**Electricity Price Prediction Process**

**PHASE 5 PROJECT SUBMISSION**

**Problem Statement:**

The problem is to predict electricity prices in the future, which is a common task in the energy industry. Accurate price forecasts are essential for efficient energy trading, resource allocation, and cost management. The goal is to create a model that can provide reliable predictions of electricity prices at various time horizons, enabling energy market participants to make informed decisions.

**Design Thinking Process:**

Empathize:

* Understand the needs and pain points of energy market participants, such as utilities, consumers, and traders, by gathering feedback and conducting interviews.

Define:

* Clearly define the problem, objectives, and success criteria for electricity price prediction.

Ideate:

* Brainstorm potential solutions, including data sources, forecasting algorithms, and evaluation metrics.

Prototype:

* Develop a prototype or proof-of-concept to test the feasibility of the solution.

Test:

* Evaluate the prototype, gather feedback, and refine the approach if necessary.

Implement:

* Build the final solution for electricity price prediction.

Monitor:

* Continuously monitor the model's performance and make improvements as needed.

**Phases of Development:**

Data Collection:

* Gather historical electricity price data, which typically includes time stamps, price values, and relevant features like weather conditions, demand, and generation capacity.

Data Preprocessing:

* Clean the data by handling missing values, outliers, and scaling features. Convert time stamps into a suitable format.

Feature Engineering:

* Create relevant features from the data, such as lagged prices, rolling statistics, and holiday indicators.

Model Selection:

* Choose an appropriate time series forecasting algorithm, such as ARIMA, Exponential Smoothing, or machine learning models like LSTM or Prophet.

Model Training:

* Split the data into training and validation sets. Train the model on historical data and tune hyperparameters.

Model Evaluation:

* Use appropriate evaluation metrics like Mean Absolute Error (MAE), Mean Squared Error (MSE), or Root Mean Squared Error (RMSE) to assess the model's accuracy.

Model Deployment:

* Deploy the trained model to generate real-time electricity price predictions.

Continuous Improvement:

* Continuously update the model with new data and retrain it to improve accuracy and adapt to changing market conditions.

**Choice of Time Series Forecasting Algorithm:**

The choice of the forecasting algorithm depends on the characteristics of the electricity price data.

Some commonly used algorithms include:

ARIMA:

* Suitable for stationary time series data with clear trends and seasonality.

Exponential Smoothing:

* Effective for capturing exponential trends and seasonality.

LSTM (Long Short-Term Memory):

* Deep learning model suitable for complex time series with long-range dependencies.

Evaluation Metrics:

* The choice of evaluation metrics in electricity price prediction depends on the specific goals and requirements of the problem. Common metrics include:

Mean Absolute Error (MAE):

* Measures the average absolute difference between predicted and actual prices.

Mean Squared Error (MSE):

* Measures the average squared difference between predicted and actual prices.

Root Mean Squared Error (RMSE):

* The square root of MSE, providing a measure of prediction error in the same units as the price data.

Mean Absolute Percentage Error (MAPE):

* Calculates the average percentage difference between predicted and actual prices.

The choice of evaluation metric should align with the practical implications of forecasting errors in the electricity market and the specific needs of stakeholders.

**Well structured README file for electricity price prediction :**

**Certainly, here is a well-structured README file template for Electricity Price Prediction project:**

# Electricity Price Prediction

## Introduction

This project aims to predict electricity prices using time series forecasting techniques. Accurate electricity price predictions are crucial for energy market participants to make informed decisions regarding trading, resource allocation, and cost management.

## Dependencies

Before running the code, ensure you have the following dependencies installed:

- Python (version X.X)

- Required Python libraries (listed in `requirements.txt`)

You can install the necessary Python libraries using pip:

```bash

pip install -r requirements.txt

**Certainly, here's a well-structured README file for Electricity Price Prediction project:**

# Electricity Price Prediction

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## Introduction

This project focuses on predicting electricity prices using time series forecasting techniques. Accurate electricity price predictions are essential for energy market participants to make informed decisions regarding trading, resource allocation, and cost management.

## Dependencies

Before running the code, make sure you have the following dependencies installed:

- Python (version X.X)

- Required Python libraries (listed in `requirements.txt`)

You can install the necessary Python libraries using pip:

```bash

pip install -r requirements.txt

**Installation:**

Clone this repository to your local machine:

Code:

git clone <https://github.com/your-username/electricity-price-prediction.git>

Change your working directory to the project folder:

 code:

cd electricity-price-prediction

**Data:**

* The dataset used for this project contains historical electricity price data, including timestamps and price values. You can obtain the dataset from [insert source link here] and place it in the data directory within the project folder.

**Data Preprocessing:**

Before training the model, the dataset goes through several preprocessing steps:

Data Cleaning:

* Handle missing values and outliers.

Feature Engineering:

* Create relevant features such as lagged prices, rolling statistics, and holiday indicators.

Data Split:

* Divide the data into training and validation sets.

**Model Training:**

We use a time series forecasting algorithm for electricity price prediction. The choice of algorithm is based on the characteristics of the data. You can find the model training code in the train\_model.py script.

To train the model, run the following command:

 code:

python train\_model.py

**Model Evaluation:**

The trained model is evaluated using common evaluation metrics such as Mean Absolute Error (MAE), Mean Squared Error (MSE), and Root Mean Squared Error (RMSE). The evaluation code can be found in the evaluate\_model.py script.

To evaluate the model, run the following command:

code:

python evaluate\_model.py

**Usage:**

To make electricity price predictions, you can use the trained model. Insert instructions or code here for using the model to generate predictions.