DYNA DRAGON

AI4IMPACT

TWOU STOCK PREDICTION CHALLENGE

PROJECT

FINALIST PRESENTATION

FINANCIAL FORECASTING DATATHON 2021

TABLE OF CONTENTS

Our content today is divided into four parts. Each part will be described with examples.

OBJECTIVE

The goal of this project is to get you to forecast TWOU stock prices.

Dyna Dragon

Define

Presentations are tools that can be used as speeches.

Determine

Presentations are tools that can be used as speeches.

NN Model

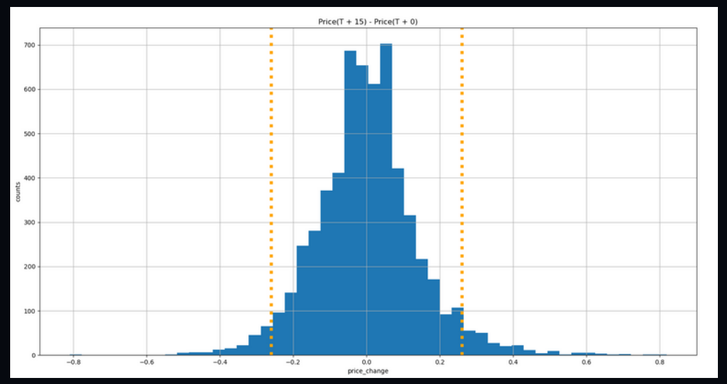
Presentations are tools that can be used as speeches.

Market

Presentations are tools that can be used as speeches.

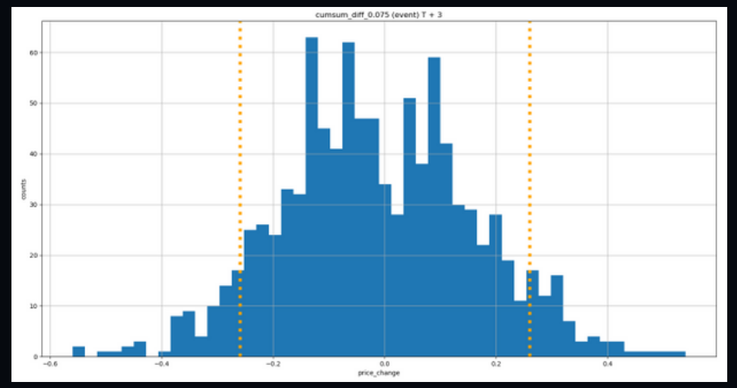
PRICE MOVEMENTS

T+15 , 5 MIN INTERVAL



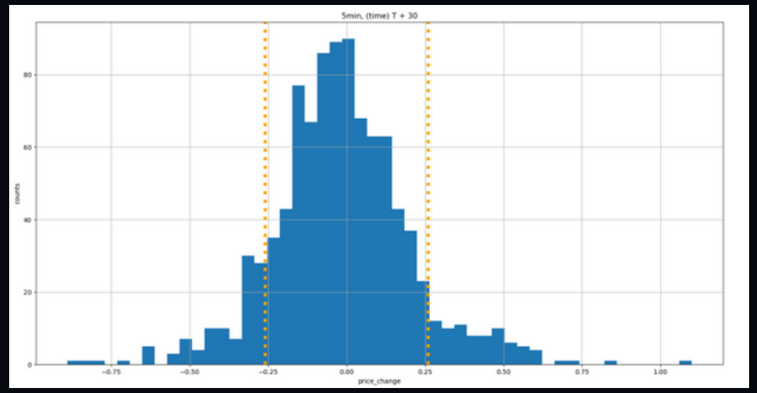
fraction of training examples > $0.26 : 0.09557

≈T+15, CUMSUM FILTER WITH THRESHOLD 0.075



fraction of training examples > $0.26 : 0.13497

T+30 , 5 MIN INTERVAL



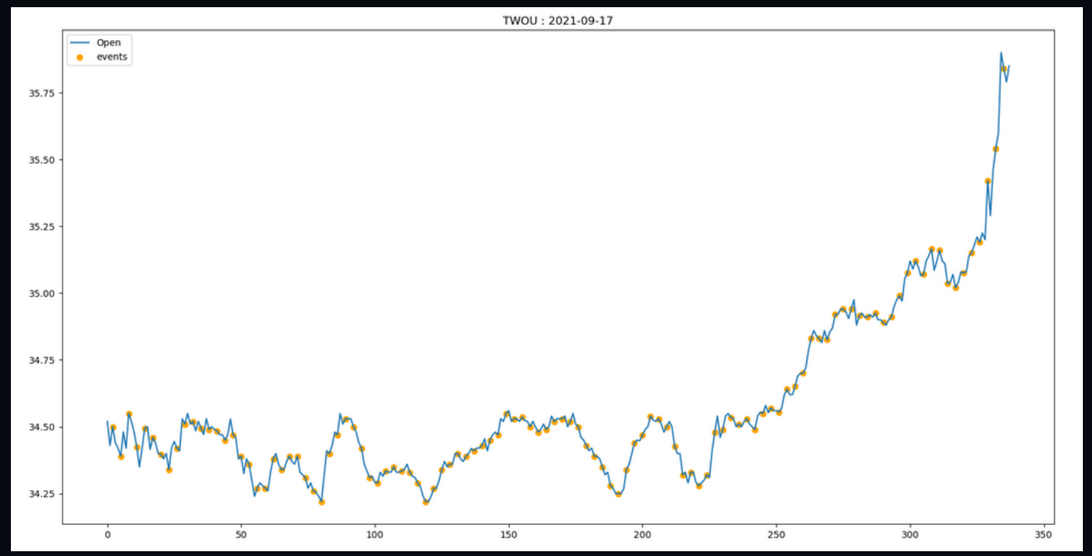
fraction of training examples > $0.26 : 0.18866

The cost of a call/put option is $26. This will buy us 100 lots. This means, that the resulting price movement must be at least $0.26 for us to break even.

SAMPLING

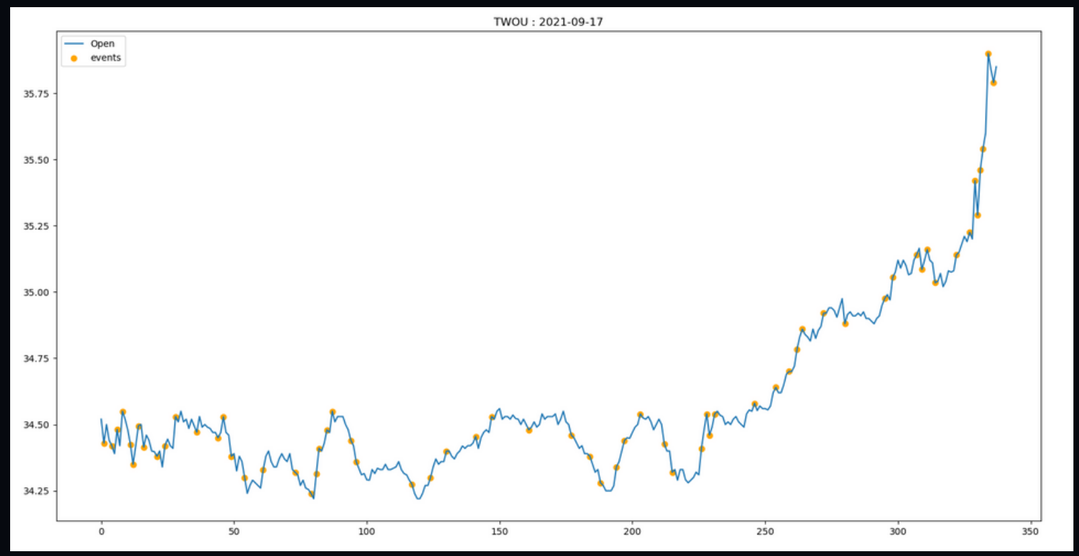
Scheme 3 : 5 min data, T + 35 min prediction

Scheme 1: Every 3 minutes



Sample Every 3rd time point
to improve the uniqueness of each
training example.

Scheme 2: cumsum filter 0.075



Sample regions with more price
movements.

