

Powering Insights - Understanding Household Energy Consumption

A DS 4002 Case Study by Pranav Arora

Imagine being a junior data scientist tackling one of the most critical challenges of our time: sustainable energy consumption. Hired by a local energy consulting firm, your mission is to analyze household energy data to uncover patterns and propose actionable insights. Using real-world data, you'll conduct exploratory data analysis (EDA), create visualizations, and build predictive models to guide energy optimization strategies. This more than just crunching number, it's about telling a compelling data-driven story that inspires smarter, more sustainable energy use!

Why This Matters

Energy efficiency goes beyond cost savings; it's key to building a sustainable future. As global energy demand continues to rise, the need for actionable insights that drive smarter consumption is more urgent than ever. By diving into this project, you'll explore how data science can solve complex problems, equipping you with essential skills in analysis, visualization, and machine learning, while contributing to sustainability efforts.

This case study challenges you to uncover answers to pressing questions:

- What trends exist in household energy use?
- How do factors like time of day or weather influence consumption?
- Can predictive models anticipate future demands and inform better planning?

Your Task

As a junior data scientist, you'll:

- Perform EDA to identify key trends and anomalies.
- Create visualizations that effectively communicate findings.
- Build models to forecast energy consumption and propose optimization strategies.

This project emphasizes your ability to transform results into meaningful, actionable insights beyond the technical deliverables.

Get Started

Everything you need is available in the GitHub repo: https://github.com/aub5uy/DS4002_CS3.

Are you ready to power insights and shape a sustainable future? The energy world awaits your analysis!

Reference Materials

L. Saad Saoud, H. Al-Marzouqi and R. Hussein, "Household Energy Consumption Prediction Using the Stationary Wavelet Transform and Transformers," in IEEE Access, vol. 10, pp. 5171-5183, 2022, doi: 10.1109/ACCESS.2022.3140818. <https://ieeexplore.ieee.org/document/9672113> (accessed Dec. 05, 2024).

M. Jacob, "Forecasting household energy consumption," Medium, Feb. 02, 2024. <https://medium.com/the-centre-for-net-zero-tech-blog/forecasting-household-energy-consumption-5ede5be522c4> (accessed Dec. 05, 2024).