

Electricity Price Prediction

Problem Statement

Predicting electricity prices on the day-ahead market is a complex challenge with significant implications for the energy industry. The objective is to develop a reliable forecasting system that can provide accurate day-ahead price predictions for electricity markets. The problem statement involves developing accurate, reliable, and efficient methods for forecasting electricity prices.

Some key challenges in this domain include:

- 1. Price Volatility:** Electricity prices can be highly volatile, influenced by factors such as demand, supply, weather, and market dynamics. Predicting these fluctuations accurately is crucial for both consumers and producers.
- 2. Data Complexity:** The data required for accurate price prediction is diverse and may include historical prices, weather data, market trends, and more. Handling this complex data is a significant challenge.
- 3. Market Dynamics:** Understanding and accounting for the dynamics of the electricity market, including the impact of renewable energy sources, regulatory changes, and grid infrastructure, is critical.
- 4. Machine Learning Models:** Developing machine learning models that can process and analyse large datasets to make precise predictions while considering the time and computational constraints of the day-ahead market.

Design Thinking Approach

To address the problem of electricity price prediction, a design thinking approach can be applied:

- 1. Empathize:** Understand the needs and challenges of electricity market stakeholders, including consumers, utilities, and regulators. Gather insights into their specific requirements for price prediction.
- 2. Define:** Clearly define the problem and its scope. Consider the various data sources and factors that affect electricity prices. Define success metrics, such as prediction accuracy and speed.
- 3. Ideate:** Brainstorm potential solutions, such as machine learning models, statistical algorithms, and data pre-processing techniques. Encourage creative thinking to explore new approaches.
- 4. Prototype:** Create prototypes of predictive models using historical data. Experiment with different algorithms and features to refine the prediction accuracy.
- 5. Test:** Test the prototypes against real-world data and evaluate their performance. Gather feedback from stakeholders and iterate on the models to improve accuracy and reliability.
- 6. Implement:** Deploy the refined models in the day-ahead market to provide real-time price predictions. Monitor their performance and make continuous improvements.