PROCESS

A procedure of how to handle and perform work to accomplish a task

DATA TRANSFORM

1

Data Sources
Handling Missing Data
Grouping
Normalization
Filtering

NEURAL NETWORK MODEL

2

Model Settings
Training and test llosses
Training and test predictions
Actual Vs Predictions
Lagged Correlation

OBSERVE THE RESULTS

3

Experimenting and look for the best results

PUBLISH

4

Pubiish the best model

DATA NORMALIZATION

Normalization :
Prices, e.g. open close high low, do not need to be normalized,
prices differences are of order < 1
Volume is first normalized using : f(x) = log(x)
Then every feature is normalized f(x) = (x - MEAN(x))/STD(x)

NEURAL NETWORK MODEL 1

- Solver type: Adam
- Drop-out probability: 0.05
- 5 layers : 51-34-23-15-10
- 0.15 lrelu saturator
- L2 reg 1E-4 weight
- Input scaling without clamp
- no autoencoder
- force and momentum losses

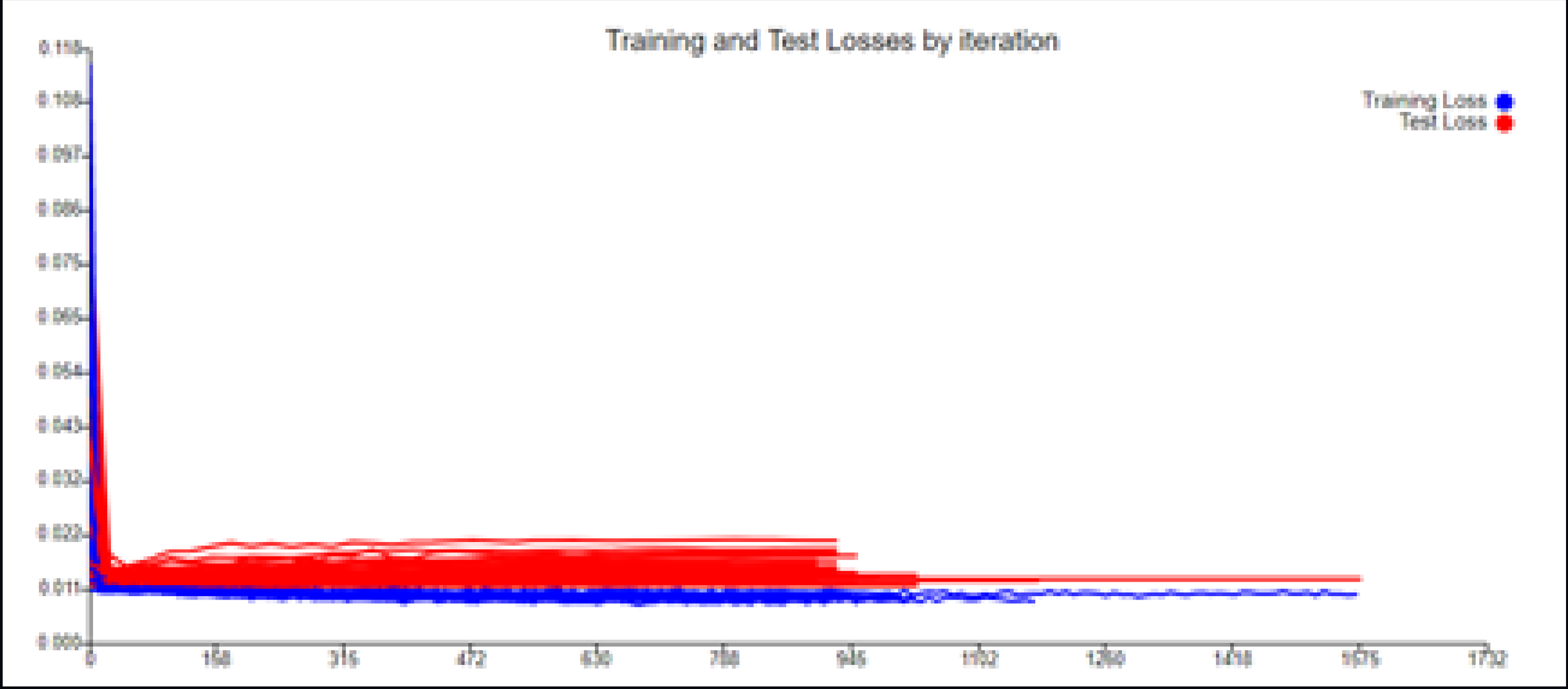
FEATURES

Pre-calculated Features:

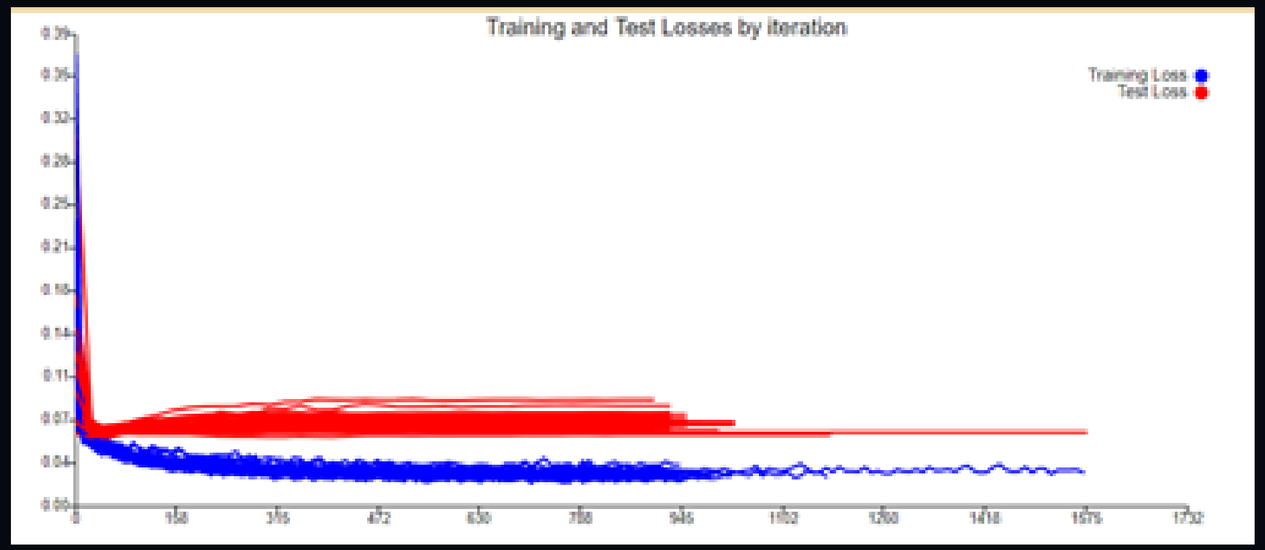
- diff_7
- force_5_lag_2
- frac_diff_d_0.6_win_50
- frac_diff_d_0.75_win_30_lag_10
- frac_diff_d_0.75_win_30_lag_20
- kurt_win_20_lag_10
- std_win_50
- skew_win_50
- log_vol_mean_win_20
- log_vol_mean_win_50

