

# Lab 4 Result

Group 3

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## Moving Average Model

Model: We trained a basic moving average model to test our strategy. Here we use ARIMA(p,d,q). At first, we set the parameter as (0, 0, 1), then we found that the predicted price trend is flat. Thus, later we adjust the parameter and choose the least RSME as our final results.

Data: Since ARIMA is univariate, we only input close price to train the model. To better train the model, we need to remove the seasonality and trend in order to reach stationary. In data preparation, we transformed the close price into a logarithmic form. However, after the transformation, it still have the trend in the log\_close data.

Strategy: our strategy in the MA model is to create a buy signal when the daily return > 0, else do nothing. Buy signal -> 1, Hold, -> 0

Results: In the MA model, the predicted price does not follow the same trend as the actual price. Instead, it tends to predict the trend in a seasonal way. We believe that the input price may still contain seasonality and trend, thus the model couldn't accurately predict the stock price. When the predicted price tends to go down, the signal will be 0, and our strategy return will result in 0%.

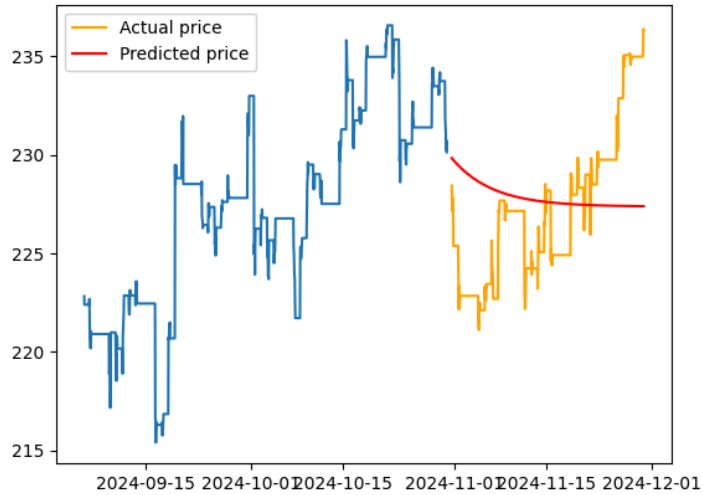
AAPL

MA Model ARIMA(2,0,1):

RMSE: 4.203

S\_return: 0%

M\_return: 1.03%



```
RMSE: 4.188107442945759  
s_return on AAPL: 0.0 %  
m_return on AAPL: 3.4691018201711055 %
```

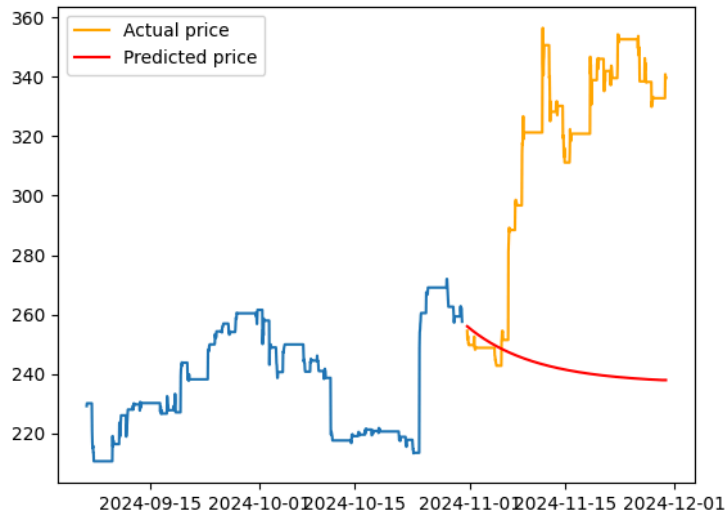
TSLA

MA Model ARIMA(2,0,1):

RMSE: 81.469

S\_return: 0%

M\_return: 33.47%



```
RMSE: 81.43661273633606
s_return on TSLA: 0.0 %
m_return on TSLA: 33.47083087802012 %
```

