❓ What Your Project Does (In Simple Words)

Your project **predicts how much money a household will pay for electricity** using data like their **monthly income, number of fans, air conditioners, and the number of rooms**.

It uses **Machine Learning (Support Vector Machine Regression)** to learn patterns from existing data and then **make predictions** for new or future household situations.

⚙️ How It Works (Step-by-Step)

1. 📥 Data Collection

You started with a CSV file containing real data about household energy use and electricity bills.

2. 🔍 Data Understanding

You explored the data to understand:

- What each column means (e.g., `monthly_income`, `no_of_AC`)
- If any data was missing
- How different features are related (like income vs bill)

3. 📊 EDA (Exploratory Data Analysis)

You used graphs like:

- **Histograms** to see how values are spread out (e.g., how income is distributed)
- **Heatmaps** to see **which features affect the bill the most**

4. 🧹 Data Preprocessing

You:

- Filled missing values with the **median**
- Removed **duplicate rows**
- Prepared the data so that a machine learning model could work with it

5. ✂️ Data Splitting

You split the dataset into:

- **Training data (80%)**: to teach the model

- **Testing data (20%)**: to check how well it learned

6. □ Model Training (SVM)

You trained a **Support Vector Regressor (SVR)** model:

- This model looks for the best pattern in the data to predict the `amount_paid` column.
- It uses **mathematical equations** to guess future bills based on inputs like income, number of ACs, etc.

7. 📈 Evaluation

You checked:

- **Mean Squared Error (MSE)**: to see how far your predictions are from actual values
- **R^2 Score**: to measure how well your model explains the data

8. 💾 Model Saving

You saved the trained model using **Joblib** so you can reuse it in the future without retraining.

✅ In One Sentence:

“This project takes household data and predicts how much the electricity bill will be, using a machine learning model trained on past data.”