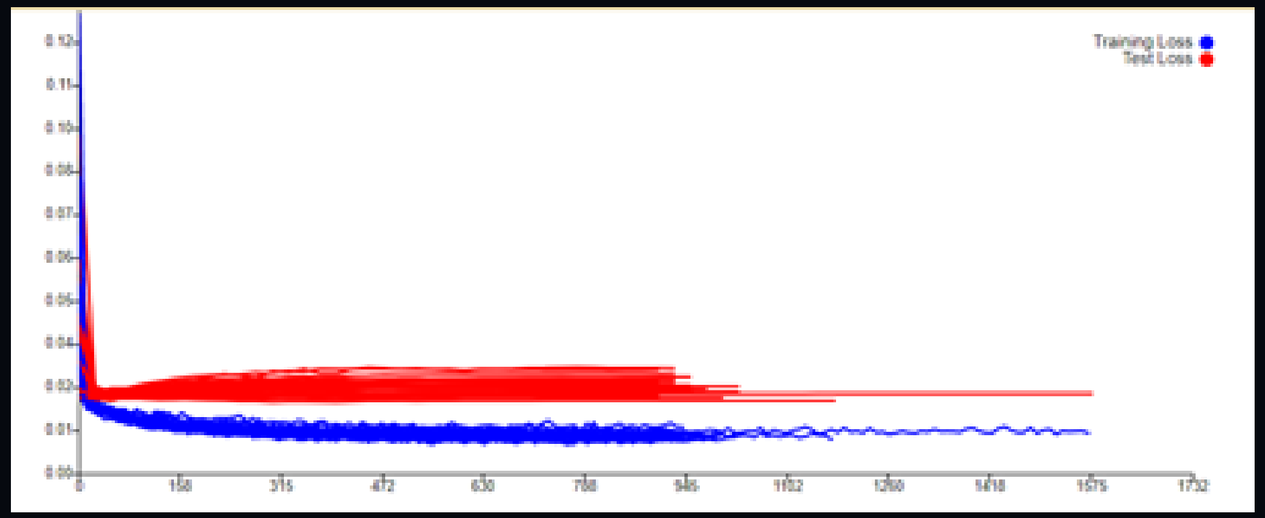
TRAINING AND TEST LOSSES

MODEL 1



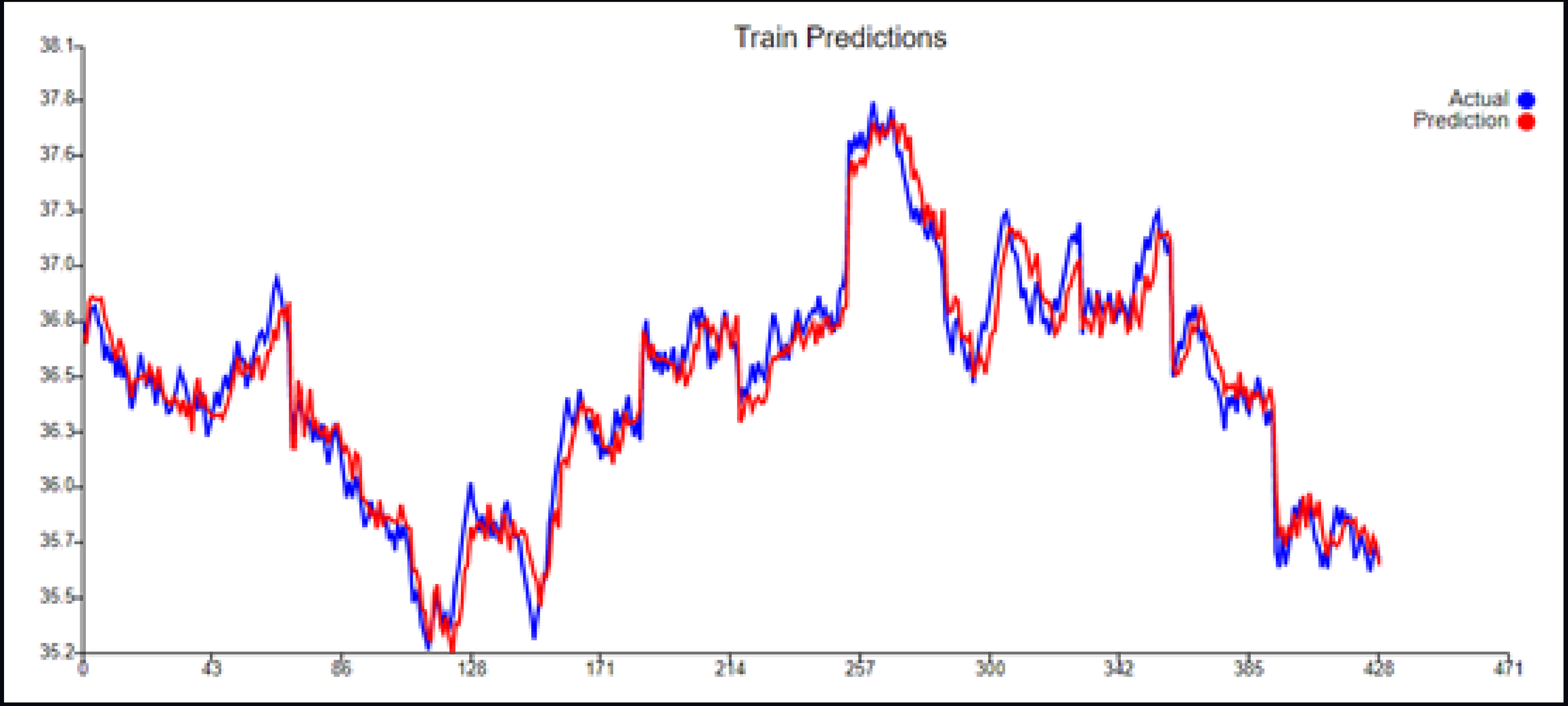
FORCE AND MOMENTUM LOSSES MODEL 1





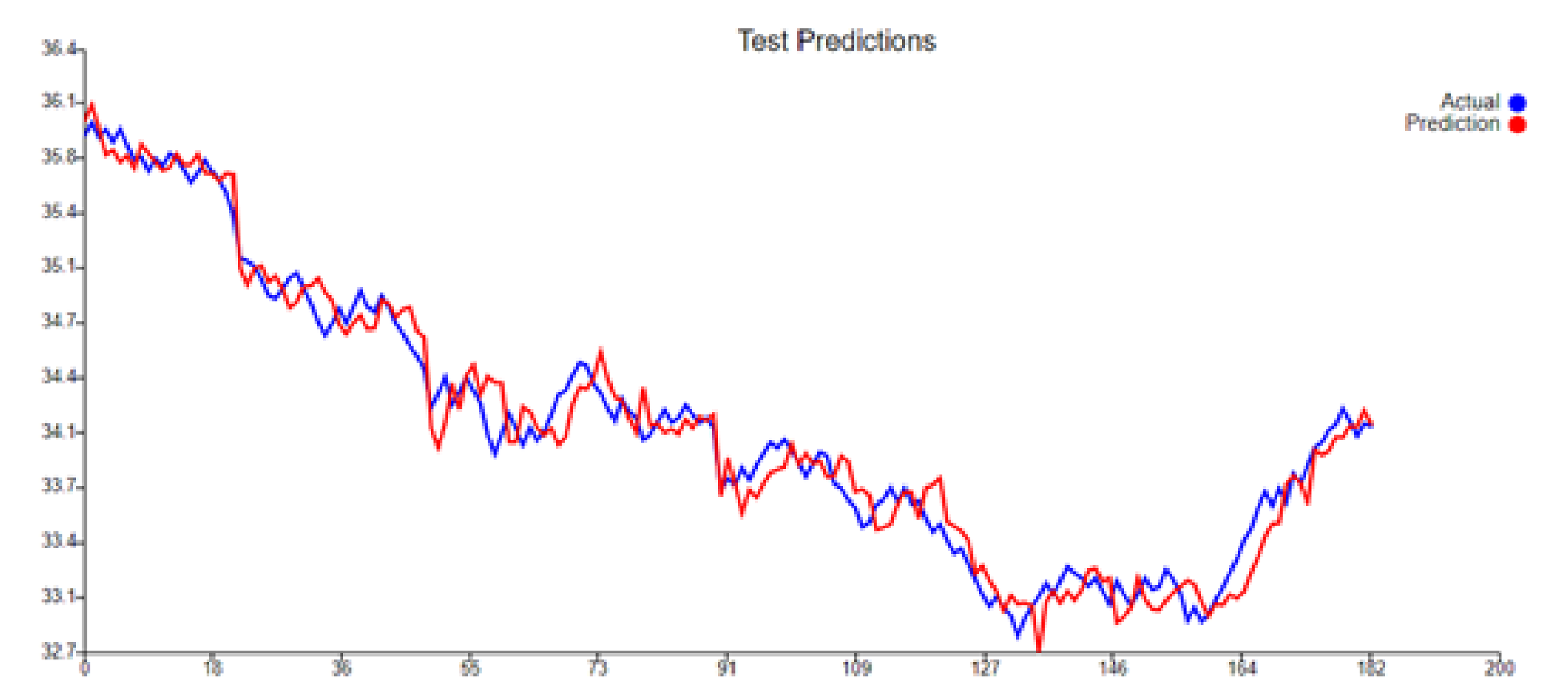
TRAINING PREDICTIONS

MODEL 1



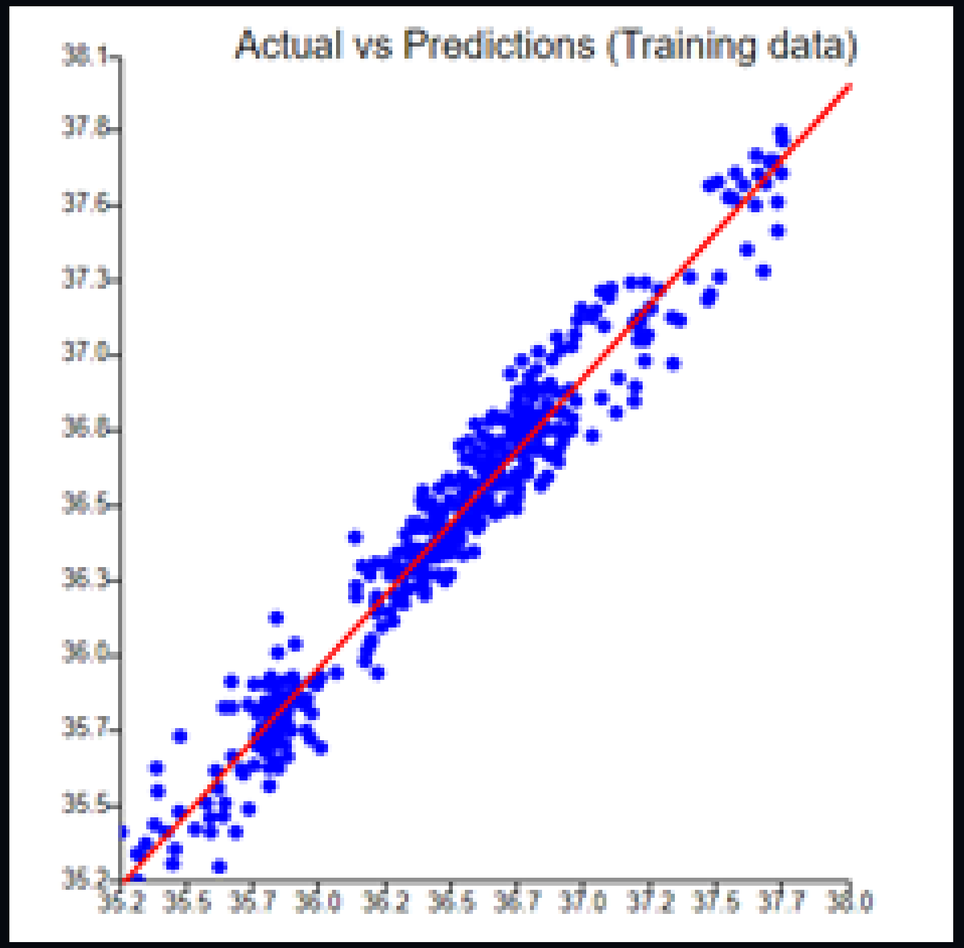
TEST PREDICTIONS

