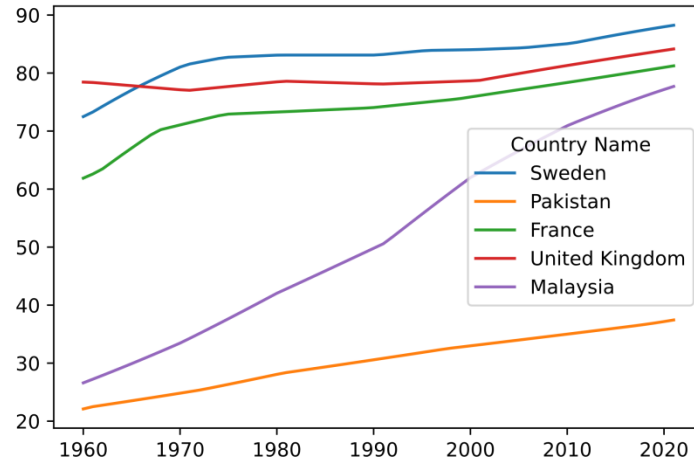


Figure 3. Correlation heatmap for indicators in Malaysia

## 5. Data Visualization

In this section the following parameters are discussed in the detail.

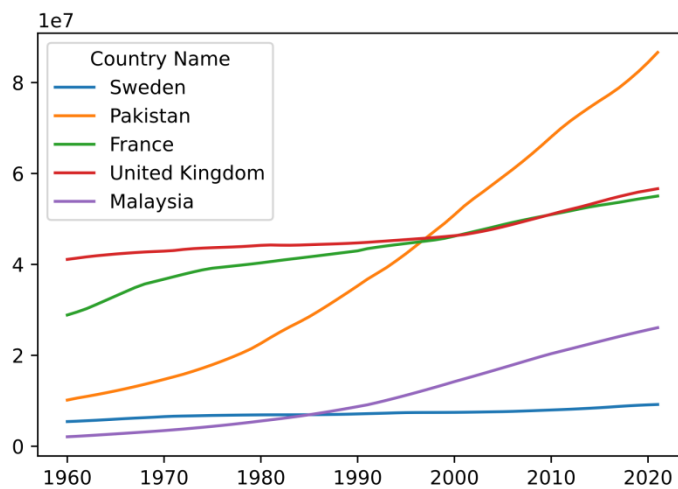
### 5.1. Percentage Of Urbantotalpopulation



*Figure 4. Percentage of the total urban population*

The percentage of urban total population in five different countries is compared in this graph from 1960 to 2020. Over time, this value in Malaysia raised from 25% to almost 80%, which is the highest increase among all the countries. The percentage has slightly varied during the era in case of Sweden, France, United kingdom. In 1960 the percentage of total urban population was almost 23 %, while in 2020, it is 40% as shown in Figure 4.

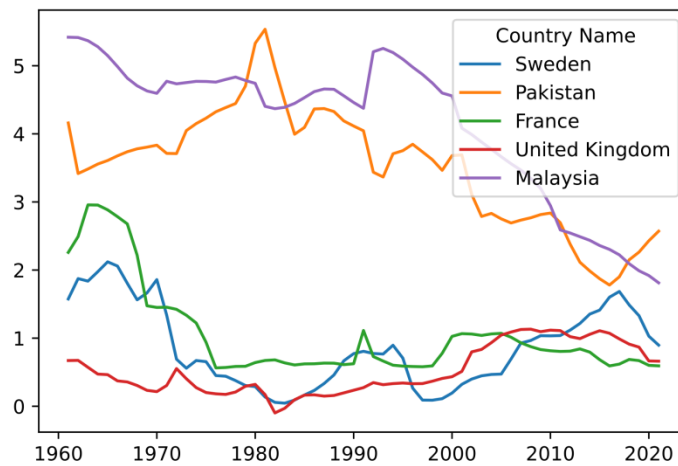
### 5.2. Urban Population



*Figure 5. Urban population*

The urban population in five different countries is compared in this graph shown in Figure 5. from 1960 to 2020. Over the time, urban population has been consistently increasing with fast rate. The smallest urban population in 1960 was in Sweden that slightly improved in 2020. The urban population in Sweden was the least affected during the era from 4 to 6 million. The urban population in Pakistan drastically increased during the time from 1960 to 2020.

