Algorithmic Trading

David Smith
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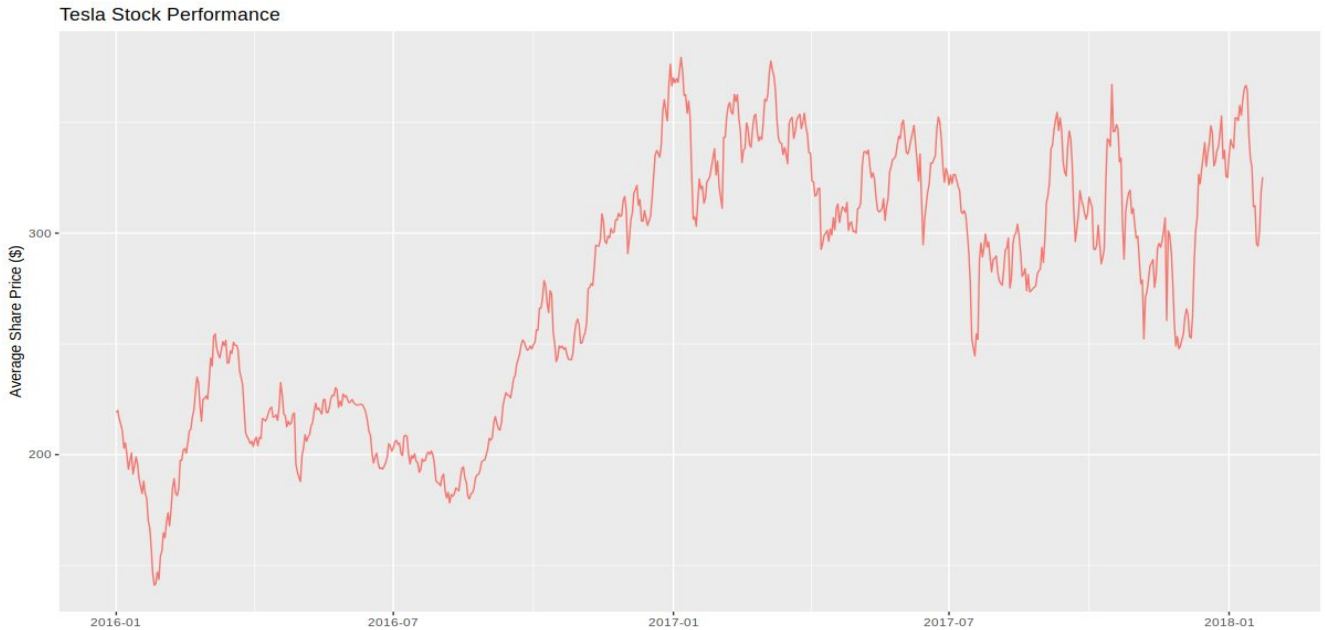
Outline of Approach

- Aim 1: Use a neural network to predict daily high and low prices for a given stock.
- Aim 2: Create a system of trading rules to operate based on these predictions.
- Aim 3: Test these rules over a set period to evaluate profitability.

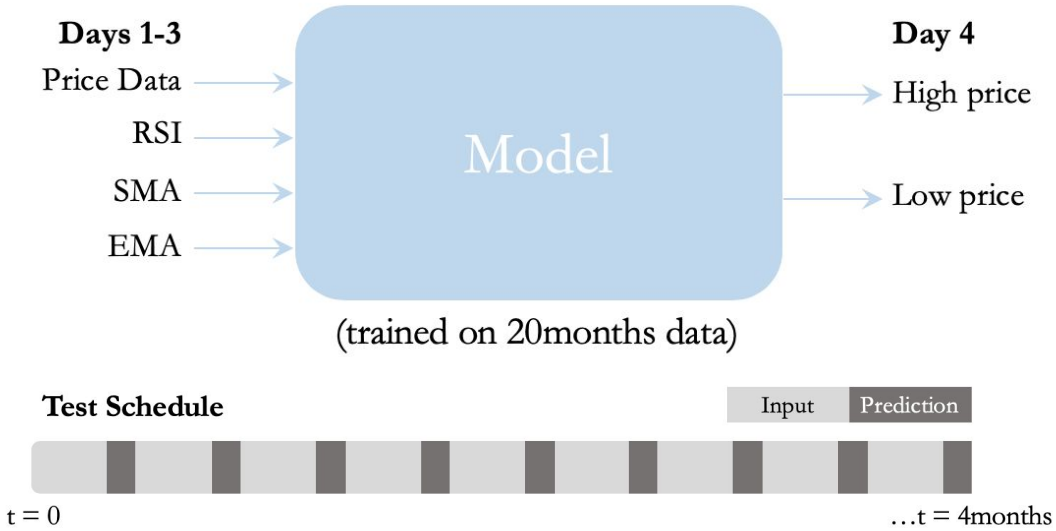
Choice of Asset

- Tesla, Inc: electric car and energy company.
- Two years worth of opening, closing, high and low prices and stock volumes.