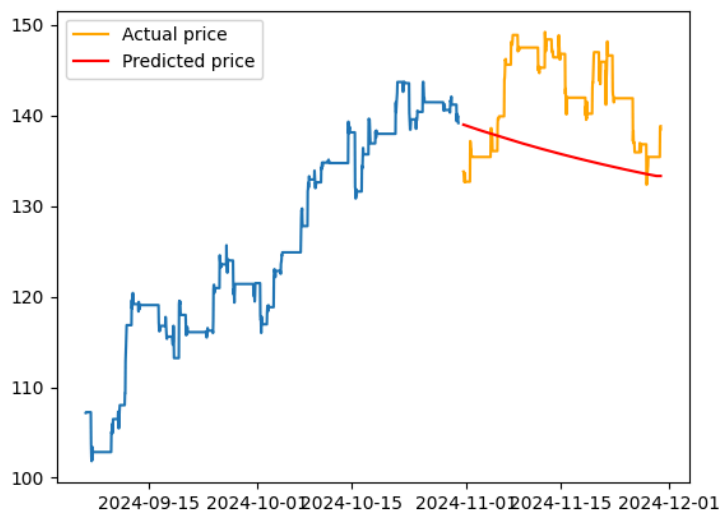
NVDA

MA Model ARIMA(2,0,1):

RMSE: 7.96

S\_return: 0%

M\_return: 3.744%



```
RMSE: 7.9647406724236305
s_return on NVDA: 0.0 %
m_return on NVDA: 3.7441222629100324 %
```

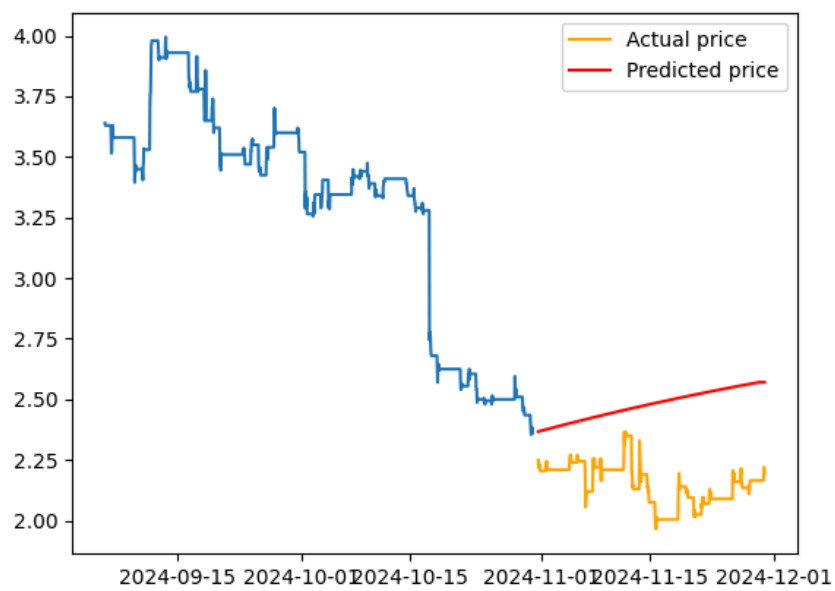
LCID

MA Model ARIMA(1,0,1):

RMSE: 0.3507

S\_return: -2.477%

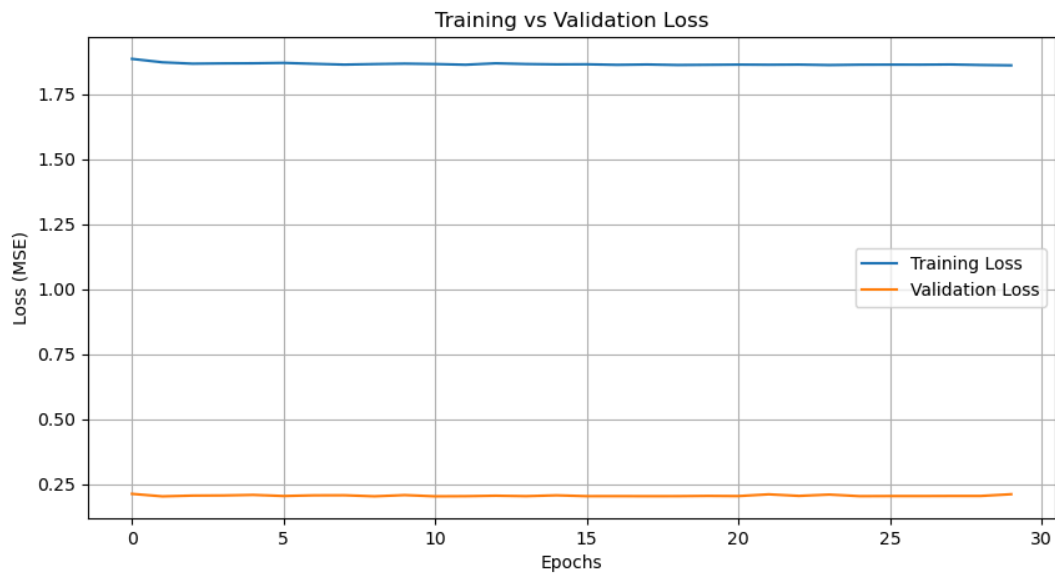
M\_return: -2.66%



```
RMSE: 0.3507273050486567
s_return on LCID: -2.4774774774774744 %
m_return on LCID: -2.66666666666666505 %
```

