University of Hertfordshire UH

Clustering and Data Fitting

Name: Wajiha Ul Islam

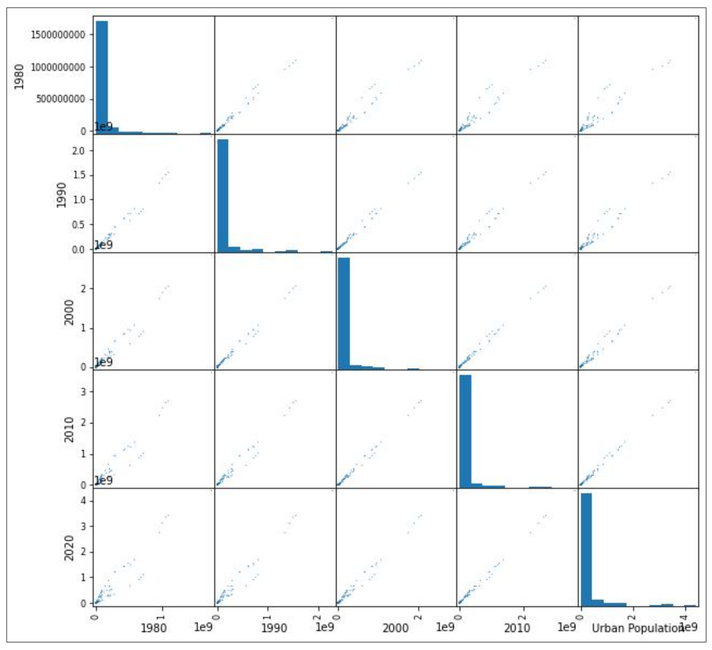
Student ID: 22041881

Github Repository Link: https://github.com/wajiha577/Assignment-3-Clustering.git

The relationship between Carbon Dioxide gas emission and urban population

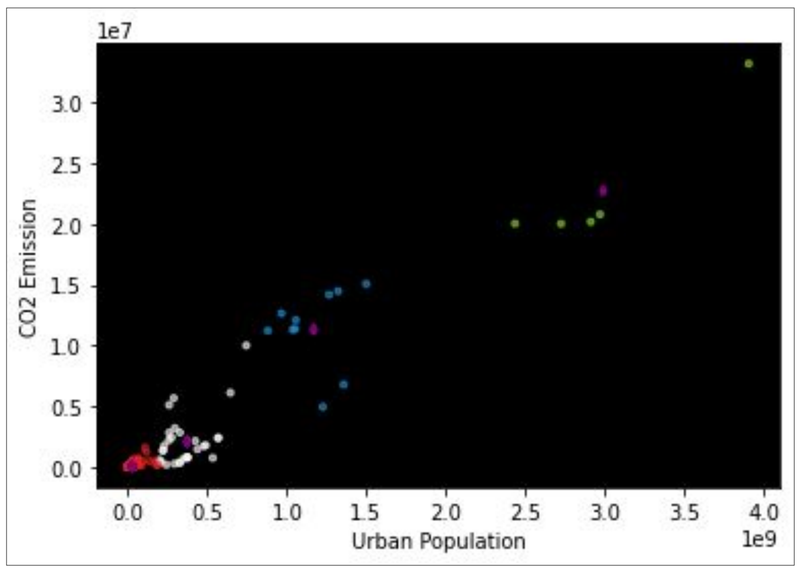
Summary

- The modern way of our civilization has affected the environment badly. Most of the world's population prioritizes living in cities. Most of the cities are built after destruction of forest area.
- Due to industrialization in the cities, the emission of Carbon Dioxide gas has rapidly increased in last few years.
- Most of the urban population is dependent on motor vehicles that is also a main reason of Carbon Dioxide gas emission.
- The following graph shows scatter matrix of urban population for years 1980, 1990, 2000, 2010 and 2020.



