APPLIED DATA SCIENCE-1

ASSIGNMENT-2:
STATISTICAL AND TRENDS

TAMILSELVAN PALANISAMY

22055049

Git Hub Link: https://github.com/Tamil2095/ADS1_Statistical-and-Trends

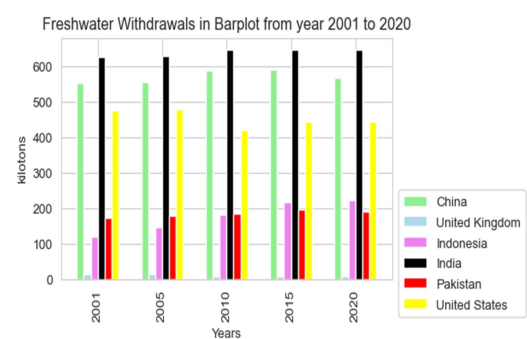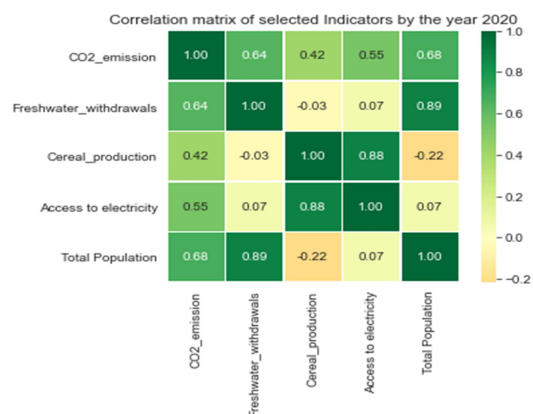Dataset Link: https://data.worldbank.org/topic/climate-change

12/12/2023

ABSTRACT:

In the era of growing environmental concerns, understanding the intricate relationship between key variables is crucial. This story delves into the environmental footprint of six diverse countries – China, United Kingdom, Indonesia, India, Pakistan, and the United States – by analyzing their CO2 emissions alongside freshwater removal, cereal production, access to electricity, and total population.

# Navigating Environmental Dynamics and Economic Shifts: A Comprehensive Analysis (2001-2020)

Correlation matrix of selected Indicators by the year 2020

Freshwater Withdrawals in Barplot from year 2001 to 2020

CO2 Emission in kilotons

A correlation of r = 0.64 emerges, indicating a connection between carbon emissions, and water consumption. Notably, China and India show a simultaneous rise in CO2 emissions and freshwater removal. However, India distinguishes itself by achieving a more water-efficient development, decoupling economic growth from proportional water use. On the other hand, The United Kingdom balances reduced CO2 emissions with stable freshwater removal. Indonesia's CO2 increase aligns with higher freshwater removal, indicating a potential link between industrial growth and water demand.
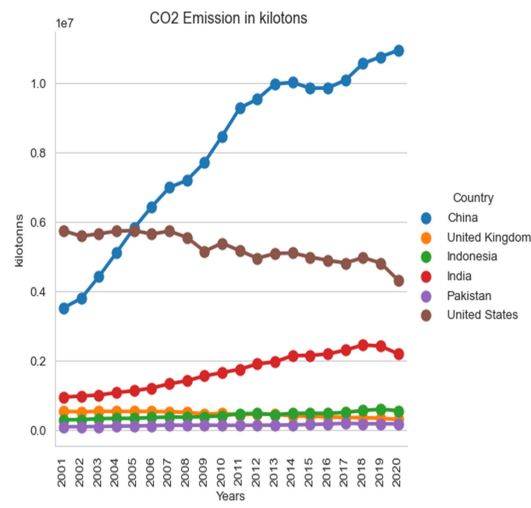
China, the world's leading emitter, experiences a steady rise in CO2 emissions from 2001 to 2020, surpassing 10 billion metric tons. This surge suggests a challenge in balancing economic growth with environmental responsibility. The United States, despite a decline in emissions, remains a significant contributor, highlighting the need for sustainable practices. The United Kingdom, however, stands as a beacon, achieving a reduction in CO2 emissions while maintaining economic stability, showcasing the potential success of environmental policies.