# LSTM Model

First train: epochs=30, batch\_size=32, learning\_rate=0.0005



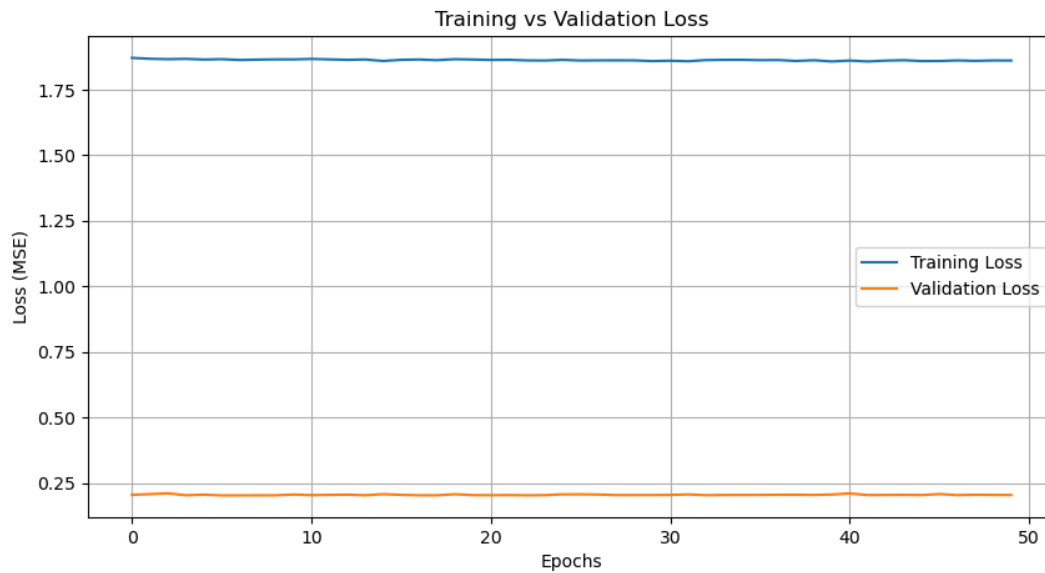
90/90 ██ 2s 14ms/step

23/23 ██ 0s 8ms/step

Final Training MSE: 1.8611

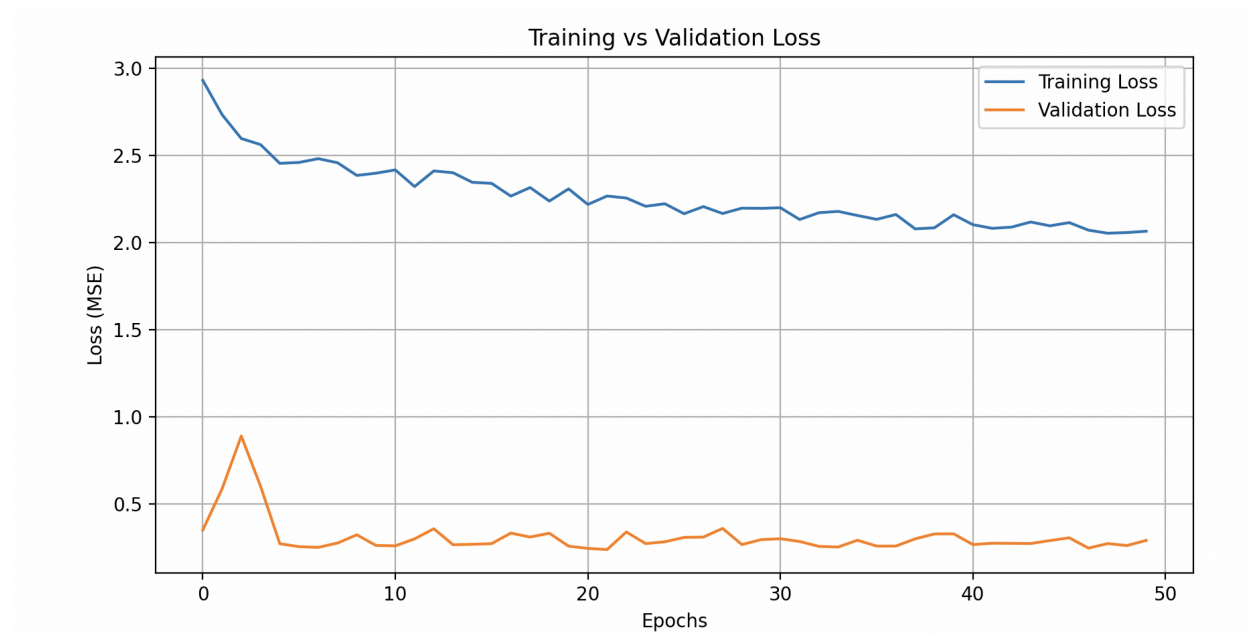
Final Test MSE: 0.2105

Second train: epochs=50, batch\_size=16, , learning\_rate=0.0005,



```
23/23 ————— 0s 9ms/step  
Final Training MSE: 1.8573  
Final Test MSE: 0.2039|
```

Third train: epochs=50, batch\_size=32, learning\_rate=0.0001



Final Training MSE: 1.8581

Final Test MSE: 0.2037

After consideration, we decide to use the last model to train

```
[mysql> select * from predicted_stock_data where trade_signal != "HOLD";
```

id	stock	datetime	close	predicted_diff_pct	trade_percentage	trade_signal
15818	NVDA	2025-01-27 14:30:00	124.03	-1.019501	-0.100000	SELL 10%
17786	LCID	2024-09-13 17:30:00	3.93	-0.167908	-0.030000	SELL 3%
17787	LCID	2024-09-13 18:30:00	3.93	-0.218193	-0.040000	SELL 4%
17788	LCID	2024-09-13 19:30:00	3.93	-0.248240	-0.050000	SELL 5%
17789	LCID	2024-09-16 13:30:00	3.83	-0.266674	-0.050000	SELL 5%
17790	LCID	2024-09-16 14:30:00	3.83	-0.245379	-0.050000	SELL 5%
17791	LCID	2024-09-16 15:30:00	3.81	-0.243957	-0.050000	SELL 5%
17792	LCID	2024-09-16 16:30:00	3.79	-0.200040	-0.040000	SELL 4%
17793	LCID	2024-09-16 17:30:00	3.80	-0.144038	-0.030000	SELL 3%
17794	LCID	2024-09-16 18:30:00	3.81	-0.115606	-0.020000	SELL 2%
17795	LCID	2024-09-16 19:30:00	3.77	-0.101381	-0.020000	SELL 2%
17796	LCID	2024-09-17 13:30:00	3.90	-0.085720	-0.020000	SELL 2%
17797	LCID	2024-09-17 14:30:00	3.91	-0.119330	-0.020000	SELL 2%
