AIDM7330 Basic Programming for Data Science

Report for individual assignment

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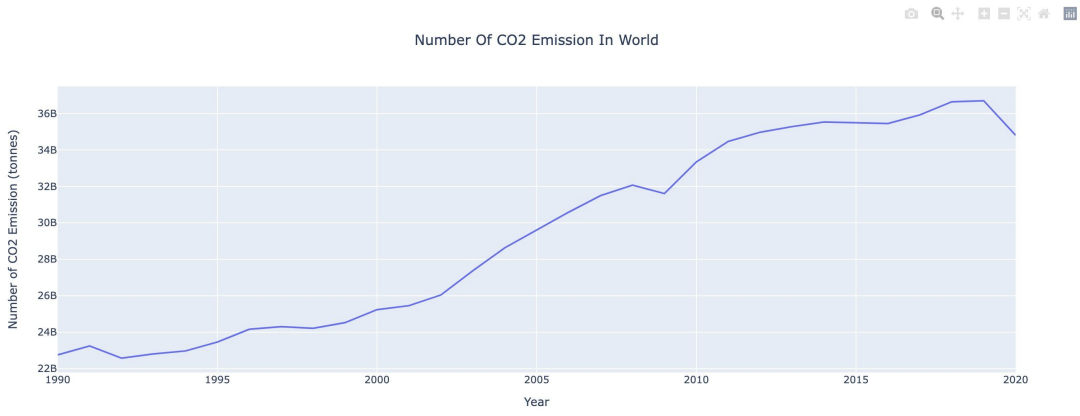
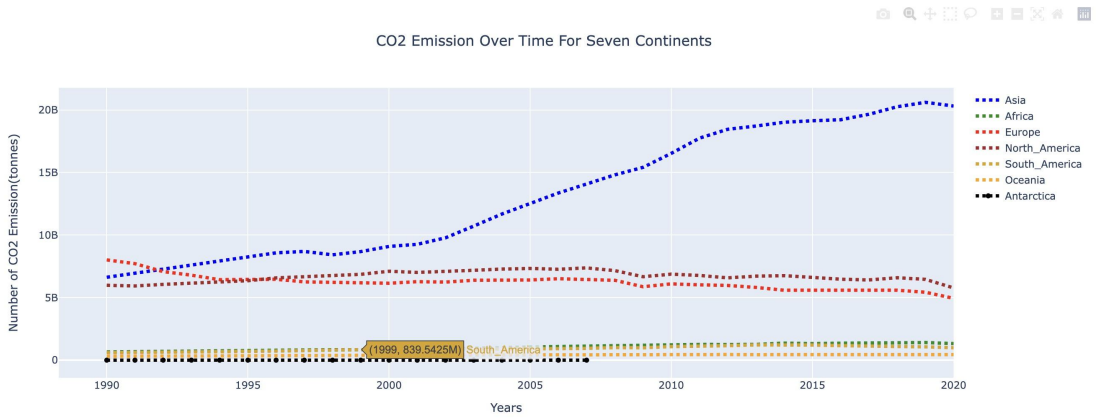
CO2 emissions have always been a hit topic around the world. In recent years, with the increase of CO2 emissions, global warming and changes in environmental climate have caused a lot of discussion. Many environmental and climate protection organizations in the world have proposed that governments should control the total amount of CO2 emissions and use new energy sources. Does the world's CO2 emissions show a decreasing trend by 2020?

In order to explore the changing trend of CO2 emissions around the world, I make a simple line chart. As we can see from the first line chart, the world's CO2 emissions showed a downward trend from 2019 to 2020, falling by about 7%. This can be explained by many reasons. It may be because of the outbreak of COVID-19 that many countries have shut down production for a period of time. At the same time, people travel by car and by plane. It may also be because governments of many countries have begun to vigorously use new energy sources to replace some of the original traditional fuels, resulting in a reduction in CO2 emissions. It is also possible that governments have new restrictions on CO2 emissions from factories by publishing some new policies.

