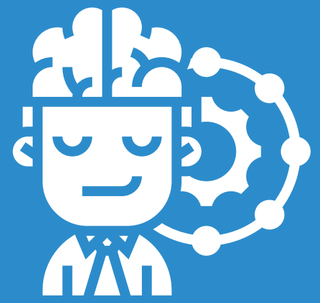
1

Organize Nifty dataset using Pandas for analysis.



2

Construct a predictive model using XGBoost machine learning algorithm.

3

Forecast Nifty Fifty index for the upcoming day based on the model.

4

Incorporate technical indicators like Aroon, Balance Volume, and Fibonacci Replacement for analysis.

5

Implement a sophisticated strategy to optimize profits and trading decisions.

QUANTATHON

NIFTY FIFTY TRADING

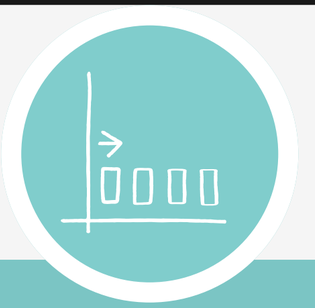
NIFTY FIFTY TRENDS ANALYSIS

THE NIFTY FIFTY DATA FOR JANUARY 2024 HAS BEEN COLLECTED, INCORPORATING VARIOUS PARAMETERS SUCH AS OPEN, CLOSE, HIGH, LOW, AND VOLUME. THIS WELL-DIVERSIFIED INDEX COMPRISES THE TOP 50 COMPANIES IN TERMS OF FREE-FLOAT MARKET CAPITALIZATION, REFLECTING THE OVERALL HEALTH OF THE INDIAN MARKETS.

THE ANALYSIS REVEALS THAT FROM JANUARY 1ST TO 5TH, A POTENTIAL SHARP BREAKDOWN MAY OCCUR IF THE NIFTY 50 SHARE PRICE CLOSES BELOW THE IMMEDIATE SUPPORT LEVEL OF 21,440.08. SIMILARLY, FOR THE PERIOD OF JANUARY 22ND TO 26TH, A SHARP BREAKDOWN COULD BE ANTICIPATED IF THE SHARE PRICE CLOSES BELOW THE IMMEDIATE SUPPORT LEVEL OF 21,230.58.

WE UTILIZE THE XGBOOST MODEL TO FORECAST THE NEXT DAY'S CLOSING PRICE BASED ON THE PROVIDED DATASET. THE MODEL IS TRAINED ON ONE DATASET AND TESTED ON ANOTHER, ASSESSING PERFORMANCE USING KEY METRICS SUCH AS MEAN ABSOLUTE PERCENTAGE ERROR (MAPE), MEAN SQUARED ERROR (MSE), AND MEAN ABSOLUTE ERROR (MAE).

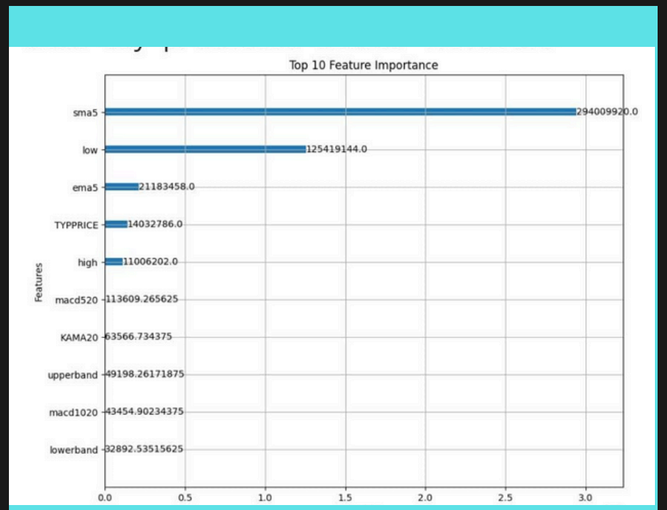
WE OPTED FOR THE XGBOOST MODEL OVER LSTM, RANDOM FOREST, AND MA MODELS DUE TO ITS ABILITY TO PERFORM FEATURE IMPORTANCE ANALYSIS AND INCORPORATE REGULARIZATION WITHIN THE OBJECTIVE FUNCTION, THUS MITIGATING OVERFITTING. ADDITIONALLY, XGBOOST IS ADEPT AT HANDLING MISSING AND NON-LINEAR DATA.