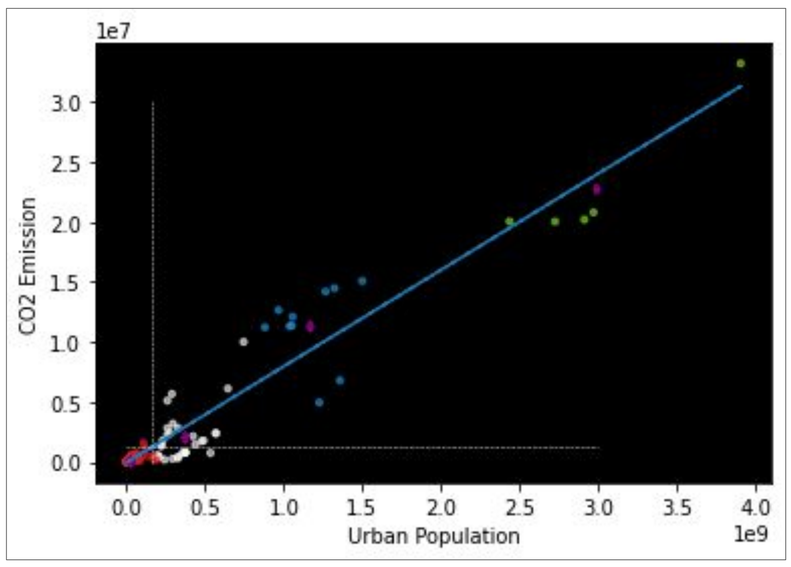
Introduction

- The purpose of this study is to highlight the effects of urban population growth on the climate/environment.
- After studying the relation between urban population and Carbon Dioxide gas emission, I got to know that these entities are directly proportional.
- More the urban population, more of the Carbon Dioxide gas emission will occur.



- The preceding scatter plot represents four clusters based on the data of urban population and Carbon Dioxide gas emission.
- There is a large distance between the data points of green cluster.
- In this plot, we can clearly observe the dependency of Carbon Dioxide gas emission on urban population.
- As the urban population grows, the emission of Carbon Dioxide gas also shows upward trend.
- The first cluster (red coloured) represents the less population and less Carbon Dioxide gas emission.

Data Trend

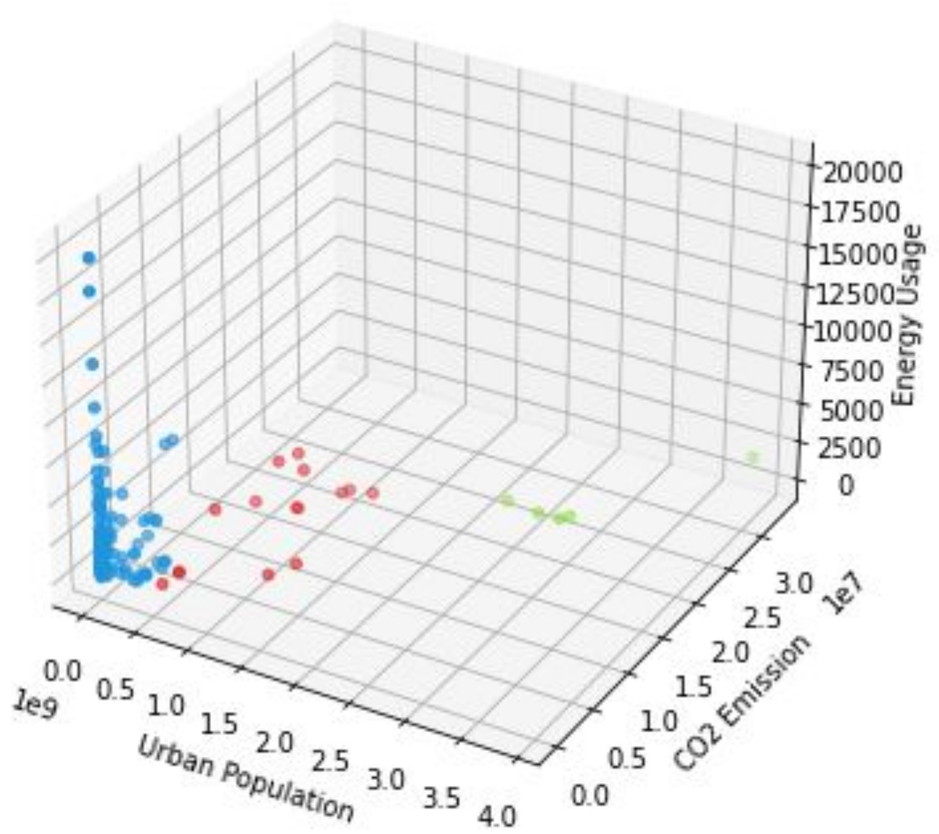


After fitting the data against urban population and Carbon Dioxide gas emission, we can clearly see an upward trend and directly proportional relation between these two entities.

- According to a research by frontiersin.org, the environment of the Earth is being continuously degraded due to the rapid growth in economy and urbanization [1].
- This is also a reason of global warming.
- In the preceding plot, we have also drawn 2 lines to represent mean and percentile. Most of the data lies at the start of the plot.

Energy Usage and its Effect

- After studying the effect of energy usage on environment change, I got some amazing results.
- I have created a 3d scatter plot against energy usage, Carbon Dioxide gas emission, and urban population.
- In the following plot, we can observe that energy usage indirectly affects the climate change. When the urban population increases, it also add into the energy usage.
- The more energy is used, the greater the amount of CO2 emissions.



- The some of the elements of blue cluster represents that energy usage, Carbon Dioxide gas emission, and Urban population are directly proportional to each other.

References

- [1] https://www.frontiersin.org/articles/10.3389/fenrg.2022.848800/full

University of Hertfordshire UH

THE WORLD BANK
IBRD • IDA