

Phase 1 : Problem Definition and Design Thinking



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Project 4: Electricity Prices Prediction

Objective :

➤ The electricity price prediction task is based on a case study where you need to predict daily price of electricity based on the daily consumption of heavy machinery used by businesses.

Problem Statement :

➤ Create a predictive model that utilizes historical electricity prices and relevant factors to forecast future electricity prices, assisting energy providers and consumers in making informed decisions regarding consumption and investment.

Problem Definition :

➤ The problem is to develop a predictive model that uses historical electricity prices and relevant factors to forecast future electricity prices. The objective is to create a tool that assists both energy providers and consumers in making informed decisions regarding consumption and investment by predicting future electricity prices. This project involves data preprocessing, feature engineering, model selection, training, and evaluation.

Design Thinking :

Data Source : Utilize a dataset containing historical electricity prices and relevant factors like date, demand, supply, weather conditions, and economic indicators.

Load your electricity price dataset

```
import pandas as pd
```

```
data = pd.read_csv('Electricity.csv')
```

Data Preprocessing :

```
print(data.describe()) # Summary statistics
```

```
print(data.isnull().sum()) # Check for missing values
```

Handle missing values (if any)

```
data.fillna(data.mean(), inplace=True)
```

Remove duplicate values (if any)

```
data = data.drop_duplicates()
```

Feature Engineering :

Time-based features

```
data['Date'] = pd.to_datetime(data['Date'])
```

```
data['Year'] = data['Date'].dt.year
```

```
data['Month'] = data['Date'].dt.month
```

```
data['DayOfWeek'] = data['Date'].dt.dayofweek
```

```
# Lagged variables
```

```
data['ElectricityPrice_Lag1'] = data['ElectricityPrice'].shift(1)
```

```
data['ElectricityPrice_Lag7'] = data['ElectricityPrice'].shift(7)
```

Model Selection :

```
from statsmodels.tsa.arima_model import ARIMA
```

```
# Define the ARIMA order (p, d, q)
```

```
p = 1 # Example value
```

```
d = 1 # Example value
```

```
q = 1 # Example value
```

```
# Create the ARIMA model
```

```
model = ARIMA(data['ElectricityPrice'], order=(p, d, q))
```

```
# Fit the model to the data
```

```
model_fit = model.fit()
```

```
# Print the summary of the model
```

```
print(model_fit.summary())
```

Model Training :

Split the data into training and testing sets

```
train_size = int(len(data) * 0.8)
```

```
train, test = data['ElectricityPrice'][:train_size],  
data['ElectricityPrice'][train_size:]
```

Initialize and fit the ARIMA model on the training data

```
model = ARIMA(train, order=(p, d, q))
```

```
model_fit = model.fit()
```

Print the summary of the model

```
print(model_fit.summary())
```

Evaluation :

Make predictions on the test set

```
predictions = model_fit.forecast(steps=len(test))
```

Calculate MAE, MSE, RMSE (import necessary libraries)

```
from sklearn.metrics import mean_absolute_error,  
mean_squared_error
```

```
import math
```

```
mae = mean_absolute_error(test, predictions)
mse = mean_squared_error(test, predictions)
rmse = math.sqrt(mse)
```

Print the evaluation results

```
print(f'Mean Absolute Error (MAE): {mae}')
print(f'Mean Squared Error (MSE): {mse}')
print(f'Root Mean Squared Error (RMSE): {rmse}')
```

codings:

Load your electricity price dataset

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import pandas as pd
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```
data = data.drop_duplicates()
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```
# Time-based features
```

```
data['Date'] = pd.to_datetime(data['Date'])
data['Year'] = data['Date'].dt.year
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data['DayOfWeek'] = data['Date'].dt.dayofweek
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# Lagged variables
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data['ElectricityPrice_Lag1'] = data['ElectricityPrice'].shift(1)
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```

NOTE : Run the program with compiler with csv.file