17798	LCID	2024-09-17 15:30:00	3.84	-0.128193	-0.030000	SELL 3%
17801	LCID	2024-09-17 18:30:00	3.77	0.090325	0.020000	BUY 2%
17802	LCID	2024-09-17 19:30:00	3.78	0.169416	0.030000	BUY 3%

### Trading Simulation Results:

We simulate from '2025-01-01 14:30:00' to '2025-01-10 23:59:59' using our own strategy. We assume we buy 200 share at the initial time.

Here is the result:

For NVDA

```
Trading Simulation Results
Start Date: 2025-01-02 14:30:00
End Date: 2025-01-10 20:30:00

Initial Stocks: 200
Initial Price: $136.98
Initial Portfolio Value: $27396.00

Final Stocks: 16
Final Price: $135.86
Final Cash: $25977.83
Final Portfolio Value: $28151.59
```

For LCID:



## Trading Simulation Results

Start Date: 2025-01-02 14:30:00

End Date: 2025-01-10 20:30:00

Initial Stocks: 200

Initial Price: \$3.07

Initial Portfolio Value: \$614.00

Final Stocks: 189

Final Price: \$3.02

Final Cash: \$60.98

Final Portfolio Value: \$631.76

For TSLA:

## Trading Simulation Results

Start Date: 2025-01-02 14:30:00

End Date: 2025-01-10 20:30:00

Initial Stocks: 200

Initial Price: \$380.34

Initial Portfolio Value: \$76068.00

Final Stocks: 197

Final Price: \$394.86

Final Cash: \$2110.36

Final Portfolio Value: \$79897.78

However, we lose money for AAPL:

## Trading Simulation Results

Start Date: 2025-01-02 14:30:00

End Date: 2025-01-10 20:30:00

Initial Stocks: 200

Initial Price: \$245.74

Initial Portfolio Value: \$49148.00

Final Stocks: 200

Final Price: \$236.93

Final Cash: \$384.14

Final Portfolio Value: \$47770.14