Team_90

GB Electricity Market Strategy

Techboard
IIT Guwahati

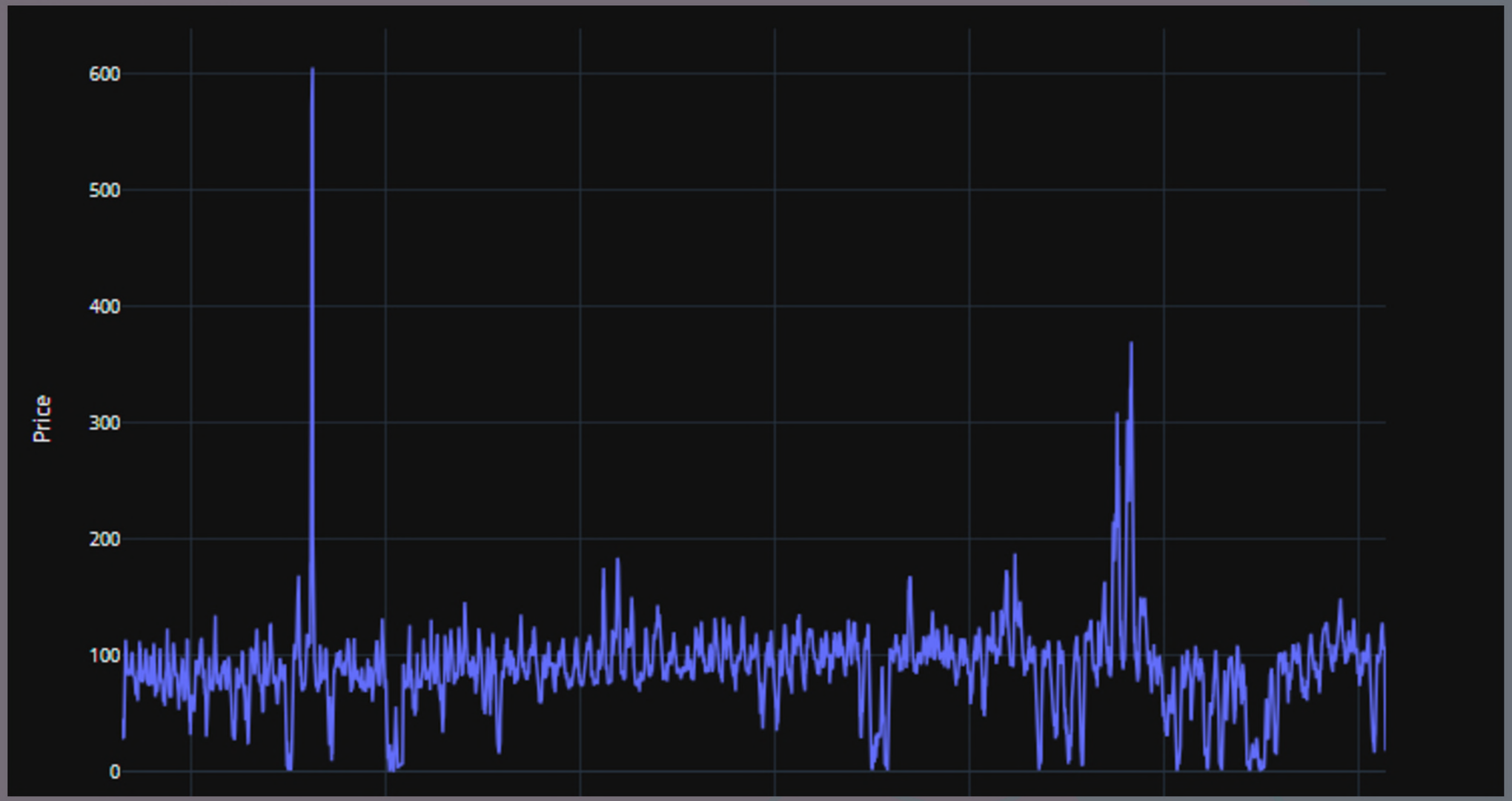
Finance and Economics Club
IIT Guwahati

Topics Covered

1. Regime Identification
2. Price Trend Identification
3. Strategy
4. Metrics

Energy Price

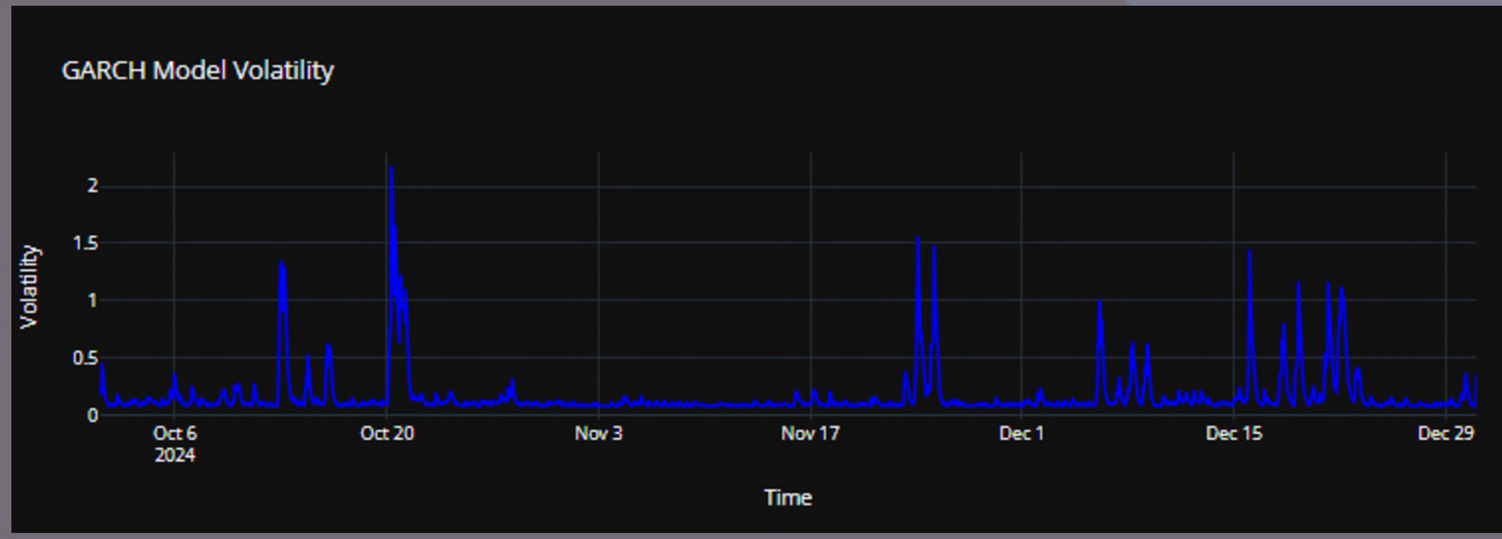
- Data Period: Aug'24-Dec'24
- Granularity: HalfHourly



Regime Identification

A GARCH(1,1) model is used to detect and analyze these volatility patterns in energy price data, providing valuable insights into periods of market turbulence or stability.

- Detecting volatility patterns – It models how volatility evolves over time, distinguishing between stable and turbulent market conditions.
- Classifying market regimes – By defining thresholds based on conditional volatility, it categorizes periods into high volatility (turbulent market) and low volatility (stable market).
- Enhancing trading strategies – By knowing whether the market is in a high or low volatility regime, traders can optimize their trade execution and reduce risk by focusing on more predictable periods.



Weather Data

We had used the tempreature data of a city of Great Britain as a feature for the ANN model.

We had artificially generated the weather data of 9 different cities Great Britain containing the tempreature data from August - December 2024.

	City	Correlation with Energy Price
0	Edinburgh	-0.170041
1	Birmingham	-0.168299
2	Plymouth	-0.149284
3	Inverness	-0.155598
4	Norwich	-0.187362
5	London	-0.168320
6	Cardiff	-0.180899
7	Manchester	-0.162008
8	Newcastle	0.355814
9	Weighted Population Avg	-0.139144

Artificial Neural Networks

ANN learns patterns from past data and uses complex, non-linear relationships in energy price fluctuations and weather influence to improve price forecasting.

LAYERS

1. Input Layer: 2 features (Price, Temperature).
2. Layer 1: 128 neurons (ReLU) + Batch Normalization + Dropout (30%).
3. Layer 2: 64 neurons (ReLU) + Dropout (30%).
4. Layer 3: 32 neurons (ReLU).
5. Output Layer: 1 neuron for predicted price.

