APPLIED DATA SCIENCE 1

ASSIGNMENT – 2
Statistics And Trends

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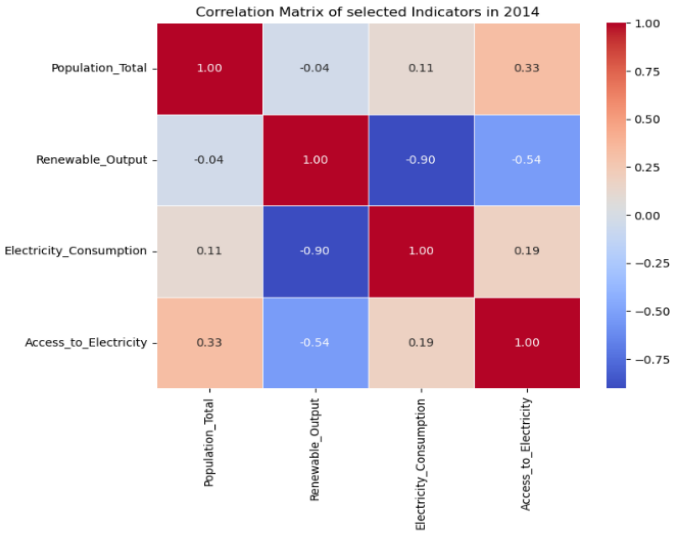
Link to GitHub repository:https://github.com/sandrabinu3/Statistics-and-Trends.git
Link to data: 1. https://data.worldbank.org/topic/climate-change
2. https://data.worldbank.org/indicator/rural
3. https://data.worldbank.org/indicator/urban

Abstract:

This study investigates the trends of electricity production, use, and access in five different countries from 2005 to 2014. It attempts to clarify trends and patterns in the changing energy environment through a thorough study, illuminating the variables affecting differences in electricity metrics throughout the given period.

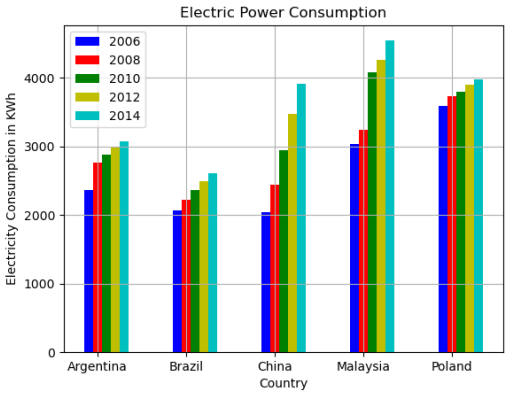
Electricity Access, Consumption and Production (2005-2014)

All countries consider the sustainable production and usage of electricity as well as its accessibility with great importance. Let's explore the use of energy in a few nations, namely Argentina, Brazil, China, Malaysia, and Poland. There are many factors concerning it and let's consider the population total, access to electricity and electricity consumption and

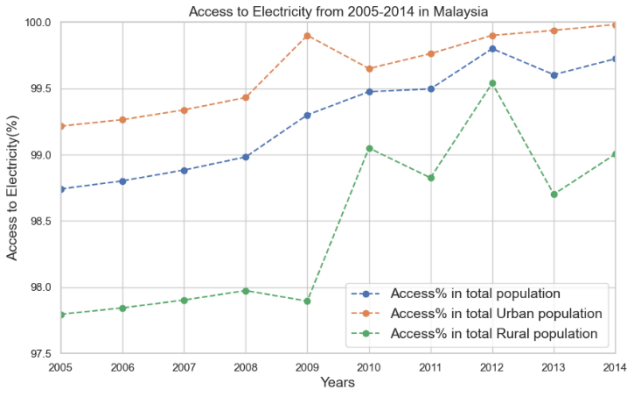


renewable electricity production.

The heatmap reflects that total population is certainly a factor in electricity consumption (r=0.11). Although the correlation coefficient is small (due to the variation in population of countries taken), as population increases electricity consumption increases and varies with year, in line with initiatives to upgrade infrastructure in densely populated areas.



In the observed years consumption is showing a steady increase and by 2014, Malaysia shows the highest and Brazil shows the lowest consumption rate among the observed countries. China, growing as the most populous, shows the highest rate of increase in consumption over years among them. Economic growth, rising living standards, better healthcare, better education, and an all-around higher level of living are all aided by having access to electricity. Now, being highest in consumption here, let's consider the access to electricity (% of the total population) in Malaysia.

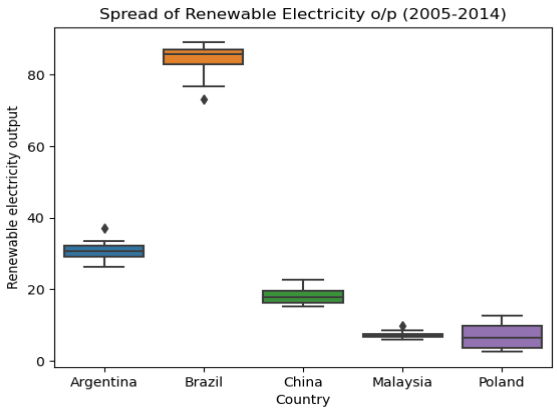


There are disparities in access within and across nations, with rural areas frequently encountering more difficulties than urban ones. Here although Malaysia has a gentle access to electricity % in its total population, the % of total rural population who has access (94.53) is much lower than % of total urban population who have access (99.05) in 2005. But it shows a favourable shift towards 2014.