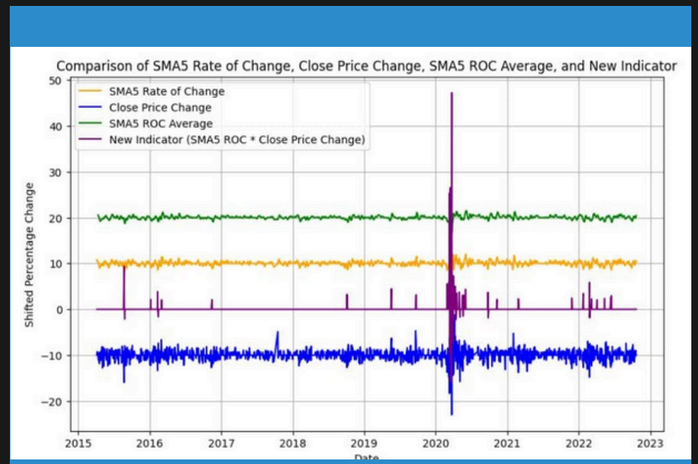
THE SIMPLE MOVING AVERAGE (SMA5), LOW, EXPONENTIAL MOVING AVERAGE (EMA5), AND HIGH ARE IDENTIFIED AS THE MOST RELEVANT FEATURES. THE PREDICTED NEXT DAY'S CLOSING PRICE IS 17,575.893. THESE INDICATORS PLAY A CRUCIAL ROLE IN IDENTIFYING AND CONSOLIDATING MARKET TRENDS.

GRAPHS AND INFERENCES OBTAINED

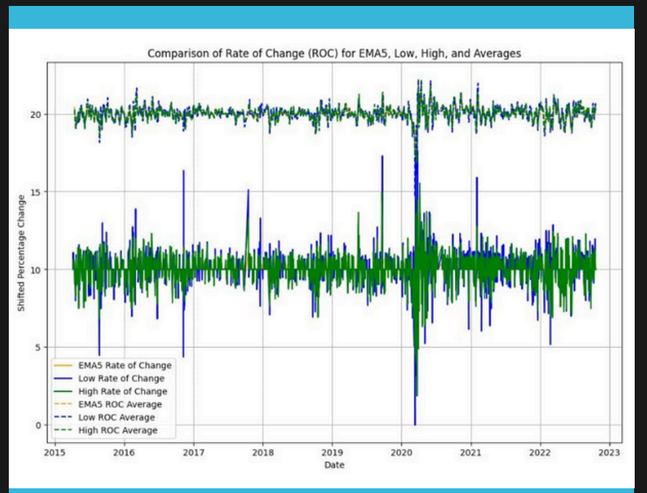
THE IMPORTANT PARAMETERS TO BE TESTED



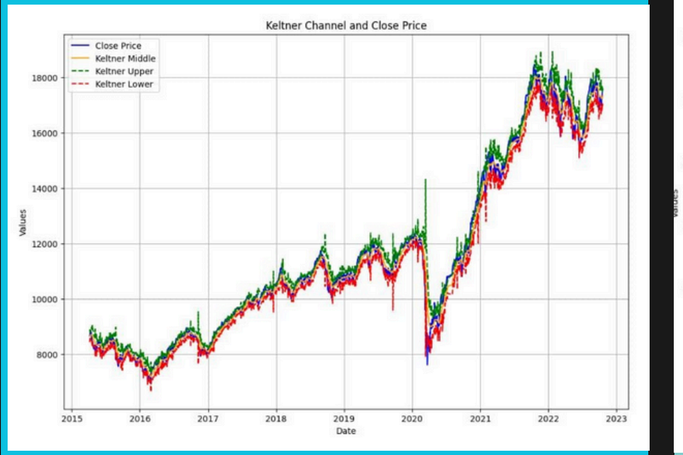
Top 10 Feature Model from the XG Boost, an ML Model



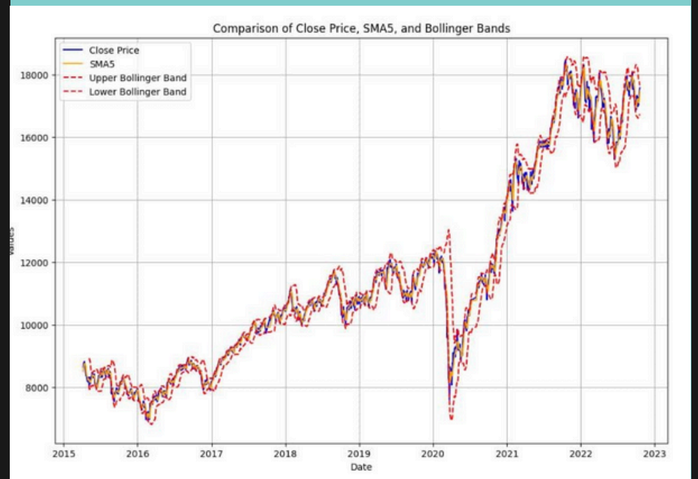
Comparison of SMA5 Rate of Change, Close Price Change, SMA5 ROC Average, and New Indicator