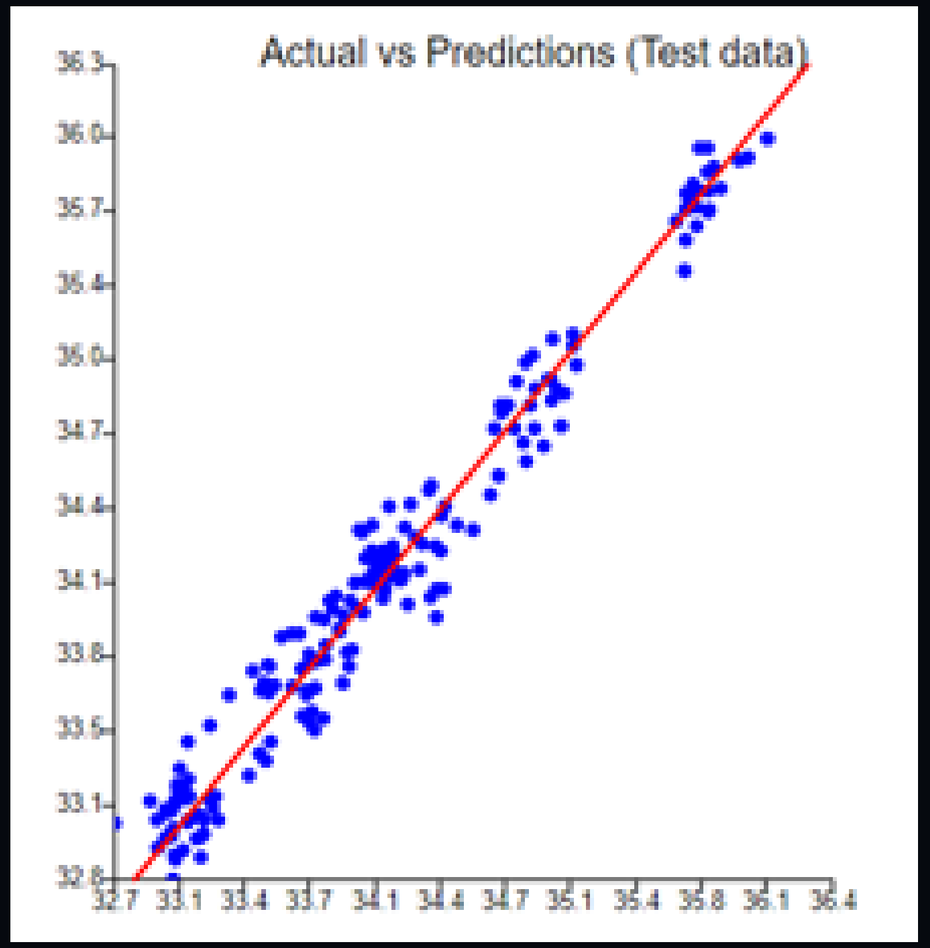
MODEL 1



ACTUAL VS PREDICTIONS

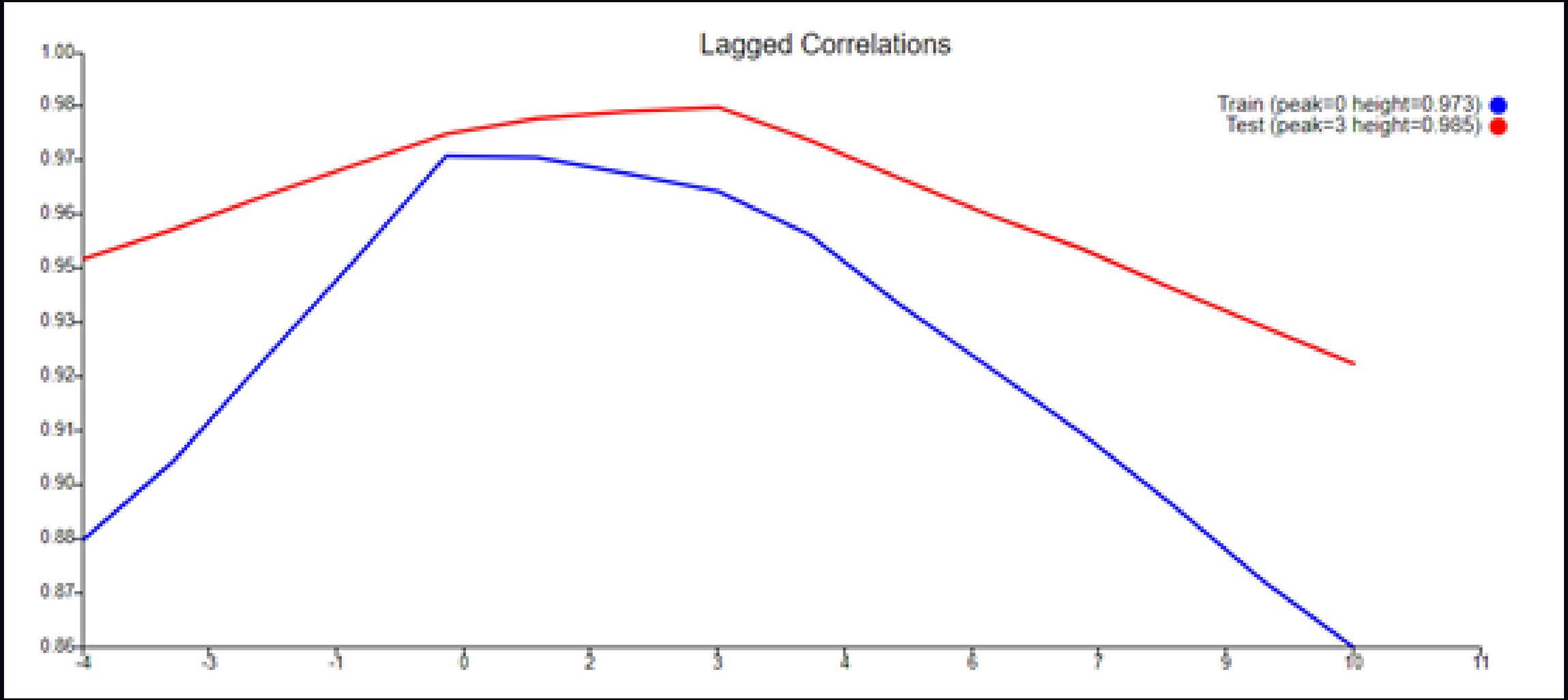
MODEL 1





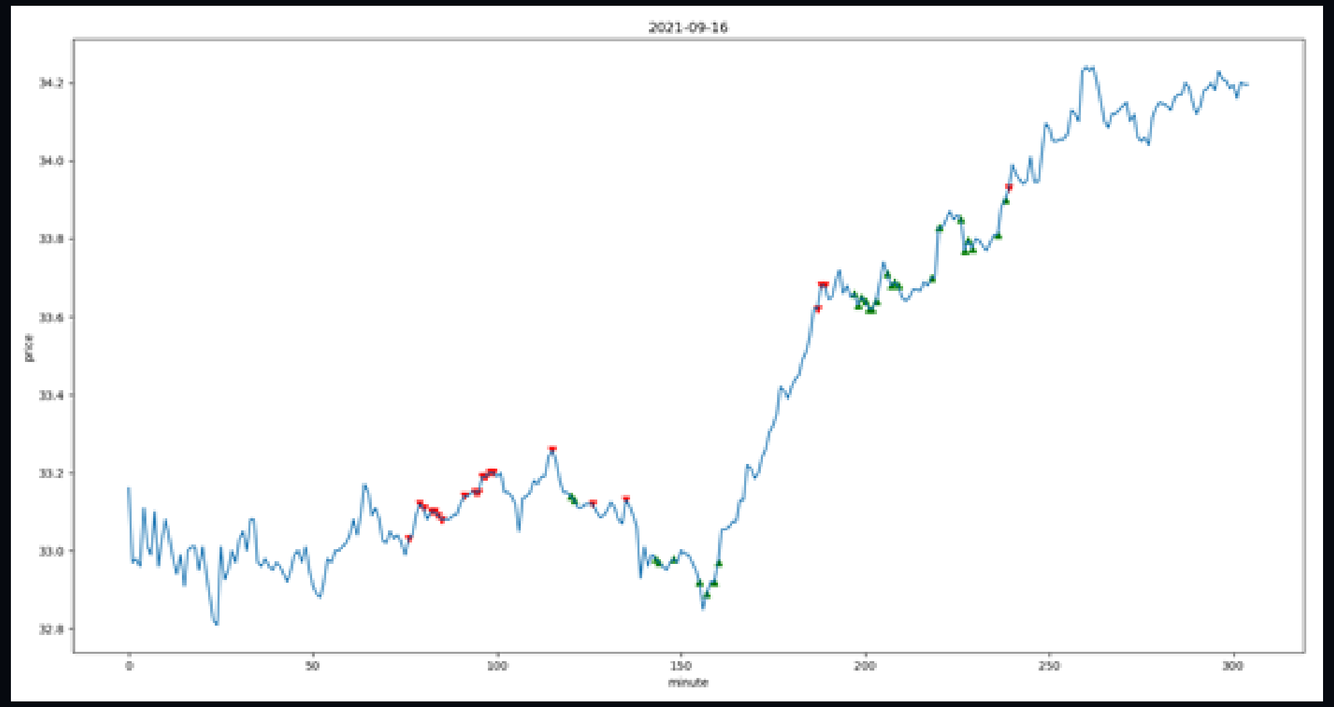
LAGGED CORRELATIONS

MODEL 1



BACK TESTING

MODEL 1



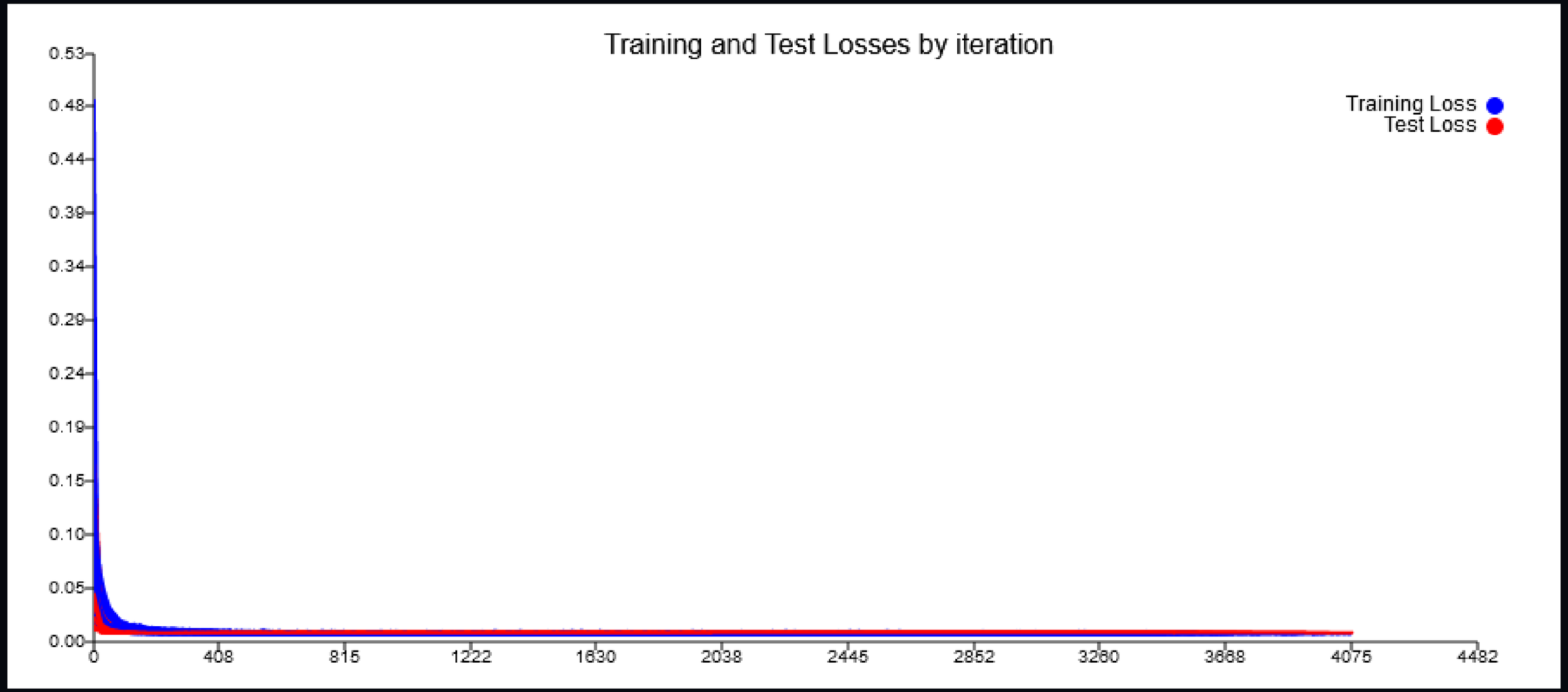
PROFIT : -247.929931640625
