Overview of energy start-ups and prediction for the future trend of energy usage

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Project Aim

To undertake a comprehensive analysis of the energy industries by utilizing historical data and data analytics techniques.

Key Hypotheses

The adoption of clean energy sources is steadily increasing, leading to a gradual shift away from traditional fossil fuels for energy.

Clean energy start-ups are more likely to secure funding and achieve success compared to traditional energy sectors during the periods of 1980s to 1990s and 2000s and 2010s.

Identify the trend of energy consumption, clean energy will surpass traditional energy in the future.

Background

Energy start-ups and consumption situation from 1980

World_energy_consumption_dataset

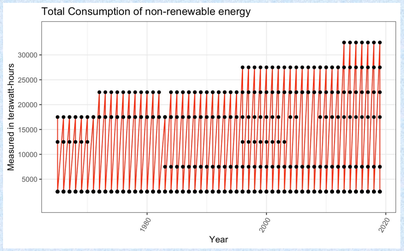

Figure 1

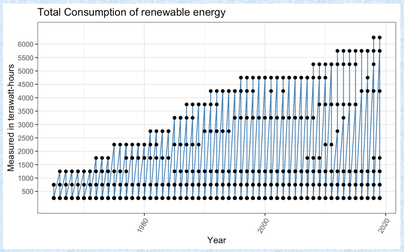

Figure 2

Figure 1&2: Line plot of two types of energy consumption all over the world from 1980 - 2020

Energy_startup_dataset

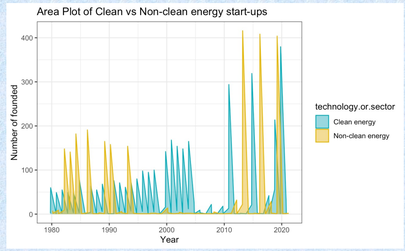

Figure 3

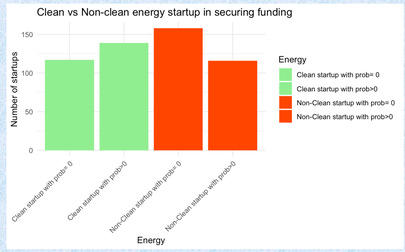

Figure 4

Figure 3: Area plot of number of start-ups in terms of clean and non-clean energy form 1980 -2020

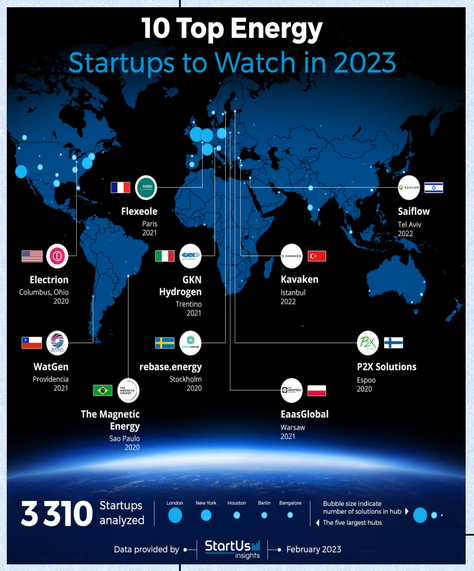

Figure 4: Barplot of start-ups with different energy in terms of their probability of securing funding

Methods

RStudio

Two Approaches

World_energy_consumption_dataset

- Remove all the unrelated calculation of data, describe the pattern of energy consumption
- Exploratory Data Analysis (Data cleaning & Data visualizing)
- Fit a regression model to predict the future energy usage
- Supervised Parametric Regression (Multiple linear regression)
- Check Linearity, Homoscedasticity, Independence and Normality of the fitted model
- Evaluate the fitted model (Assumption Checking)
- The model not performing well (overfitting or underfitting)

Energy_startup_dataset

- Exploratory Data Analysis (Data cleaning & Pattern identifying)
- Select all the data related to energy, observe the change in number of startups over the year
- Supervised Parametric Classification (Logistic regression)
- Estimate how the selected predictors affect the chance of getting funding and becoming success
- Evaluate the fitted model (AUC & Cross-Validation)
- Area under Curve examine the capability to distinguish between classes
- The model not performing well (regularization)

Expected Outcomes

As environmental awareness grows, clean energy will recognized as the forefront energy source for the future. In the latest ranking of the top 10 energy start-ups for 2023, all of them prioritize sustainable energy solutions.

Government and major energy corporations can play an important role in contributing the advancement of clean energy and phasing out traditional energy by extending financial support to start-ups in the clean energy sector.

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