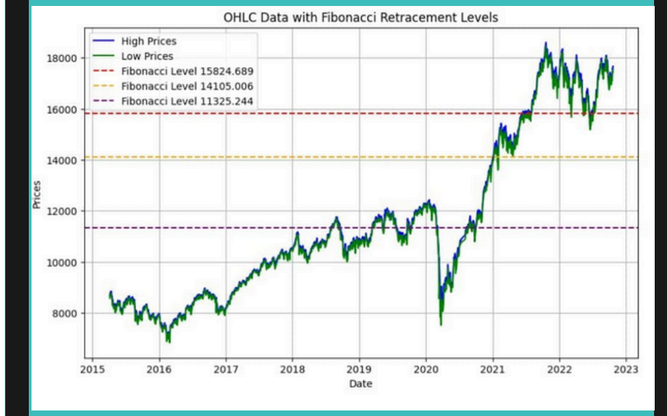
Comparison of Rate of Change (ROC) for EMA5, Low, High, and Averages



Keltner Channel and Close Price



Comparison of Close Price, SMA5, and Bollinger Bands



OHLC Data with Fibonacci Replacement Levels

INDICATORS AND PARAMETER USED FOR THE STOCKS

HTTPS://COLAB.RESEARCH.GOOGLE.COM/DRIVE/1A2E1C2HY4EOLDROS0OHOXH_NYCWCTCQL#SCROLLTO=U142J-RBW4_S

THIS IS THE LINK TO THE COLLAB NOTEBOOK WHEREIN THE CODES AND THE COMMENTS FOR THE SAME ARE PUT UP.

FROM THIS EXTENSIVE LIST, WE SELECTED SPECIFIC PARAMETERS FOR OUR ANALYSIS.

PPI	PPI (Producer Price Index) measures the average change over time in the selling prices received by domestic producers for their output.	**CPI**	CPI (Consumer Price Index) measures the average change over time in the prices paid by urban consumers for a basket of goods and services.
RSI	RSI (Relative Strength Index) is a momentum oscillator that measures the speed and change of price movements.	**SMA 5**	SMA5 (Simple Moving Average with a period of 5) calculates the average price over the last five periods, smoothing out fluctuations to identify trends.
EMA5	EMA5 (Exponential Moving Average with a period of 5) is a trend-following indicator that gives more weight to recent price data	**KELT -NER**	Keltner Channels are a volatility-based indicator consisting of an upper and lower band surrounding a central moving average, helping to identify potential trend reversals.
BOLL-INGER BANDS	Bollinger Bands are volatility bands placed above and below a moving average, indicating potential overbought or oversold conditions.	**Fibon-acci Retra ceme nt**	Fibonacci Retracement is a technical analysis tool that identifies potential levels of support and resistance based on key Fibonacci ratios.

VERIFYING THE PREDICTIONS

AN ANALYSIS OF THE RANDOM FOREST CLASSIFIER, AND LIQUIDITY CONSTRAINTS, SLIPPAGE, ALPHA, BETA

A Random Forest Classifier was used. The Random Forest Classifier was selected for its suitability in predicting stock price movements based on various technical indicators. It can effectively capture non-linear relationships between these indicators and stock prices, handle different types of features, and prevent overfitting. Moreover, its ability to provide insights into the importance of individual indicators makes it valuable for identifying key factors influencing the model's predictions in the context of our stock price prediction task.

Liquidity constraint is crucial in our momentum trading strategy for Nifty50. It reflects the challenge of executing large trades without significantly impacting market prices. Ensuring sufficient liquidity is essential for smooth entry and exit of positions, minimizing the risk of price slippage. Liquidity constraints are a potential market failure that can dampen investments in energy efficiency.

Transaction cost awareness is vital in our Nifty50 momentum trading approach. Keeping transaction costs low is key to optimizing overall returns. Strategically managing these costs contributes to the effectiveness of our momentum trading strategy. Slippage is a concern in our Nifty50 momentum trading. It occurs when the executed trade price deviates from the expected price. Minimizing slippage is crucial, especially in volatile markets. Our strategy focuses on advanced execution techniques and technology to manage slippage and enhance overall performance.

Alpha represents the excess return of an investment or portfolio compared to its expected return based on its beta and the overall market return. $\text{Alpha} = \text{Actual Return} - (\text{Risk-Free Rate} + \beta \times (\text{Market Return} - \text{Risk-Free Rate}))$. Beta measures the sensitivity of an investment's returns to changes in the market returns. It quantifies the systematic risk of an investment. $\text{Beta} = (\text{Asset Returns}, \text{Market Returns}) / \text{Variance}(\text{Market Returns})$

THANK YOU!

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