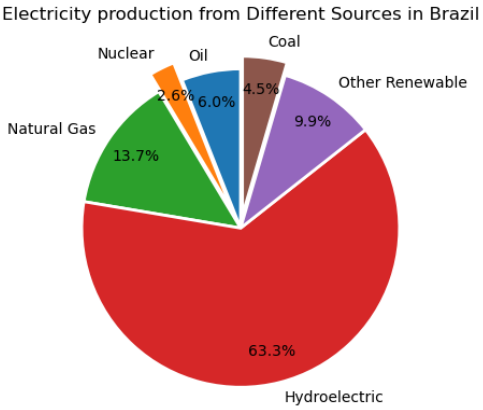
Mean of selected country's access to electricity %		
Year	Urban	Rural
2005	99.05	94.53
2014	99.99	99.38

But still over the years, Malaysia has shown its commitment to provide energy to both urban and rural communities by maintaining access rates above 99%. It is a global issue to strike a balance between the increasing need for electricity and environmental sustainability, which has prompted research into renewable energy sources. Different countries have varied energy mixes. While some put a higher priority on renewable energy sources for sustainability, others rely largely on fossil fuels. A major concern is how producing electricity would affect the environment. Mitigating climate change requires a shift to cleaner energy sources. To combat climate change and guarantee long-term energy security, a shift to

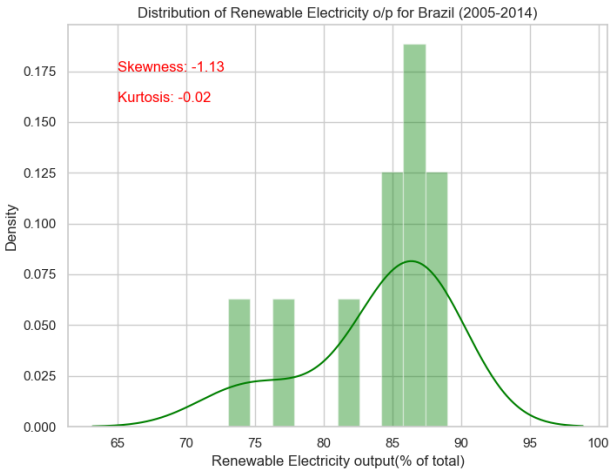
sustainable and renewable energy sources is imperative.



The boxplot shows the spread of percentage of renewable energy in the considered countries from 2005 to 2014. With significant proportions of their electricity production coming from renewable sources, Argentina and Brazil have both shown a strong commitment to renewable energy. Brazil's renewable output ranged from about 73% to 88%, whereas Argentina's output varied from about 26% to 37%. These initiatives help create a cleaner energy mix. While Malaysia although being the highest consumer is only in its stride to increase the renewable energy production to its energy portfolio.



The most significant finding is that Brazil's hydroelectric power sector dominates the country's energy production, accounting for a huge 63.3% of total output. In addition to hydroelectricity, Brazil makes investments in other renewable energy sources, making up 9.9% of the total output. This shows a dedication to looking into more sustainable alternatives and diversifying the energy portfolio. Brazil's energy output is also derived from coal and nuclear power, which account for just 2.60 percent and 4.53 percent of total energy production, respectively focusing on greener and more sustainable energy alternatives, given that coal and nuclear power are frequently linked to safety and environmental issues. Among Brazil's energy sources, natural gas is a significant contributor, making up 13.73% of total output. The usage of natural gas may be influenced by initiatives to lower carbon emissions as it is seen to be a cleaner fossil fuel than coal and oil.



The nation has deliberately varied its energy mix, reducing reliance on fossil fuels, and increasing the use of other renewable energy sources like hydroelectricity. This strategy is in line with worldwide movements toward ecologically friendly and sustainable energy sources. The negative skewness (leftward asymmetry) suggests the likelihood of occasionally lower-than-average values. Since the kurtosis is near zero, it may be concluded that the frequency of extreme values differs not appreciably from that of a normal distribution.

So, comparing these countries, Brazil has a significant share of renewable electricity output and its access to electricity percentage of total population (99.65% in 2014) also suggests its contribution to social and economic development. Its focus on per capita energy consumption indicates that it prioritizes sustainability and energy efficiency. These initiatives show a global commitment to addressing energy concerns in an inclusive and environmentally responsible way by helping to construct resilient, sustainable, and eco-friendly energy systems. The accomplishment of these objectives by this nation should serve as motivation for ongoing global cooperation and efforts to build a more sustainable and just energy future.