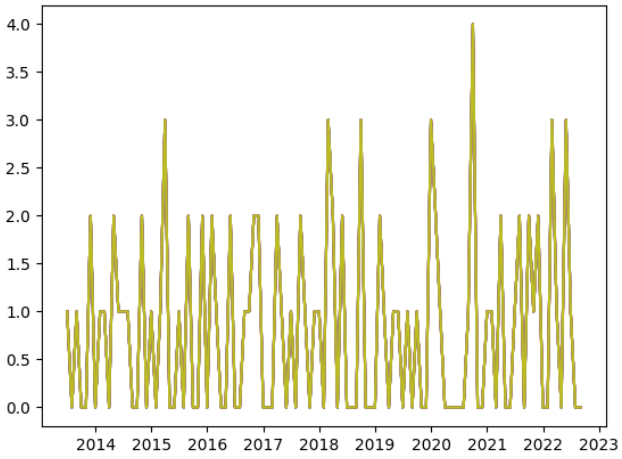
Volxplode

1. Data Collection and Preprocessing:

- The code starts by collecting two types of data: stock price data for Nifty 200 stocks and historical VIX (Volatility Index) data.
- The stock price data is downloaded from Yahoo Finance for each stock in the Nifty 200 list.
- The VIX data is also collected and preprocessed to align with the stock data.
- Various preprocessing steps are performed, such as converting dates, setting index, and renaming columns.

2. Technical Indicators and Feature Engineering:

- The code performs feature engineering by calculating various technical indicators from the stock price data.
- Some of the indicators used include moving averages, standard deviations, z-scores, RSI (Relative Strength Index), and MACD (Moving Average Convergence Divergence).
- Lagged versions of the indicators are also calculated to capture previous values.
- Signals in a month -

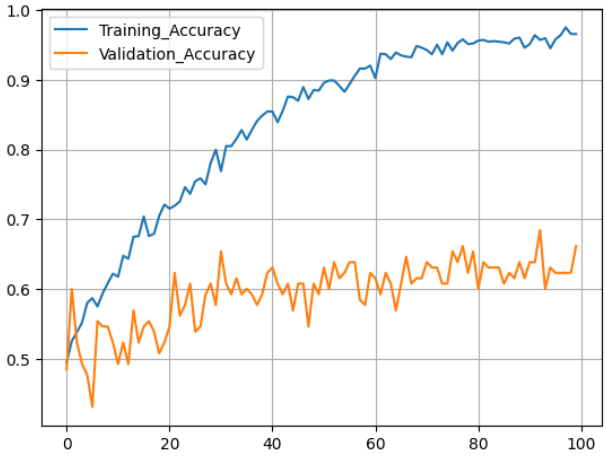


3. Neural Network Training:

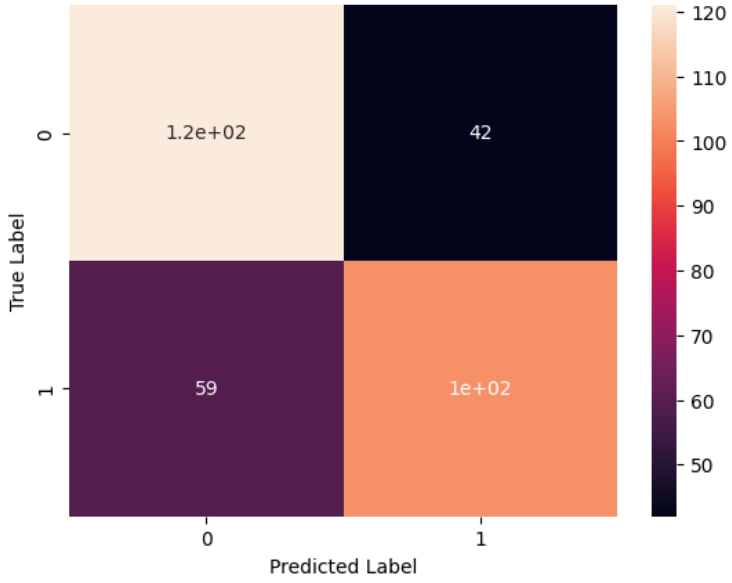
- To predict the direction of stock returns, a neural network model is trained for each stock.
- The training data is prepared by selecting relevant features as input (X) and the direction of next-day returns as the target (Y).