TOTAL ORDER SIZE : 26
PROFIT PER OPTION : -9.5357666015625

We set our threshold to 0.1, it has to be low enough to be able to trade at all

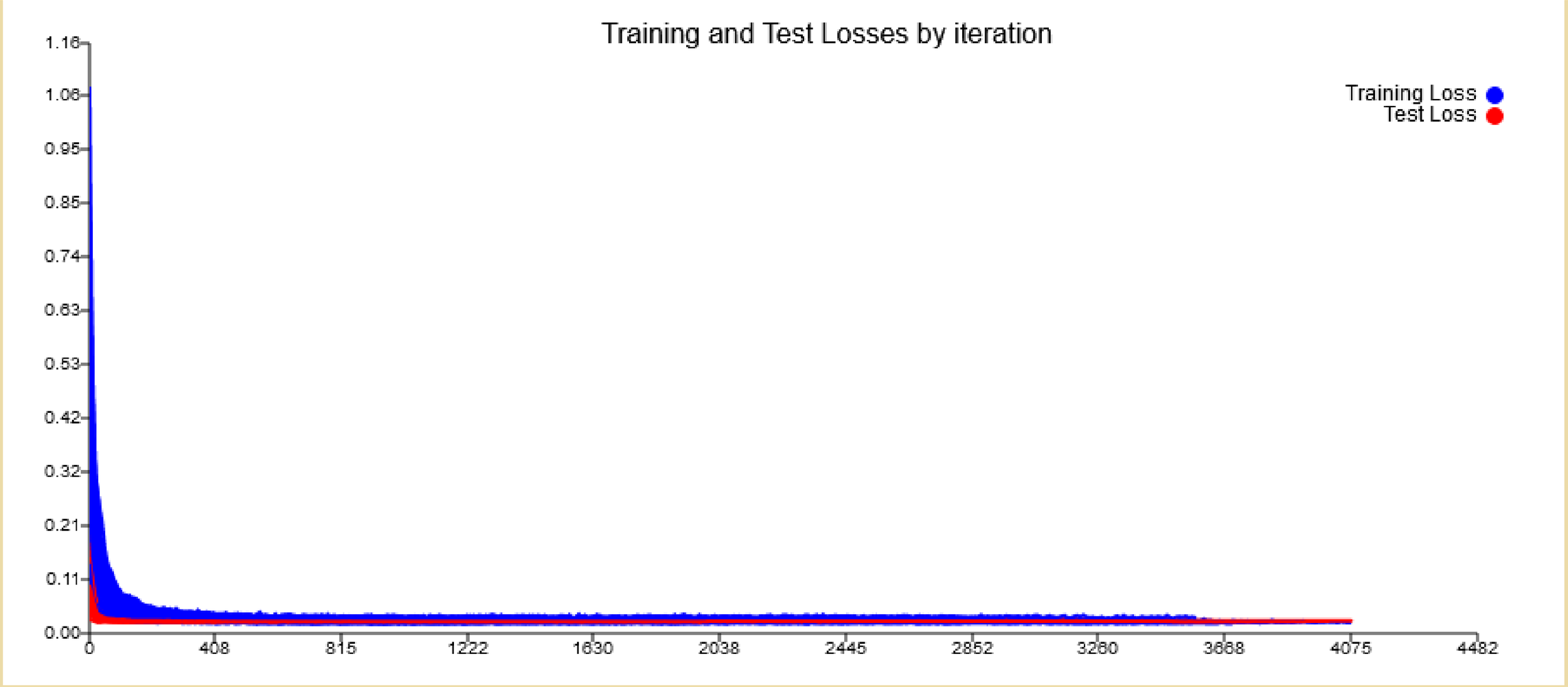
We use 60min options even if we cannot see that far since the cost is the same and there is a lack of mean reversion.