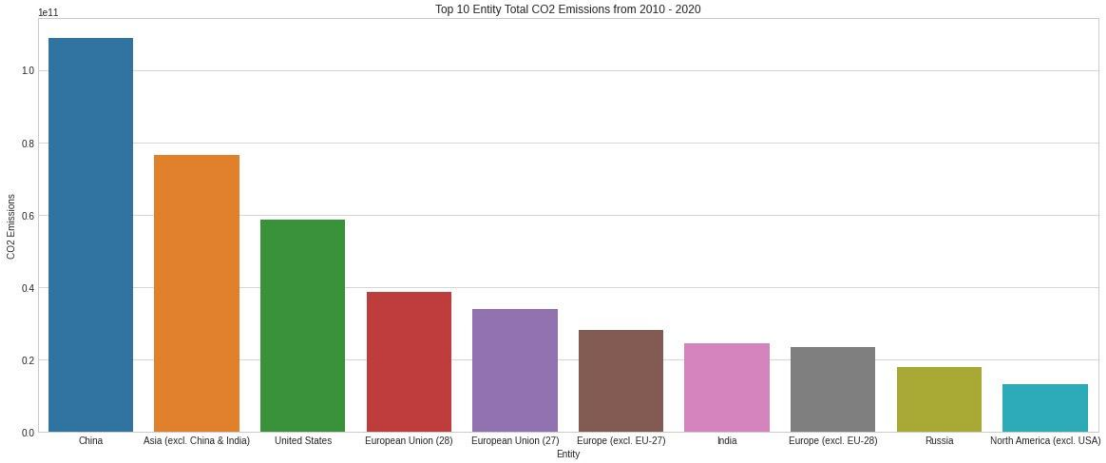


Next, I analyze which of the seven continents in the world have made a greater contribution to the reduction of CO2 emissions. As can be seen in the second line chart, Asia's CO2 emissions have shown a rising trend from 1990 to 2020. However, the changes in CO2

emissions in Europe and North America have not been particularly large. Since 2008, the overall trend has shown a weak downward trend.

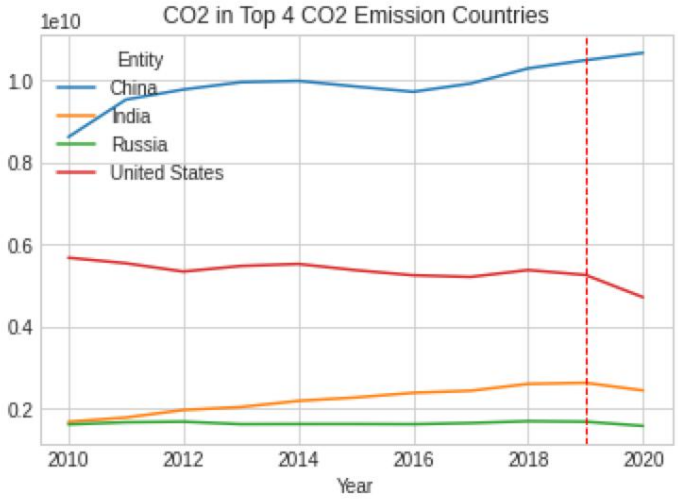


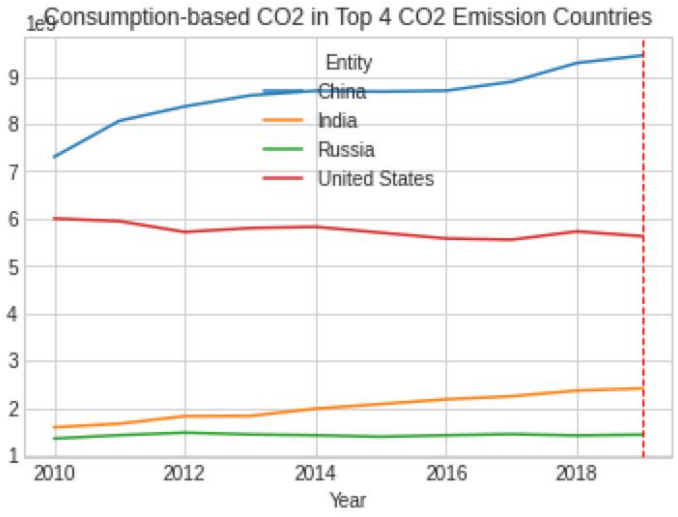
After removing the data for 'World', 'Seven Continents', and entities of all income levels. We select the top 10 entities and observe their total CO2 emissions from 2010 to 2020. As can be seen from the bar chart, 4 countries of the top 10 entities stand out. They are China, the United States, India and Russia.