- To address class imbalance, the SMOTE technique is applied to oversample the minority class (negative returns).
- The neural network model is constructed with multiple hidden layers and trained using the prepared data.

```
Model: "sequential_9"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense_36 (Dense)            (None, 64)                3584

 dense_37 (Dense)            (None, 128)               8320

 dropout_18 (Dropout)        (None, 128)               0

 dense_38 (Dense)            (None, 64)                8256

 dropout_19 (Dropout)        (None, 64)                0

 dense_39 (Dense)            (None, 1)                 65

=================================================================
Total params: 20,225
Trainable params: 20,225
Non-trainable params: 0
_________________________________________________________________
```



	precision	recall	f1-score	support
0.0	0.67	0.74	0.71	163
1.0	0.71	0.64	0.67	162
accuracy			0.69	325
macro avg	0.69	0.69	0.69	325
weighted avg	0.69	0.69	0.69	325



4. ## Prediction and Probability Calculation:
    - The trained model is used to generate predictions for the direction of next-day stock returns.
    - The probabilities of the predicted directions are also calculated, indicating the confidence of the model's predictions.
    - The predicted directions, overnight returns, and probabilities are stored for each stock in separate lists.

5. ## Stocks Selection for Trading:
    - The code selects the top 10 stocks with the highest probabilities of positive returns (> 0.50) for each day.
    - These stocks are considered as potential candidates for trading based on the model's predictions and confidence.

```
stocks_trade
```

```
[['ADANIENT', 'ADANIPORTS', 'APOLLOHOSP', 'ASIANPAINT', 'AXISBANK'],
 ['EICHERMOT', 'INDUSINDBK', 'APOLLOHOSP', 'DRREDDY', 'BRITANNIA'],
 ['NESTLEIND', 'ITC', 'HINDALCO', 'COALINDIA', 'WIPRO'],
 ['TITAN', 'COALINDIA', 'BAJAJ-AUTO', 'WIPRO', 'BRITANNIA'],
 ['MARUTI', 'KOTAKBANK', 'COALINDIA', 'WIPRO', 'HEROMOTOCO'],
 ['EICHERMOT', 'ITC', 'COALINDIA', 'DIVISLAB', 'DRREDDY'],
 ['ITC', 'MARUTI', 'DRREDDY', 'TCS', 'LT'],
 ['DRREDDY', 'ADANIPORTS', 'BAJAJ-AUTO', 'WIPRO', 'TATACONSUM'],
 ['ITC', 'TITAN', 'COALINDIA', 'HINDALCO', 'UPL'],
 ['WIPRO', 'COALINDIA', 'KOTAKBANK', 'TITAN', 'TCS'],
 ['TCS', 'EICHERMOT', 'APOLLOHOSP', 'TATAMOTORS', 'DRREDDY'],
 ['WIPRO', 'APOLLOHOSP', 'UPL', 'COALINDIA', 'EICHERMOT'],
 ['TCS', 'APOLLOHOSP', 'UPL', 'TATASTEEL', 'NESTLEIND'],
 ['BPCL', 'LT', 'BRITANNIA', 'TCS', 'EICHERMOT'],
 ['EICHERMOT', 'NESTLEIND', 'ITC', 'CIPLA', 'TECHM'],
 ['DRREDDY', 'TITAN', 'COALINDIA', 'ITC', 'POWERGRID'],
 ['LT', 'TECHM', 'ITC', 'HDFC', 'ICICIBANK'],
 ['LT', 'COALINDIA', 'EICHERMOT', 'TCS', 'TATAMOTORS'],
 ['LT', 'INFY', 'ADANIPORTS', 'BAJFINANCE', 'BRITANNIA'],
 ['CIPLA', 'HEROMOTOCO', 'ASIANPAINT', 'UPL', 'TCS'],
```

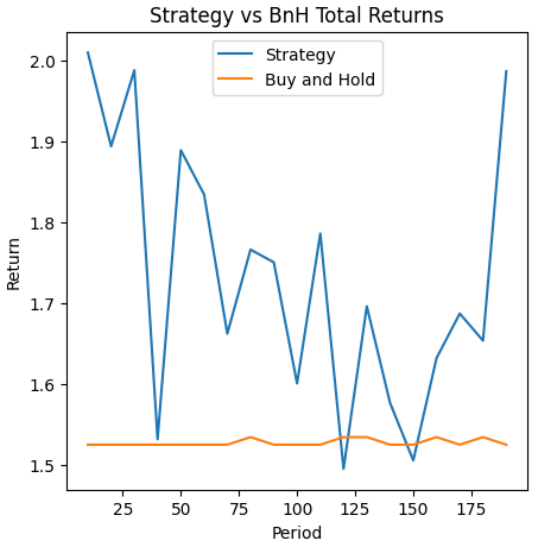
6. ## Portfolio Construction and Returns Calculation:
    - For each day, the code calculates the returns of the selected stocks by multiplying the overnight return with the predicted direction.
    - The average return of the selected stocks for each day is computed and stored.
    - This reflects the performance of the strategy and serves as a measure of portfolio returns.