Cereal production of selected countries
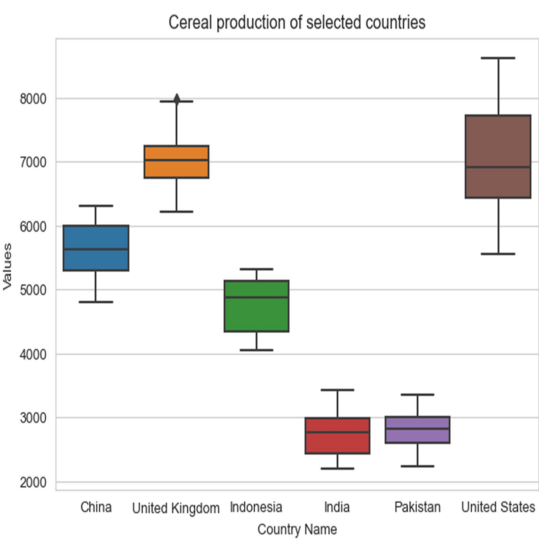
China and India, with substantial populations, witness a consistent increase in both CO2 emissions and cereal production r = 0.42. This suggests a potential link between the growing demand for food and associated agricultural activities contributing to higher emissions. The United States, despite high CO2 emissions, efficiently increases cereal production, hinting at differences in agricultural practices and efficiency. Median Values [China: 5628, United Kingdom: 7031, Indonesia: 4882, India: 2766, Pakistan: 2826, United States: 6915].

Access to electricity % of population from 2001 to 2020 year
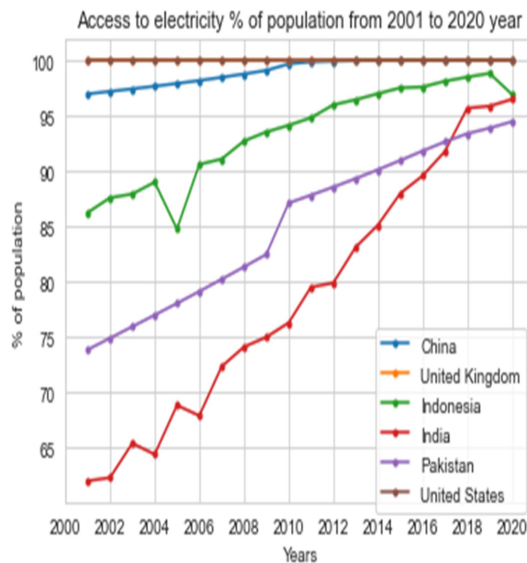
As CO2 emissions increase, so does access to electricity, especially in China and India. This implies that economic development and the expansion of energy infrastructure contribute to higher emissions. The United Kingdom and the United States, however, manage to maintain a relatively high level of access to electricity while reducing CO2 emissions. This showcases successful transitions to cleaner energy sources or improved energy efficiency.

Population % in 2020
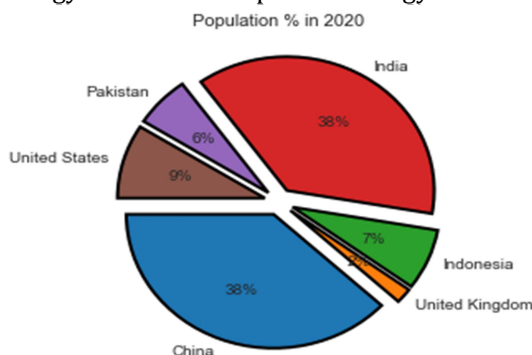
China and India, with large populations, experience a significant rise in CO2 emissions r = 0.68. However, their per capita emissions may still be lower compared to developed nations like the United States, emphasizing the importance of considering both total and per capita emissions. The United Kingdom, despite a growing population, achieves a decline in CO2 emissions, suggesting successful efforts in adopting greener technologies or policies.

Histogram of China's Total CO2 Emission from 2001 to 2020
Skewness=-0.55 and Kurtosis=-1.08
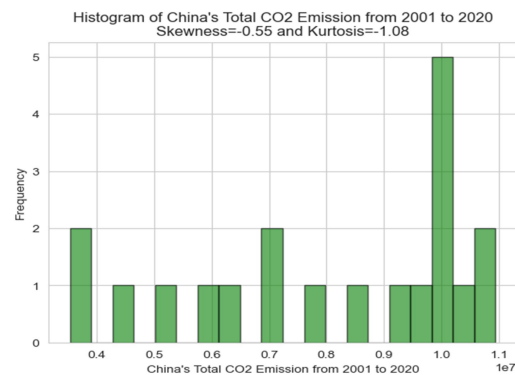
The skewness value of -0.5461 provides insight into the shape of the distribution, revealing a leftward tilt. This negative skewness signifies that the left tail of the distribution extends further or is more pronounced than the right tail. Essentially, the data is skewed to the left, indicating a greater concentration of data points on the right side of the distribution. Regarding kurtosis, the value of -1.0843 indicates the "tailedness" of the distribution. In this context, it suggests that the tails of the distribution are less substantial, and the overall shape is less peaked compared to a standard normal distribution with a kurtosis of 0. This negative kurtosis points to a platykurtic distribution, characterized by a flatter appearance and fewer extreme values than a normal distribution.

In conclusion, this variable-wise exploration underscores the complex interplay between environmental indicators. While there is a general trend of increasing CO2 emissions with economic development and population growth, some nations, notably the United Kingdom, demonstrate the potential for successful decoupling through effective environmental policies and sustainable practices.