TRAINING AND TEST LOSSES

MODEL 2

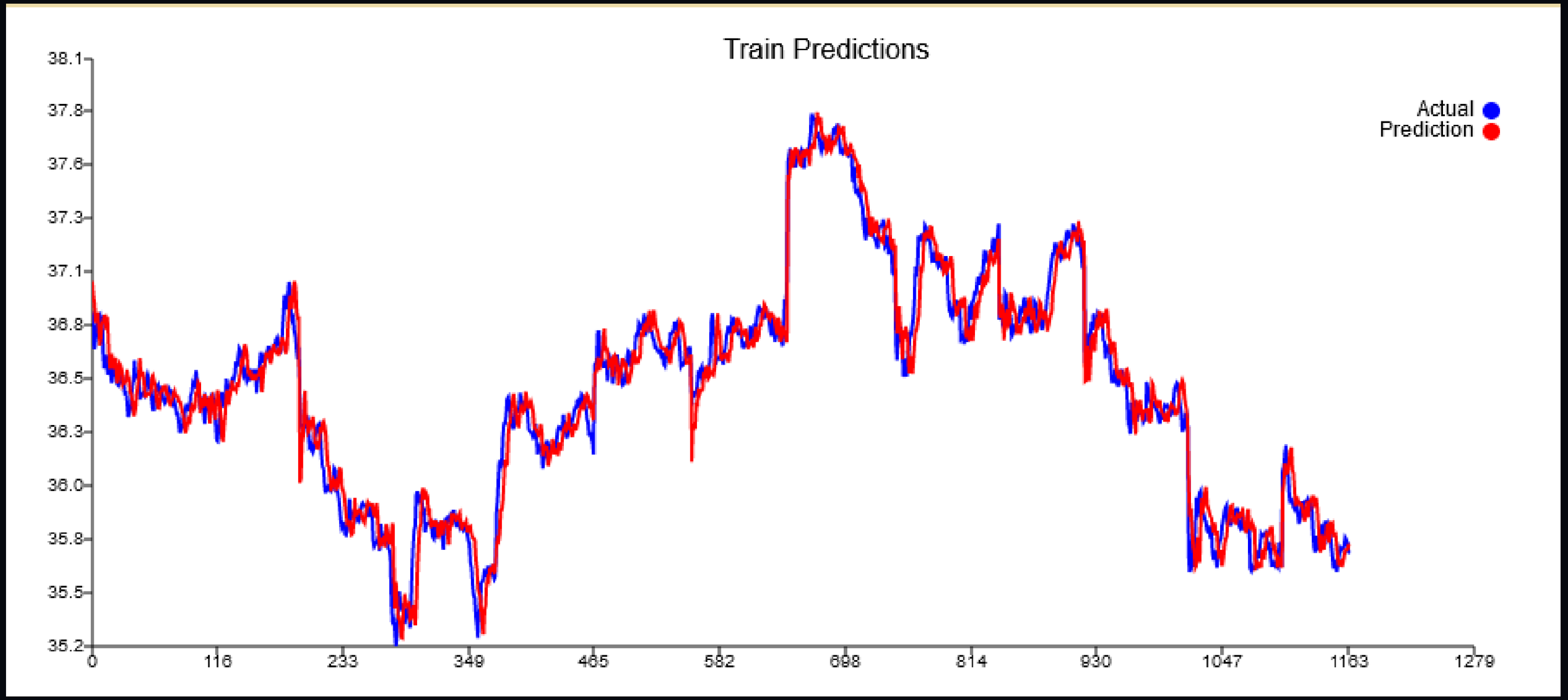


FORCE AND MOMENTUM LOSSES MODEL 2



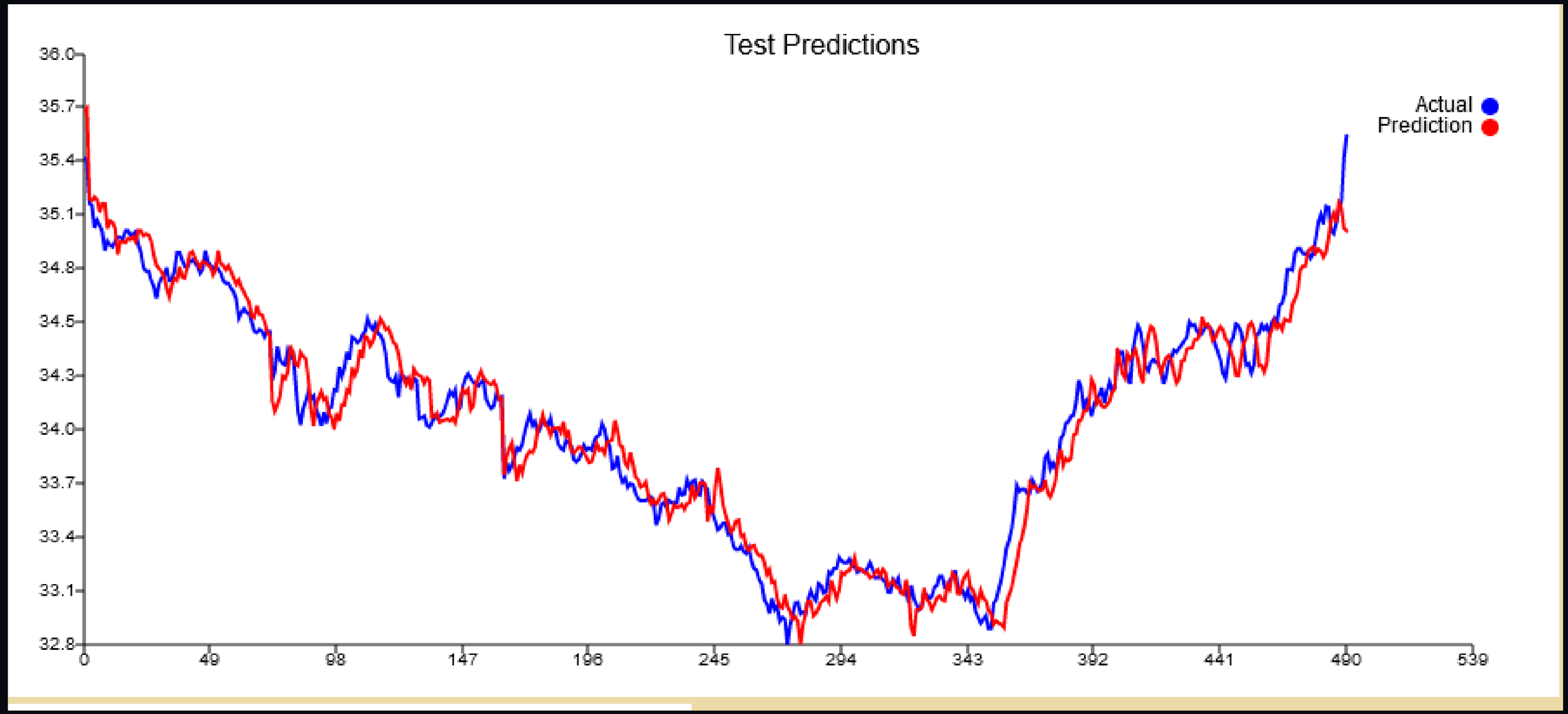
TRAINING PREDICTIONS

MODEL 2



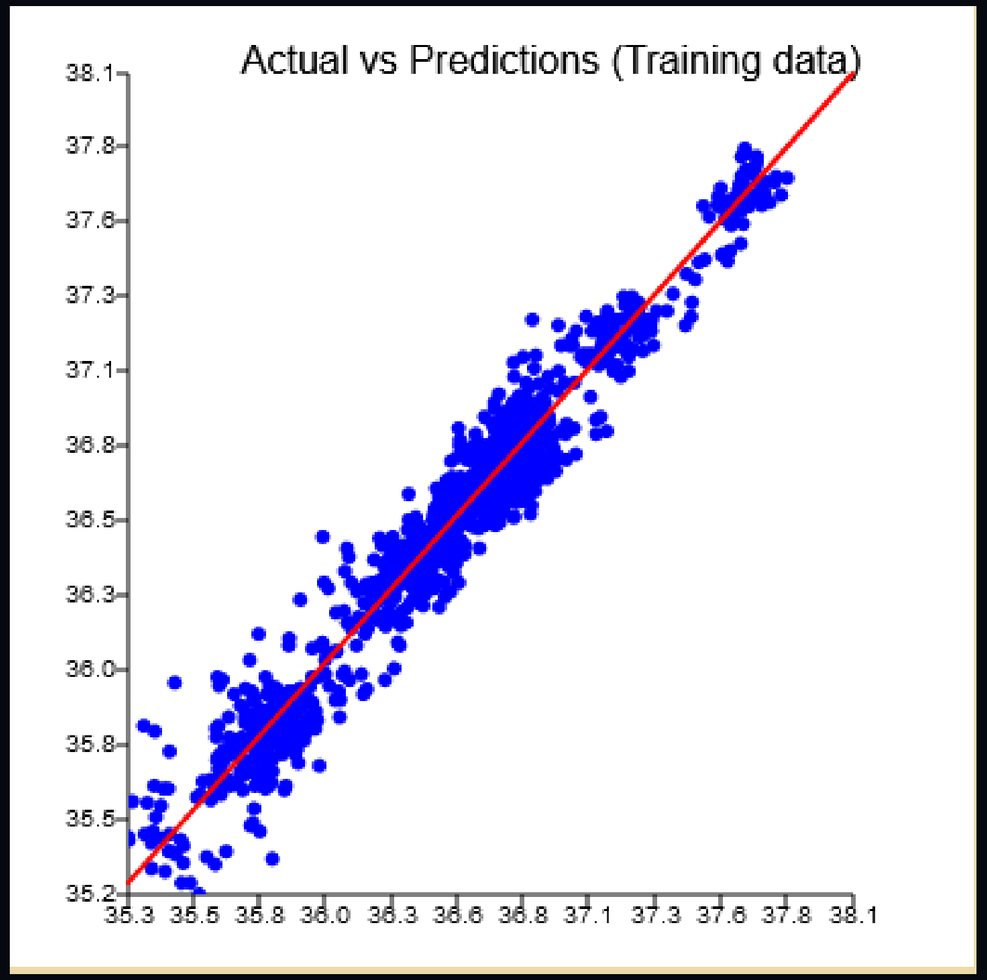
TEST PREDICTIONS

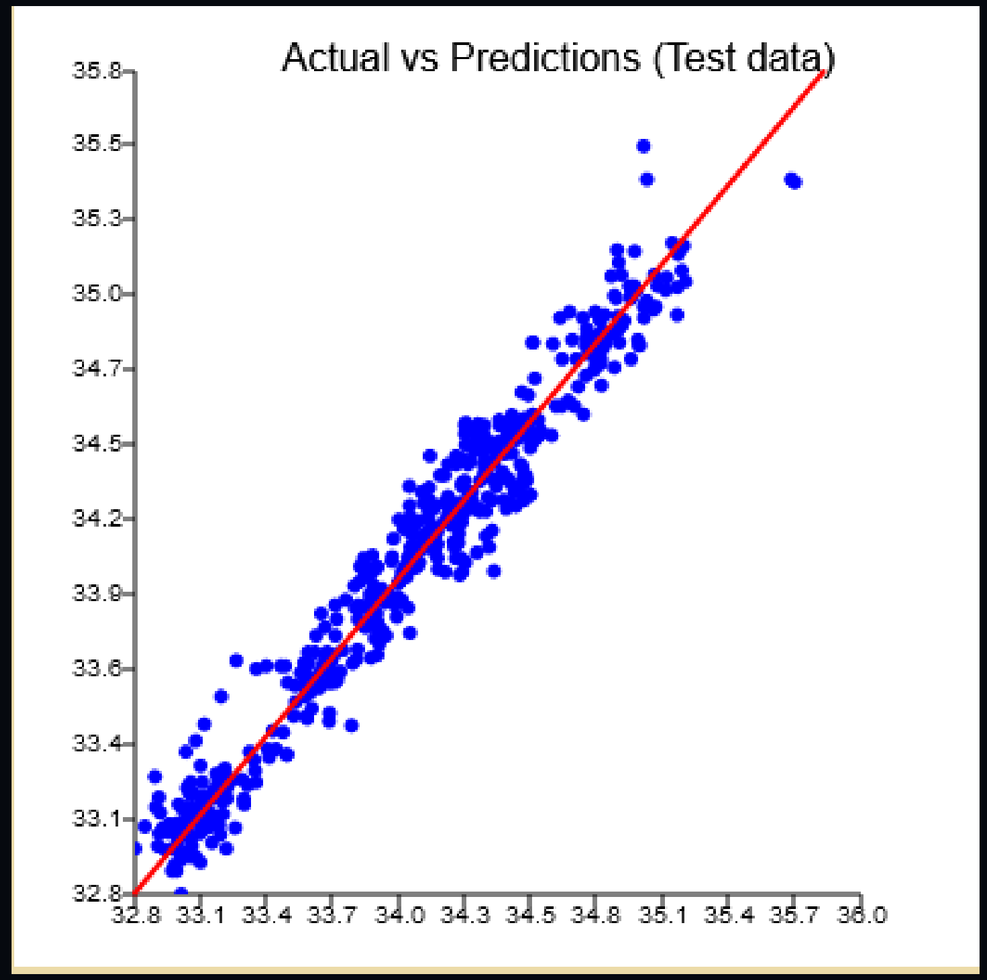
MODEL 2



ACTUAL VS PREDICTIONS

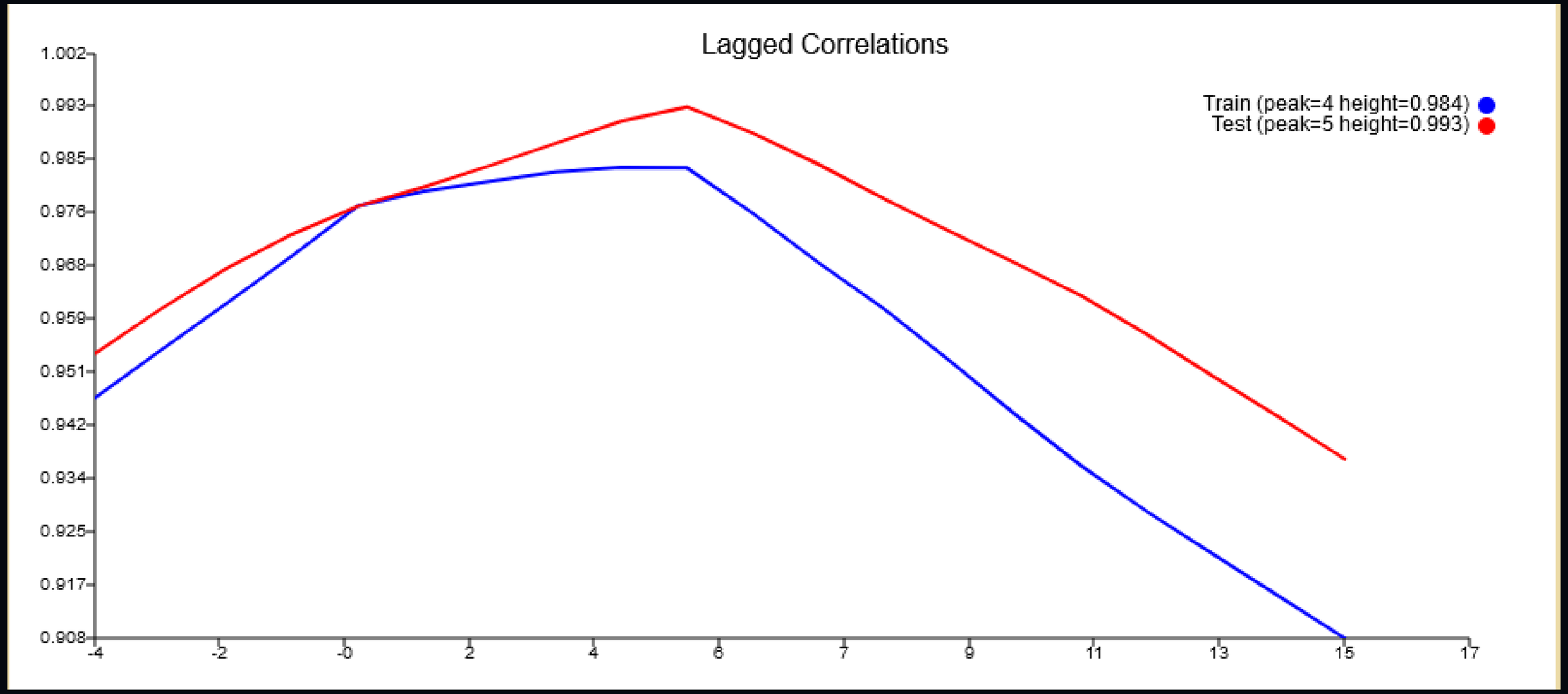