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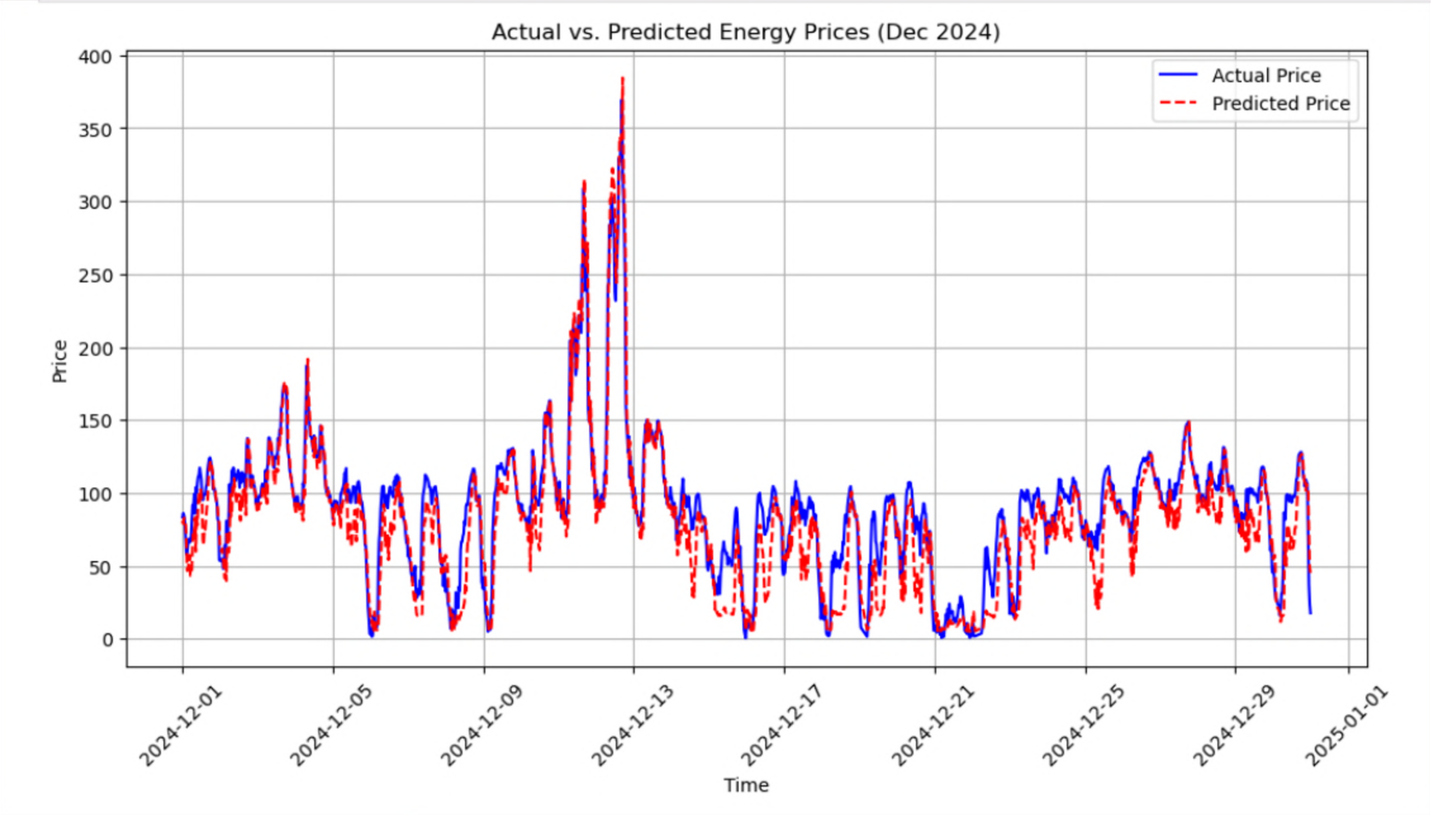

Metrics

- Mean Squared Error (MSE) : 934.1138
- Mean Absolute Error (MAE) : 24.6831
- Root Mean Squared Error (RMSE) : 30.5633
- R-Squared (R^2) Score : 0.3149
- Mean Absolute Percentage Error (MAPE) : 37.4937%

Strategy

Generate daily trades using ANN-predicted energy prices while minimizing risk through volatility filtering and stop-loss measures.

- Entry Strategy:
  - If the lowest predicted price occurs before the highest predicted price, take a long position at the low and sell at the high (Buy Sell
  - If the highest predicted price occurs before the lowest predicted price, take a short position at the high and cover at the low (Sell Buy).
- Volatility Filter:
  - Only execute trades in low-volatility regimes as determined by the GARCH model Avoid high-volatility periods to reduce uncertainty and excessive price fluctuations.
- Exit & Risk Management:
  - All positions are closed on the same day to minimize overnight risk.
  - Stop-loss applied at a predetermined level to prevent large losses in case the market moves against the trade.
  - No new trades are initiated once a stop-loss is hit for the day

Strategy Metrics:

Corrected code:

- Total Trade Profit: 59,664.45%
- Average Profit Per Trade: 2841%
- Win Rate: 80.95%
- Drawdowns: 10.68%
- Sharpe Ratio: 9.22
- Total Number Of Trades: 21

Submitted Code:

- Total Trade Profit: 173678501.46%
- Drawdowns: 91.94%
- Sharpe Ratio: 0.11

Thank you!