ARTIFICIAL INTELLIGENCE

PROJECT: MEASURE ENERGY CONSUMPTION

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PROBLEM STATEMENT

The problem at hand is to create an automated system that measures energy consumption, analyzes the data, and provides visualizations for informed decision-making. This solution aims to enhance efficiency, accuracy, and ease of understanding in managing energy consumption across various sectors.

DESIGN THINKING

The development of the project involves the following steps:

- Data Source
- Data Preprocessing
- Feature Extraction
- Model Development
- Visualization

DATA SOURCE

Identify an available dataset containing energy consumption measurements

- A data source is a location or method from which data is collected or retrieved.
- It can be a database, file, API, sensor, or any other means of obtaining information.
- Data sources can be structured, like a relational database, or unstructured, such as text from social media.
- Understanding and managing data sources is crucial for effective data management and analysis.
- The datasource for this project is given in the following link:

  https://www.kaggle.com/datasets/robikscube/hourly-energy-consumption

DATA PREPROCESSING

Clean, transform and prepare the dataset for analysis

- We can clean the data by using python
- Data preprocessing is a crucial step in preparing your data for analysis or machine learning programs.
- The specific preprocessing steps you need to perform depend on your dataset and the goals of your program.
- Python libraries like pandas, scikit-learn, and libraries for data visualization can be helpful for these tasks.
- It’s essential to understand your data thoroughly and tailor your preprocessing to meet your analysis or modeling needs.

FEATURE EXTRACTION

Extract relevant features and metrics from the energy consumption data

- Feature extraction is crucial in machine learning because it can significantly impact the performance of models.
- Properly selected and transformed features can lead to better predictive accuracy, faster training times, and more interpretable results.

MODEL DEVELOPMENT

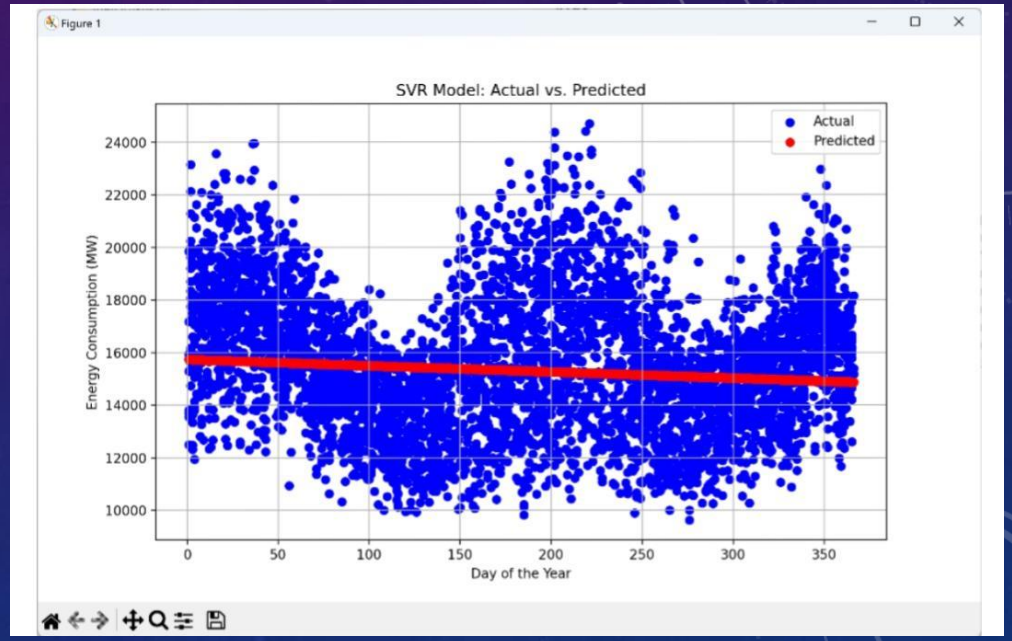
Utilize statistical analysis to uncover trends, patterns, and anomalies in the data

- The data set is cleaned, transformed and analysed for the project
- The cleaned data set is imported into the program and analysed
- With the help of the data set, the prediction of energy consumption can be done
- The kaggle notebook for the total program is given in the following link:

  https://www.kaggle.com/code/jeblinaldod/ai-phase4

SUPPORT VECTOR MODELLING

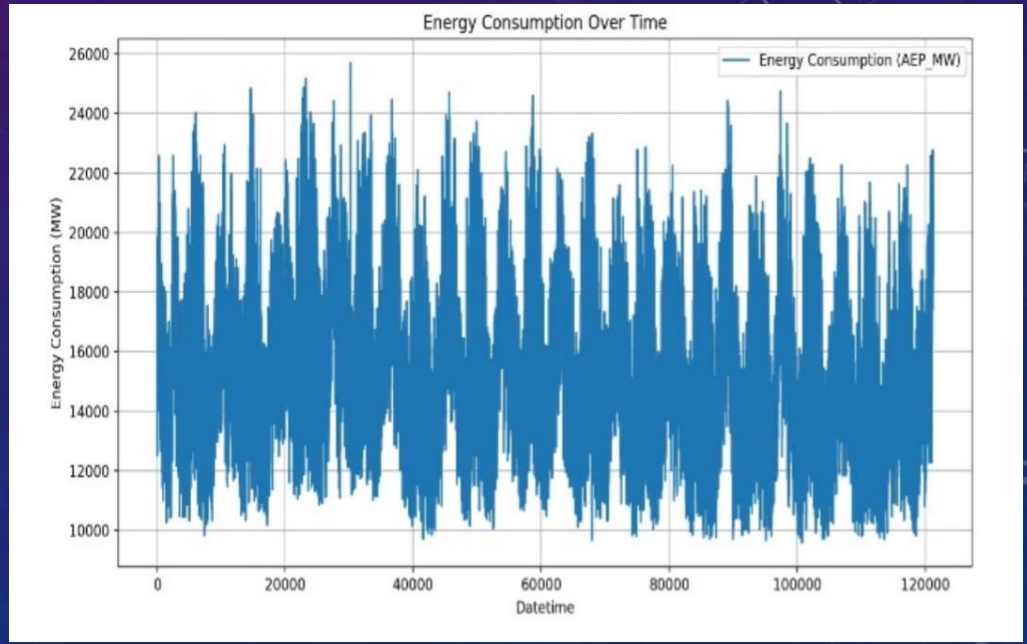
- Support vector modelling is a machine learning technique for classification or regression.
- It finds a hyperplane that separates the data into classes or predicts the output.
- In Python, you can use Scikit-Learn to implement it.
- to use it one must know how to validate and evaluate the performance of support vector models.



VISUALIZATION

Develop visualizations (graphs, charts) to present the energy consumption trends and insights

- Data visualization is the graphical representation of data to help people understand, interpret, and make sense of information.
- It can take many forms, including charts, graphs, maps, and more, and is essential for presenting complex data in a visual and easily digestible format.
- The datasource is analysed and used for visualization.



CONCLUSION

- The development of measuring energy consumption begins with the data cleaning and analysis.
- Data cleaning encompasses the treatment of missing values and the removal of duplicate entries, ensuring a complete and unique dataset.
- The subsequent data analysis unveils valuable insights by computing summary statistics and examining class distribution.
- The data visualization gives a visual output in terms of plots which are very human understandable and comparable with other data.
- The subsequent Support vector modelling and training enables you to model and train your machine for the particular dataset and provide a reliable prediction system.