MODEL 2





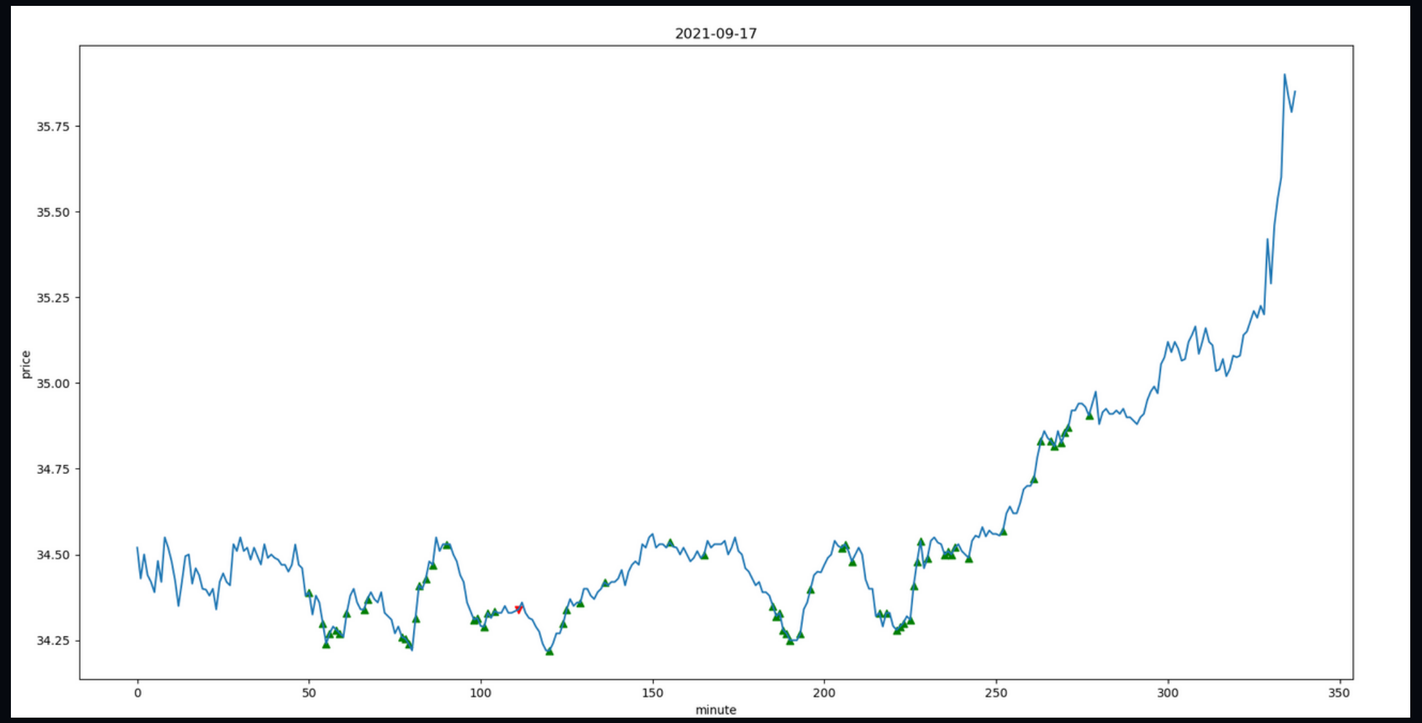
LAGGED CORRELATIONS

MODEL 2



BACK TESTING

MODEL 2



PROFIT : 55.03883361816406
TOTAL ORDER SIZE : 75
PROFIT PER OPTION : 0.7338511149088541

We set our threshold to 0.05, it has to be low enough to be able to trade at all

We use 60min options even if we cannot see that far