

# APPLIED DATA SCIENCE-1

## ASSIGNMENT-2: STATISTICAL AND TRENDS

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Git Hub Link: [https://github.com/Tamil2095/ADS1\\_Statistical-and-Trends](https://github.com/Tamil2095/ADS1_Statistical-and-Trends)

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

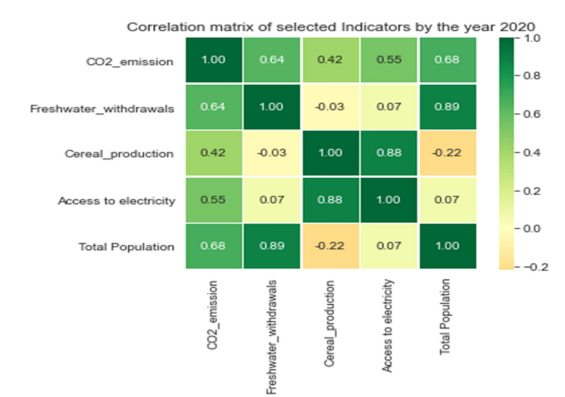
12/12/2023

### ABSTRACT:

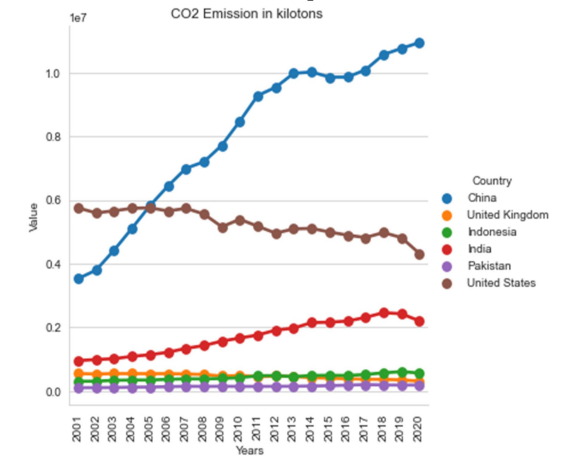
In the context of escalating environmental concerns, this study investigates the intricate relationship between key environmental variables across six diverse countries, over the period 2001-2020.

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

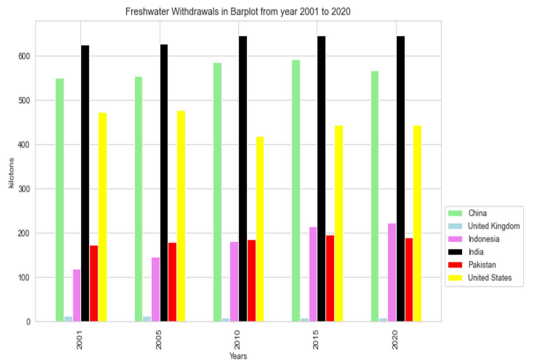
In the era of growing environmental concerns, understanding the intricate relationship between key variables is crucial. This story delves into the environmental footprint of six diverse countries – China, United Kingdom, Indonesia, India, Pakistan, and the United States – by analyzing their CO2 emissions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



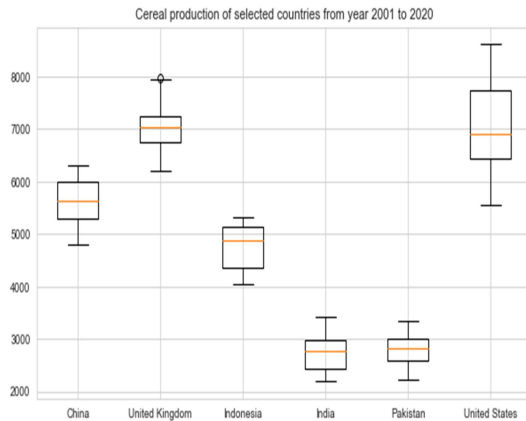
China, the world's leading emitter, experiences a steady rise in CO2 emissions from 2001 to 2020, surpassing 10 billion metric tons. This surge suggests a challenge in balancing economic growth with environmental responsibility. The United States, despite a decline in emissions, remains a significant 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.



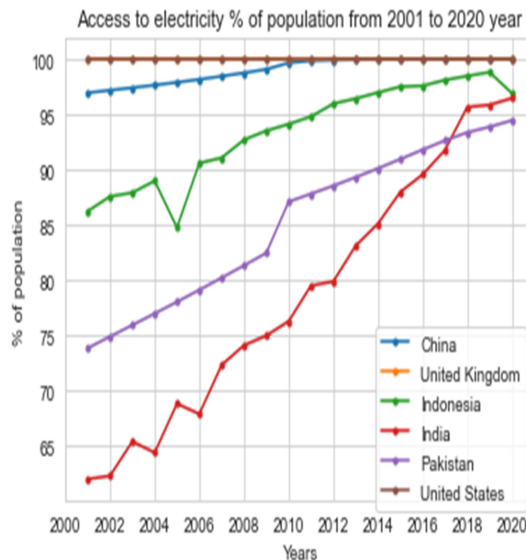
A correlation of  $r = 0.64$  emerges, indicating a connection between carbon emissions, and water consumption. Notably, China and India show a simultaneous rise in CO2 emissions and freshwater removal. However, India distinguishes itself by achieving a more water-efficient development, decoupling economic 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.



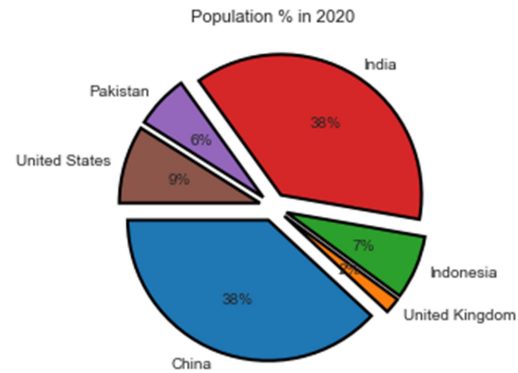
China and India, with substantial populations, witness a consistent increase in both CO2 emissions and cereal production  $r = 0.42$ . This suggests a potential link between the growing demand for food and associated agricultural activities contributing to higher emissions. The United States, despite 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].



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.

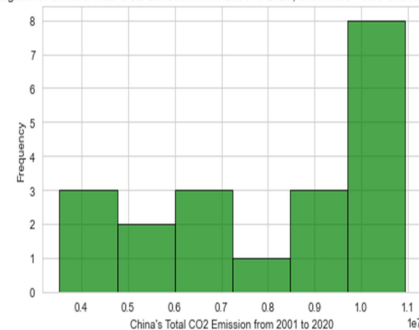


China and India, with large populations, experience a significant rise in CO2 emissions  $r = 0.68$ . However, their per capita emissions may still be lower compared to developed nations like the United States, emphasizing the importance of considering both total and per capita emissions. The United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



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.

Histogram of China's Total CO2 Emission from 2001 to 2020, skewness=-0.55 and kurtosis=-1.08



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.