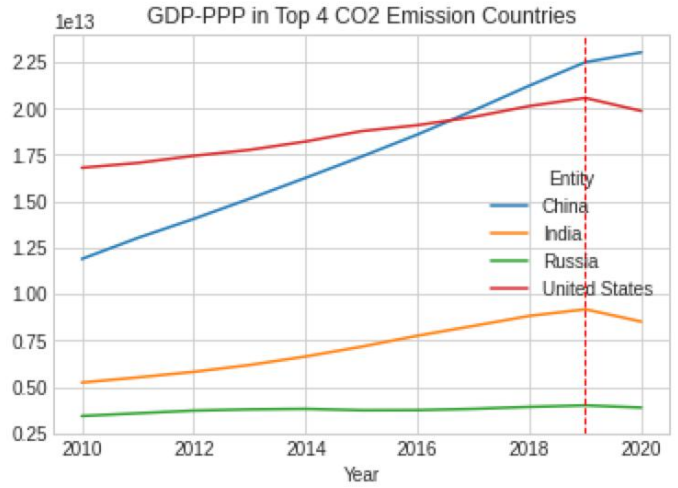


Next, I will use 2019 as the dividing line to explore the changes in the 'CO2', 'Consumption-based CO2' and 'GDP-PPP' of these four countries from 2010 to 2020. We found that Russia and India did not change much on all three metrics. China's emissions of 'CO2', 'Consumption-based CO2' and 'GDP-PPP' are all on the rise, with 'GDP-PPP' rising especially rapidly. Interestingly, the overall CO2 emissions in the United States show a downward trend, but the GDP-PPP shows an upward trend, which indicates that the United States may begin to use new energy more. At the same time, we found that around 2019, except for China, the CO2 emissions and GDP-PPP of the three countries began to show a downward trend, and

China's growth rate was not as high as in previous years. It shows that COVID-19 has a certain impact on these countries.