Neural Network

- Inputs: previous three day's worth of prices and volume levels and technical indicators:
  - Relative Strength Index (RSI), Simple Moving Average (SMA) and Exponential Moving Average (EMA).



- Architecture consisted of 3 hidden layers in a (15,10,10) configuration.

Trading Rules

Buy Conditions:

- Predictions are within 1% of actual price.
- Predictions are below the 10-day Exponential Moving Average.
- We have money and don't own stocks.
- It's not the last day of trading.

Sell conditions:

- Predictions are within 1% of actual price.
- The selling price is higher than the buy price.
- We own stocks and have no money.

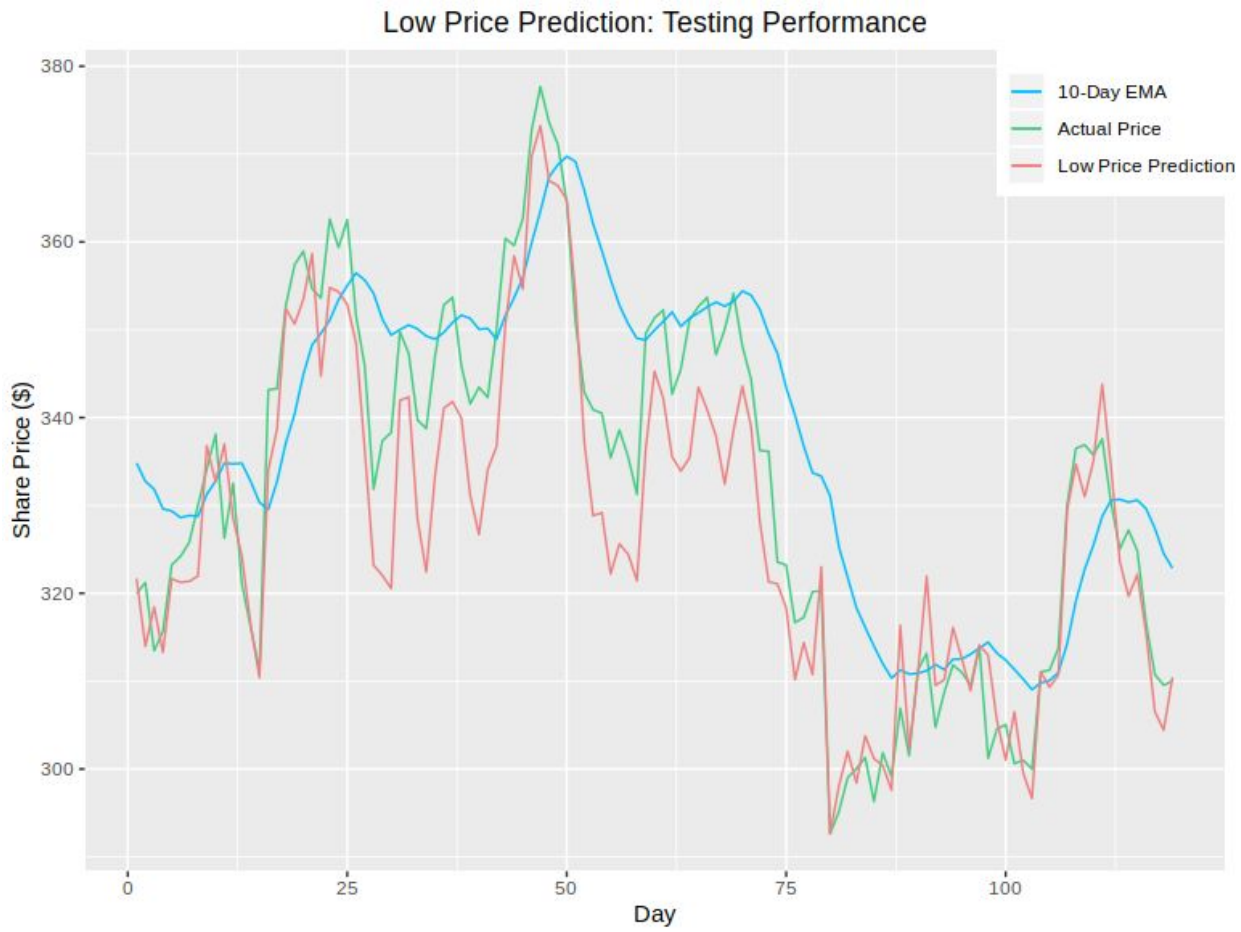
Or:

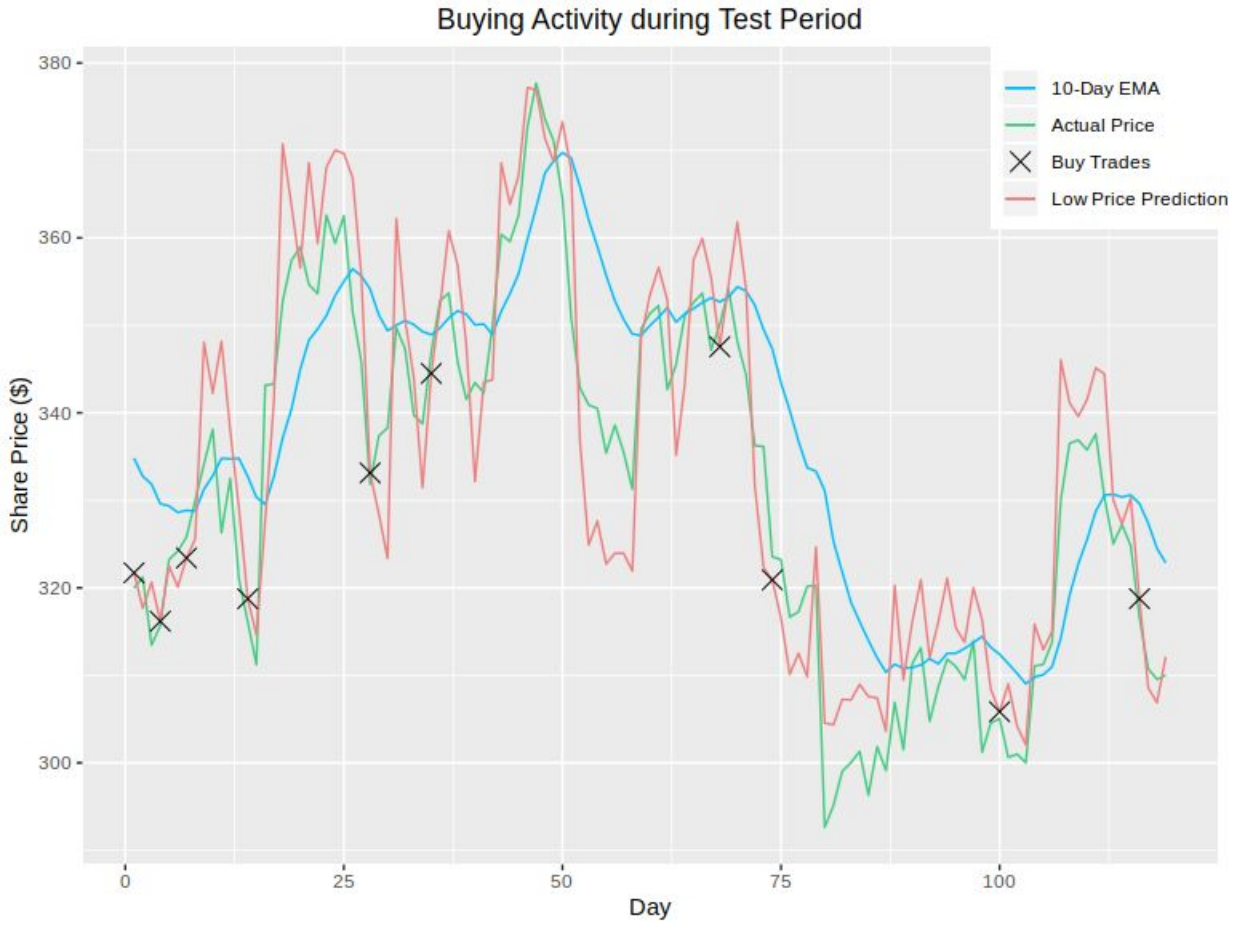
- It's the last day of trading.

If no conditions met: No Action.