### 5.3. Percentage Urban population growth

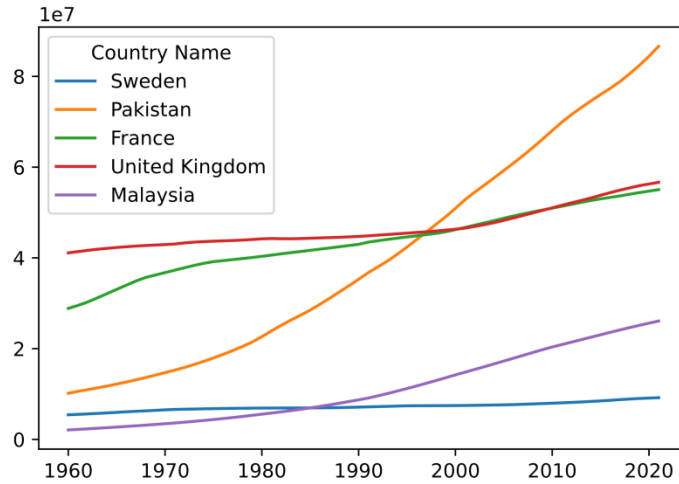


*Figure 6. Percentage growth of the urban population*

The graph in Figure 6. compares the percentage growth of the urban population in five different countries from 1960 to 2020. Pakistan and Malaysia had a higher value compared to France, Sweden and United Kingdom. The percentage growth for the Pakistan and Malaysia significantly decreased while the value remained almost constant during this period.



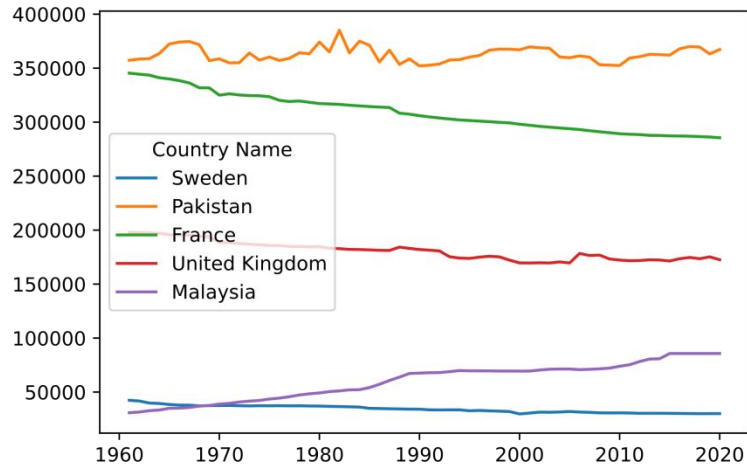
#### 5.4. Population total



*Figure 7. Total Population*

This chart presents a comparison of the total population within five countries during the time from 1960 till 2020. The population of Pakistan increased at very fast rate. Figure 7 provides the detail analysis of population between UK, Malaysia, Sweden, France and Pakistan in term of millions. The graph shows that Pakistan population rises from 1.5 million up to ten million which is higher than all other countries mentioned in the graph. Hence it is concluded that the population of Pakistan is increasing very high rate as time progresses some reasonable measurement could be needed to reduce this rate.

## 5.5. Agricultural\_land\_sq\_km



*Figure 8. Agricultural land*

This chart presents a comparison of the agricultural land area within five countries during the time from 1960 till 2020. Pakistan continuously possesses the largest agricultural area throughout the duration. Sweden has the lowest agricultural area. The agricultural area only in France slightly decreased from 350000 sq km to 290000. While Malaysia is the only country where the agricultural area is continuously increasing. Figure 8 compares the use of Agricultural land in selected countries.

### Summary

In conclusion, the given code in `Climate_change.py` python file demonstrates how to use Pandas, Matplotlib, and Plotly libraries to retrieve, transform, and visualize climate change data. The code produces informative and visually appealing charts that provide insights into the impact of various indicators on the climate change in Pakistan, Malaysia, France, Sweden, and United Kingdom. These indicators include agricultural land, Total population, urban population, percentage growth in urban population, percentage of total urban population.