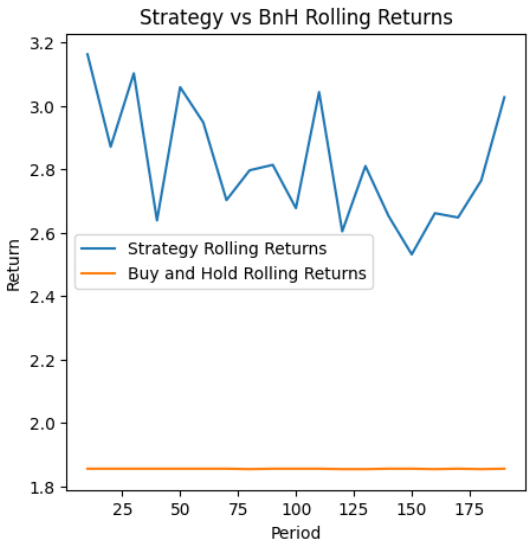
Date	Returns	Strategy_Nav
2020-02-10	NaN	NaN
2020-02-11	0.003105	1.003110
2020-02-12	0.009019	1.012198
2020-02-13	0.003735	1.015986
2020-02-14	0.000934	1.016935
...	...	...
2023-05-11	0.003419	3.265191
2023-05-12	0.004949	3.281390
2023-05-15	-0.003126	3.271149
2023-05-16	0.004516	3.285956
2023-05-17	0.003551	3.297644

810 rows × 2 columns

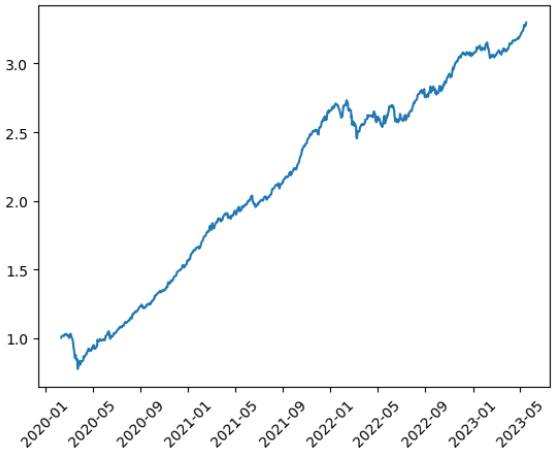
7. Strategy Evaluation and Adjustments:

- A DataFrame is created to store the portfolio returns and relevant metrics.
- The cumulative returns and drawdowns of the strategy are calculated to assess its performance over time.
- Transaction costs are considered by subtracting a small logarithmic value (log(0.999)) from the original returns.
- The adjusted returns and drawdowns are computed to evaluate the strategy's performance while accounting for transaction costs.

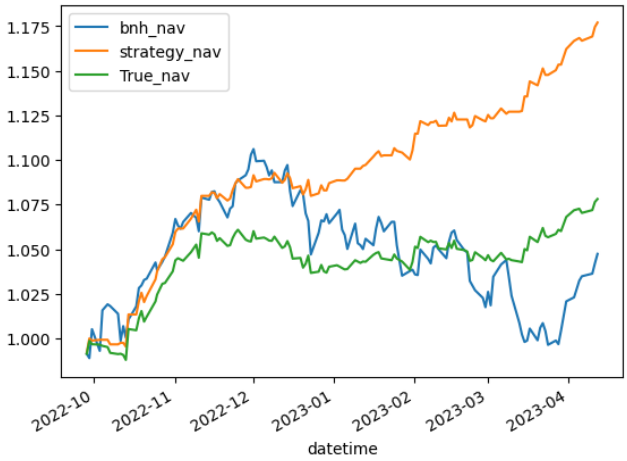




Nifty Backtest



Portfolio Backtest



Overall, the strategy aims to leverage machine learning techniques and technical indicators to predict the direction of next-day stock returns. It selects the most promising stocks based on the model's predictions and constructs a portfolio to capture potential returns. The performance of the strategy is evaluated through portfolio returns and relevant metrics.