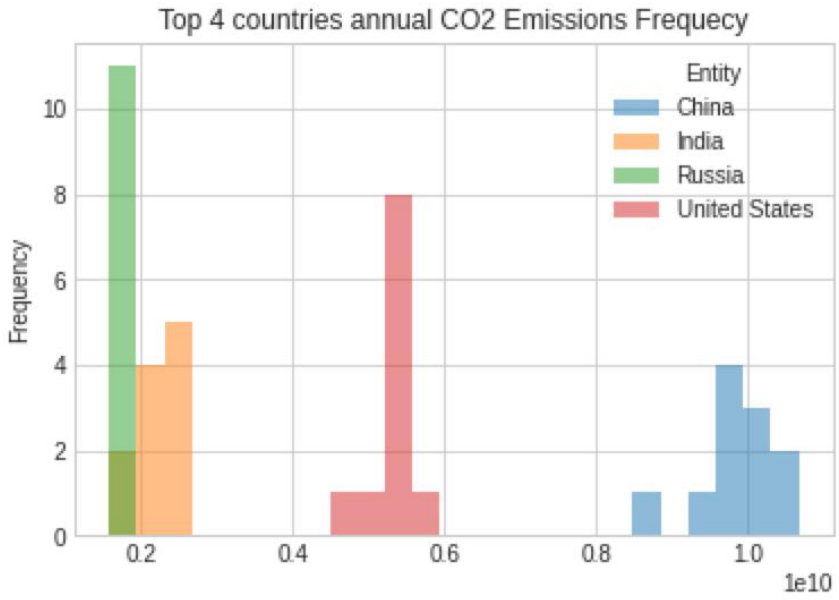


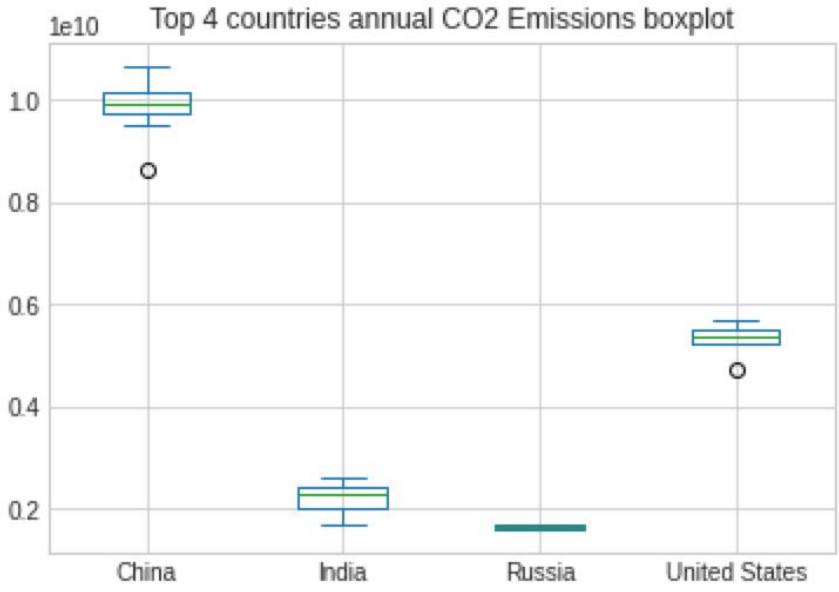


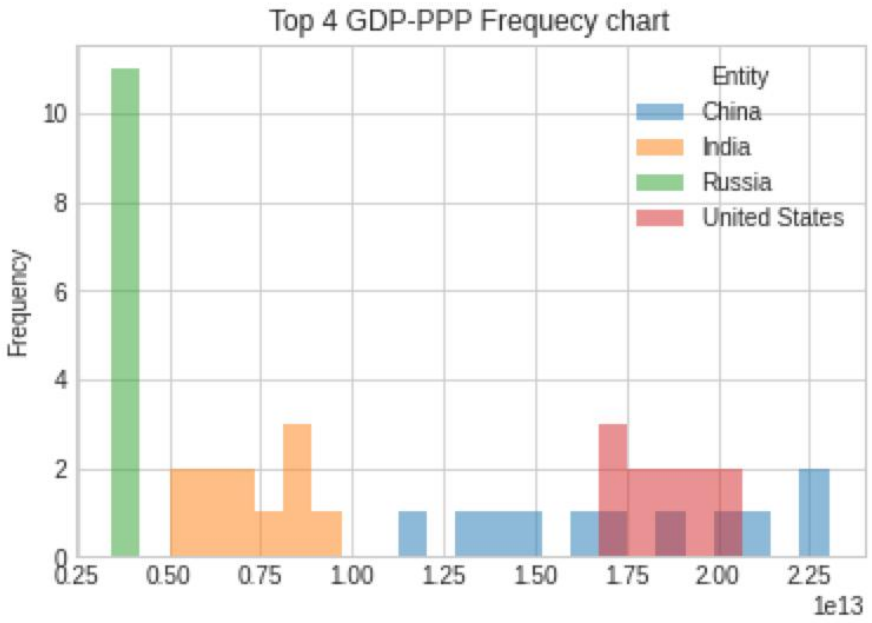


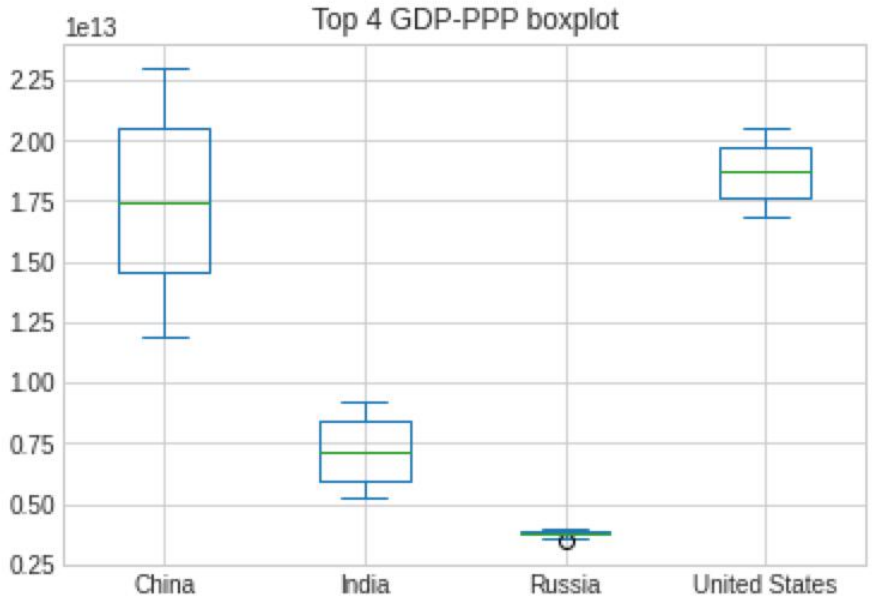
We can also see these changes in frequency plots and boxplots. In these four pictures. We can summarize two interesting findings. First, Russia’s CO2 showed a stable trend from 2010 to

2020, and Russia’s GDP-PPP did not change much. Second, it can be seen from the second boxplot that there is a large gap between China's GDP-PPP values.









In conclusion, the world's CO2 emissions have begun to decrease as people pay attention to the environmental climate. But COVID-19 in 2019 is also affecting this indicator. Although China is developing rapidly, its CO2 emissions far exceed those of other countries. The United States has reduced CO2 emissions from past years, but the GDP-PPP is still rising, which is worth learning for other countries.