A Proposal for a Master's Thesis
To be Entitled

ANALYSIS AND VISUALIZATION OF THE NIGERIAN ELECTRICITY DATA FOR SUSTAINABLE SECTOR REVAMP

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Introduction

Data Source:
https://www.kaggle.com/datasets/emmanuelogebe/nigerian-electricity-dataset

In Nigeria, the absence of a constant and dependable energy supply continues to be a problem, impeding socioeconomic growth in a number of different sectors. Millions of Nigerians are impacted by this problem, which impedes daily activities, corporate operations, and prospective progress. This research focuses on evaluating and visualizing the Nigerian electrical data from 2013 to 2021 and estimating the following ten years using sophisticated time series models in order to address this issue. We seek to contribute to the creation of effective strategies and policies that increase the efficiency of the electricity sector, draw in investments, and provide dependable electricity to all Nigerians by gaining insights into the sector's current state, identifying patterns, and highlighting areas for improvement.

Problem Statemant

The issue this study seek to solve is Nigeria's chronic lack of dependable and constant energy supply, which has a substantial impact on a number of industries as well as the nation's overall socioeconomic development. Millions of Nigerians in residential, commercial, and industrial settings are impacted by this issue. Daily tasks are hampered, company operations are disrupted, and the country's potential for progress is constrained by the unstable electrical infrastructure and frequent power outages. This study will acquire insights into the current health of the energy sector, spot trends, and highlight opportunities for development by analyzing and visualizing the Nigerian electricity statistics from 2013 to 2021 and producing projections for the following ten years. This analysis will help formulate practical strategies and policies to address the issues with energy supply, increase the sector's efficiency, attract investments, and ultimately provide reliable electricity to all Nigerians.

Aims

The purpose of this project is to analyze the Nigerian electricity data from 2013 to 2021, to use Tableau to illustrate patterns and trends, and to anticipate electricity demand for the following ten years.

Objectives

01.

Make the Nigerian electricity dataset suitable for visualization and analysis in Tableau by cleaning and processing it.

02.

Create educational and engaging visualizations using Tableau that highlight historical trends, patterns, and seasonality in the electricity data.

03.

Create ARIMA and SARIMA models to predict future electricity consumption, taking into account the effects of the unstable power infrastructure and frequent power outages as well as the visualized insights.

04.

Examine the forecasting models' performance and accuracy before choosing the one that would produce the most accurate long-term forecasts.

05.

Utilize the results of the research, visualizations, and predictions to offer suggestions for enhancing the supply of energy, creating sensible strategies and laws, and luring investments to boost the sector's efficiency and deliver dependable electricity to all Nigerians.

Approach

In this project, we use Tableau to analyze and visualize the electricity data from Nigeria and to estimate future electricity demand using the ARIMA and SARIMA models in order to address the main issue of unstable electricity supply in Nigeria. The initial step entails obtaining the 2013–2021 spannng Nigerian electricity dataset from the Kaggle source. To assure data quality, handle missing values, get rid of outliers, and perform the appropriate transformations, we preprocess the dataset. We use Tableau to do an extensive exploratory data analysis and provide interactive visuals that highlight historical patterns, trends, and seasonality in the data. These infographics provide information on the generation, use, and other pertinent aspects of energy. We anticipate future electricity consumption using the ARIMA and SARIMA models, taking into account the visualized insights and the influence of unstable power infrastructure and frequent outages. Metrics like MSE and RMSE are used to assess the performance of the models. We make recommendations to improve the Nigerian electrical system, focusing on enhancing supply, increasing efficiency, and luring investments, based on the analysis, visualizations, and forecasting findings. Tableau assists with visualization throughout the project, while Python and Jupyter Notebook take care of data pretreatment, modeling, and documentation. Our approach is to offer a thorough analysis of the Nigerian power industry by incorporating visualization, forecasts, and suggestions to resolve issues and support sectoral growth.

Evaluation Metrics

First, I'll create two iterations of the dashboard, and 20 people will give their recommendations on which one distributed information the best. By comparing the predicted values with the actual electricity demand data throughout a validation period, I'll assess the forecasting models' performance. To test the precision and dependability of the models, metrics including Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and forecasting error measures will be computed. Additionally, I'll carry out a sensitivity analysis by evaluating the models' robustness using other subsets of the data or different modeling strategies. This will give information about the models' advantages and disadvantages as well as how well-suited they are for various situations. Finally, I'll compare the forecasting outcomes from the ARIMA and SARIMA models to see which one forecasts Nigeria's electricity consumption more accurately over the long term.

Challenges

The most fundamemental challenge would be ensuring the validity and authenticity of the dataset as it was obtained from kaggle. Ensuring that the data is accurate is most imperative to the success of this study. Another potential issue is the forecasts' dependability and accuracy. There is some uncertainty involved in predicting future power consumption, and decision-making and policy development can be strongly impacted by the forecasts' accuracy and dependability. It would have been ideal to have an industry stakeholder or the government informed as well as energy providers businesses since inclusive participation and incorporating diverse perspectives can help identify additional challenges, understand local context, and promote the acceptance and adoption of the project outcomes. My problem focuses on addressing the electricity issues in Nigeria.This doesn't seem practical, though.