**Electricity Prices Prediction**

**Problem Definition:**

The problem at hand is to predict electricity prices accurately. Accurate electricity price predictions are crucial for various stakeholders, including consumers, energy providers, and policymakers. Accurate predictions can help consumers make informed decisions about their energy usage, energy providers optimize their operations, and policymakers implement effective energy policies. The challenge lies in developing a reliable model that can forecast electricity prices with a high degree of accuracy.

**Design Thinking:**

1. **Data Source:**

* Identify reliable sources for historical electricity price data. These sources might include government agencies, energy market websites, or utility companies.
* Consider collecting additional relevant data, such as weather information, demand patterns, supply data, and regulatory changes, as these factors can influence electricity prices.

1. **Data Preprocessing:**

* Understand the quality and availability of historical electricity price data. Identify missing values, outliers, and data anomalies.
* Convert timestamps into a usable format for time-series analysis.
* Normalize or scale the data if necessary to ensure all features are on the same scale.
* Split the data into training, validation, and test sets to evaluate your model properly.

1. **Feature Engineering:**

* Explore creative ways to engineer features, such as creating lag features for past prices or using domain knowledge to construct relevant variables.
* Use domain knowledge to engineer features that could be relevant, such as holidays, energy market events, or economic indicators.

1. **Model Selection:**

* Experiment with various machine learning algorithms suitable for time-series forecasting, such as:
* ARIMA (AutoRegressive Integrated Moving Average)
* LSTM (Long Short-Term Memory) networks
* Gradient Boosting algorithms (e.g., XGBoost, LightGBM)
* Explore various model architectures and hyperparameters to see which ones align best with your problem.

1. **Model Training:**

* Create a preliminary version of your model and train them on a portion of your dataset.
* Implement techniques like cross-validation to fine-tune model parameters and prevent overfitting.
* Explore rolling-window approaches for time-series data to simulate real-time forecasting.

1. **Evaluation:**

* Assess the model’s performance using appropriate evaluation metrics like Mean Absolute Error (MAE), Mean Squared Error (MSE), or Root Mean Squared Error (RMSE).
* Consider using quantile regression to predict price percentiles, which can be crucial for risk management in energy trading.
* Establish monitoring systems to track the model’s performance over time, and set up alerts for significant deviations or degradation in accuracy.

**Dataset Link:**[**https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction**](https://www.kaggle.com/datasets/chakradharmattapalli/electricity-price-prediction)