Title: EXPLORING TRENDS AND RELATIONSHIPS IN CO2 EMISSIONS DATA
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Abstract

Energy consumption, GDP, CO_2 emissions, and their global components are the focus of this study, which employs a top-down data analysis and perception approach. Looking at trends across time, the analysis sheds insight on the interplay between GDP growth, energy consumption, and environmental effect, which complicates matters in terms of both the current state of affairs and future plans for the situation.
GitHub link: [here]

Link to dataset: https://api.worldbank.org/v2/en/topic/19?dwnloadformat=csv
GitHub:

Introduction

It is important to pay more attention to key metrics including carbon dioxide emissions, energy consumption, and GDP in light of the growing global concern for environmental management. By breaking out the intricate relationship between monetary activity, energy consumption, and environmental effect over time, this aims to lay the groundwork for practical development plans and well-informed strategic decisions.

DESCRIPTIVE STATISTICS

```
           year      population  ...      trade_co2  trade_co2_share
count  50598.000000  4.000800e+04  ...   4259.000000      4258.000000
mean    1925.365173  5.926810e+07  ...     -9.081929        20.476610
std       59.882945  3.222866e+08  ...    270.681728        53.705771
min     1750.000000  2.100000e+01  ...  -2399.517000       -98.279000
25%     1882.000000  3.198618e+05  ...     -3.148000        -6.495750
50%     1929.000000  2.323117e+06  ...      1.484000         8.867500
75%     1975.000000  9.802751e+06  ...      9.029500        32.949250
max     2021.000000  7.909295e+09  ...   2206.337000       607.521000
```

The descriptive statistics provide one a better understanding of the dataset. It covers a wide range of population sizes from 1750 to 2021. Although the average proportion of CO_2 emissions attributable to commerce is 20.48%, the large standard deviation is likely due to a small number of extreme cases.
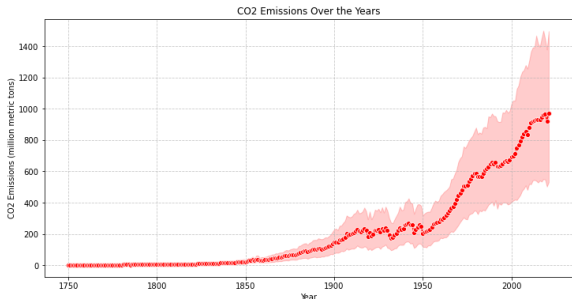
CO2 EMISSION OVER THE YEARS

Figure 2 shows the evolution of CO_2 emissions through the years. It shows that emissions may fluctuate, which means that their environmental effect can vary.

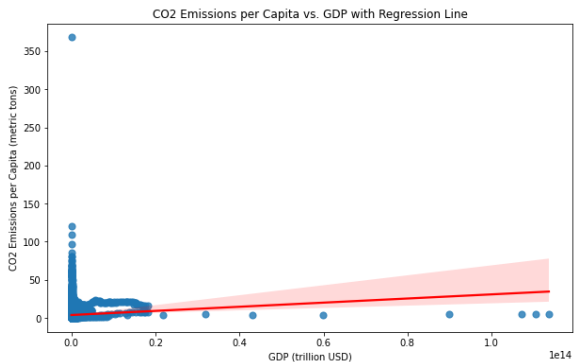## CO2 EMISSIONS PER CAPITA VS. GDP WITH REGRESSION LINE

Figure 3 portrays the connection between CO2 outflows per capita and Gross domestic product, displaying a relapse line. It shows what monetary improvement means for fossil fuel byproducts on a for each individual premise, uncovering likely patterns.
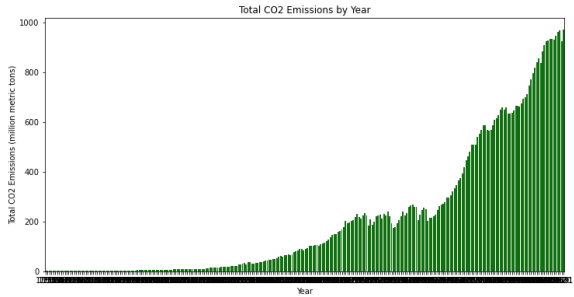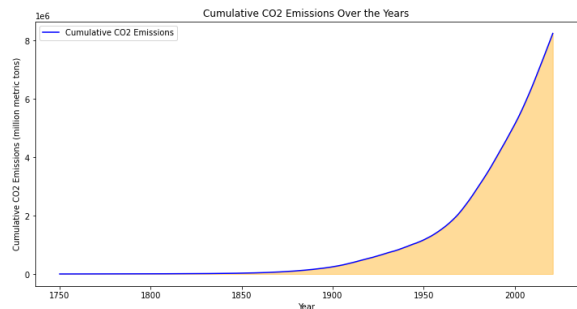
TOTAL CO2 EMISSIONS BY YEAR

Figure 4 shows the all-out yearly CO2 discharges over the long haul. It gives an exhaustive perspective on the general carbon impression, considering the distinguishing proof of patterns and examples in discharges over various years.

CUMULATIVE CO2 EMISSIONS

The trend of cumulative CO_2 emissions throughout time is seen in Figure 5. The area map shows the total effect of emissions throughout the given years, giving a holistic view of the whole ecological footprint.
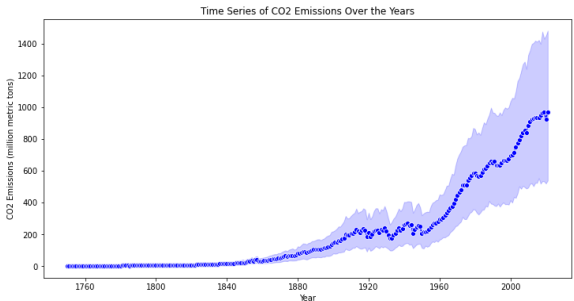
CORRELATION HEATMAP
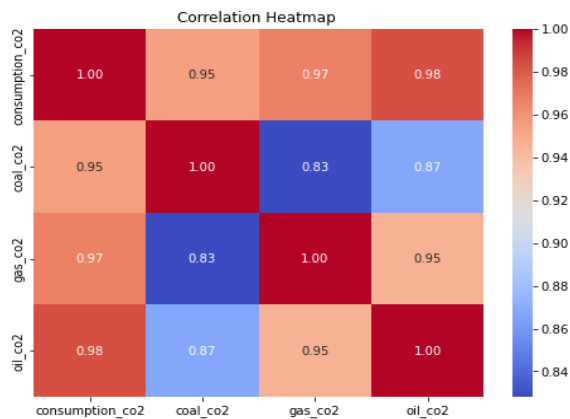
A correlation heatmap is shown in Figure 6. As a visual representation of the direction and intensity of correlations among chosen variables, it helps to spot possible associations and patterns in the data.

TIME SERIES ANALYSIS

The evolution of CO_2 emissions throughout time is seen in Figure 7. It provides a graphical representation of the development of emissions over time, using a time series plot to emphasize patterns and variations.

Conclusion

Examining changes in energy consumption, GDP, and carbon dioxide emissions highlights the intricate web of relationships that is influencing our economic and environmental environment. The results highlight the critical need of sustainable practices and call for well-informed policies that strike a balance between economic development and environmental protection, guaranteeing that ecosystems throughout the world will be able to withstand future challenges while remaining in harmony.