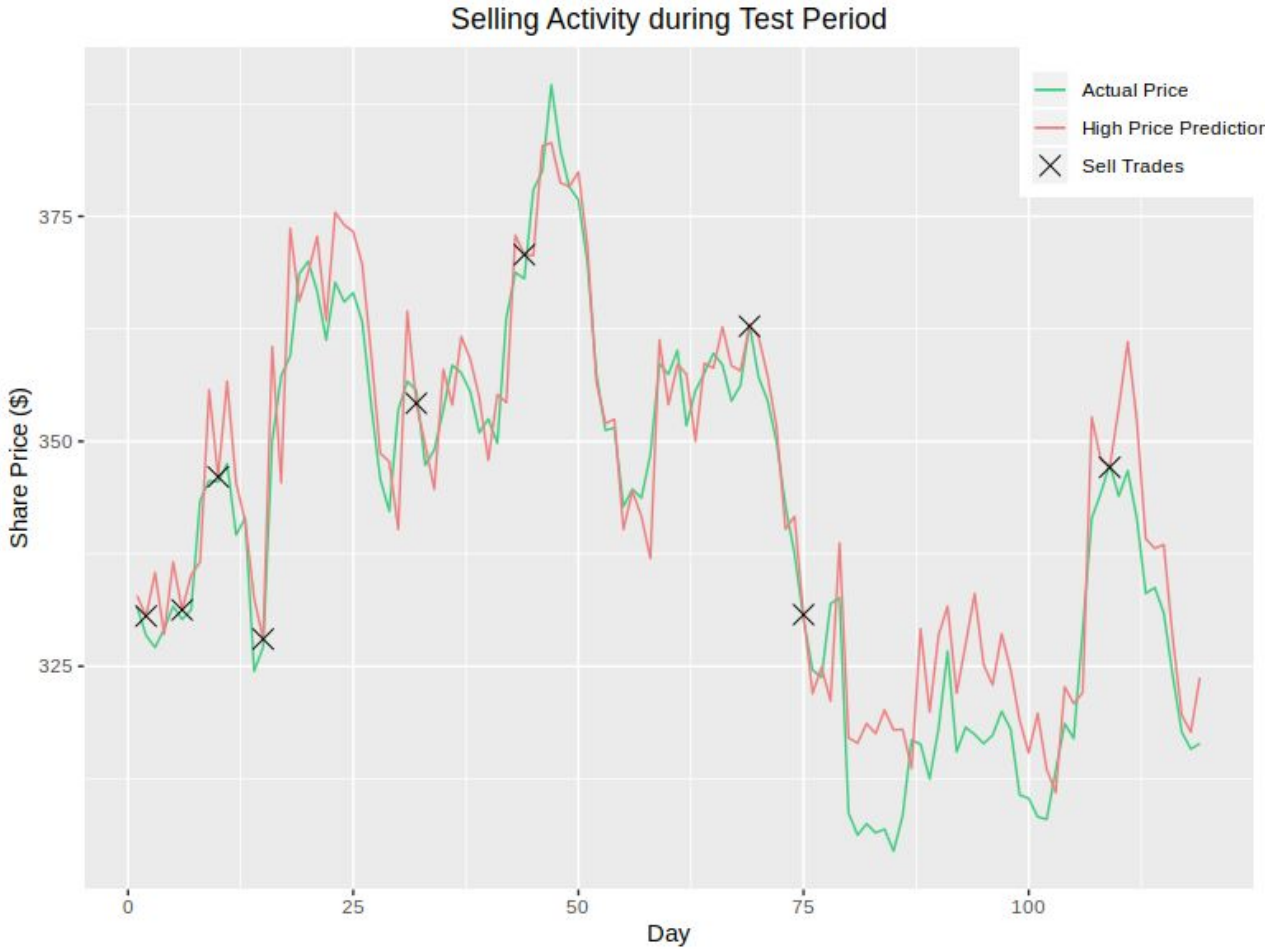
Training the Network

- Root Mean Squared Error of 0.5616
- Average share price $285
- Very low..


Low Price Prediction: Testing Performance
380
360
340
320
300
Share Price ($)
0
25
50
75
100
Day
10-Day EMA
Actual Price
Low Price Prediction


Buying Activity during Test Period
380
360
340
320
300
Share Price ($)
0
25
50
75
100
Day
10-Day EMA
Actual Price
Buy Trades
Low Price Prediction


High Price Prediction: Testing Performance
Actual Price
High Price Predictior
375
350
325
300
Share Price ($)
0
25
50
75
100
Day


Selling Activity during Test Period
Actual Price
High Price Predictior
Sell Trades
Share Price ($)
375
350
325
0
25
50
75
100
Day


Trading System Performance
10-Day EMA
Buy Trades
High Price Prediction
Low Price Prediction
Sell Trades
Share Price ($)
380
360
340
320
300
0
25
50
75
100
Day
Trading Activity
Buy
Hold
Sell
0
25
50
75
100
Day

Results

- Returns of **56.83%**
- 18 trades over 120 days: 9 buys and 9 sells
- Profit of **$5683** from initial investment of **$10000**

Reflections

- High sensitivity to volatility
  - Tendency to overfit.
- Strict but robust rules
  - Designed to minimize risk.
- Conservative trading system

Thank you for listening.

Any Questions?

Appendix