**Measure energy consumption**

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**Problem Statement:**

**Problem:**

Energy consumption monitoring is crucial for various industries and households. This project aims to create an automated system that measures energy consumption, analyzes historical data, and provides visualizations to help users understand energy consumption patterns and make informed decisions.

**Design Thinking Process:**

Empathize:

* Understand the need for energy consumption analysis.
* Identify potential users' pain points and requirements.

Define:

* Define the project's scope and objectives, including the need for automation, data analysis, and visualization.
* Clearly specify the input dataset (AEP\_hourly.csv).

Ideate:

* Brainstorm data analysis and visualization ideas.
* Explore potential libraries and tools for automation.

Prototype:

* Create a Python script that loads the dataset.
* Develop code for data preprocessing and analysis.
* Implement data visualization techniques.

Test:

* Validate the code's functionality with test data.
* Ensure it meets the project objectives.

Implement**:**

* Finalize the code and prepare it for deployment.

**Phases of Development:**

Data Collection and Dataset Selection:

* Identify a relevant dataset (AEP\_hourly.csv) for energy consumption.
* Understand the dataset's structure and content.

Data Preprocessing:

* Load the dataset using Pandas.
* Handle missing data and data cleaning if necessary.
* Ensure the data is in a usable format for analysis.

Data Analysis:

* Calculate basic statistics to understand the dataset.
* Explore trends and patterns in energy consumption data.

Data Visualization:

* Create visualizations to represent energy consumption over time.
* Customize plots with labels, titles, and legends for clarity.
* Display the visualizations to the user.

Automation:

* Create a script (energy\_consumption.py) to automate the data analysis and visualization process.
* Ensure that the script can be run with minimal user intervention.

**Dataset Description:**

* Name: AEP\_hourly.csv
* Content: Hourly energy consumption data (e.g., megawatts) recorded over time.
* Columns: Typically, it includes a 'Datetime' column for timestamps and an 'AEP\_MW' column for energy consumption values.

**Data Preprocessing Steps:**

* Load the dataset using Pandas.
* Handle missing or duplicate data points if needed.
* Ensure that the 'Datetime' column is in a proper datetime format for time-based analysis.
* Provide basic data cleaning and formatting as required.

**Visualization Techniques:**

* Line plot to visualize energy consumption over time.
* Customization of plots with labels for clarity.
* Rotating x-axis labels for readability.
* Adding legends to identify data series.

**Innovative Approaches:**

* The use of Pandas and Matplotlib for data analysis and visualization, which are commonly used libraries for these tasks.
* Automation of the process, allowing users to analyze and visualize energy consumption data by running a single Python script.
* A clean and informative README to guide users and potential contributors to the project.

**Conclusion:**

This project addresses the need for automated energy consumption analysis and visualization, providing valuable insights to users and offering a convenient and customizable solution. It's a practical application of data analysis and visualization techniques in the context of energy management.