since the cost is the same and there is a lack of mean reversion.

NEURAL NETWORK MODEL 3

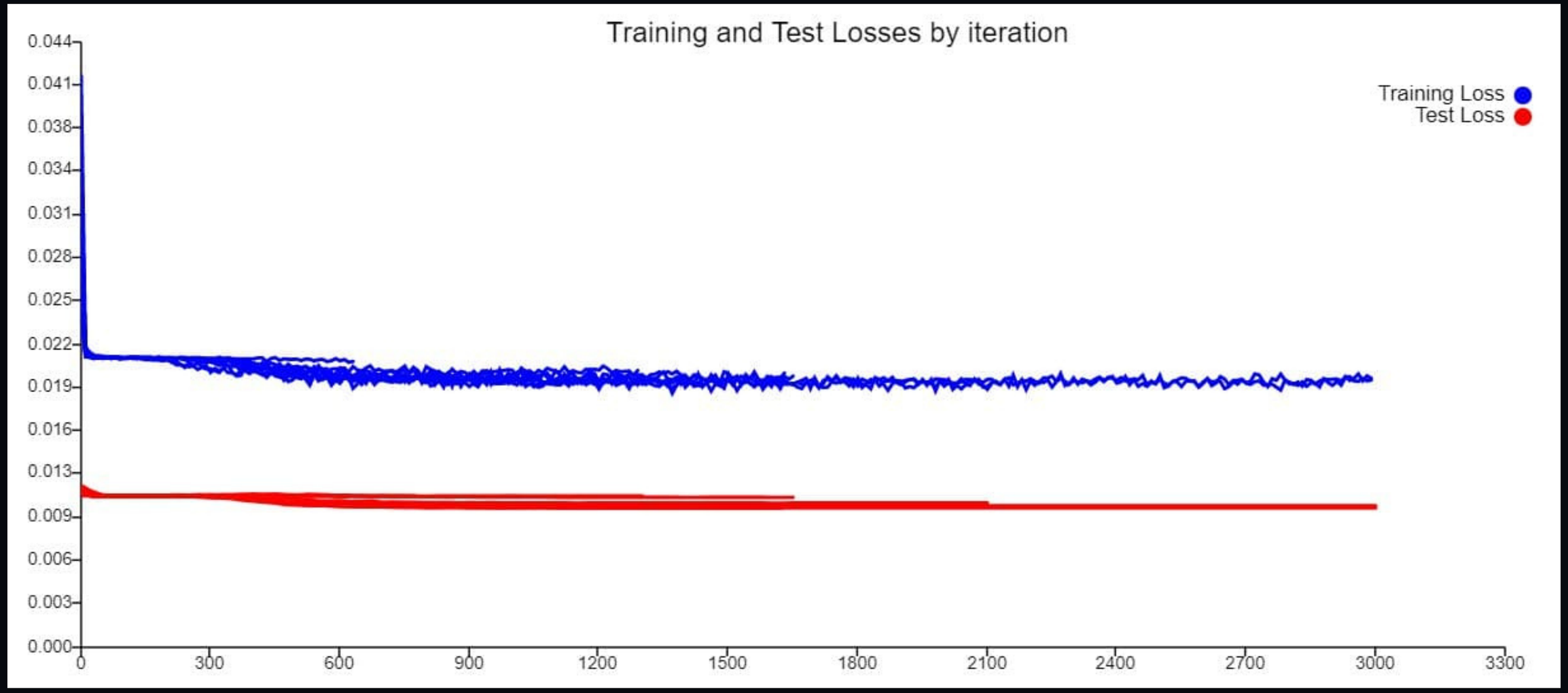
- Solver type: Adam
- 6 layers : 81-54-36-24-16-11
- Drop-out probability: 0.35
- 0.2 leaky RELU
- Input scaling with tanh clamp
- No weight decay
- No autoencoder
- Early stop 25 20

FEATURES

Pre-calculated Features:

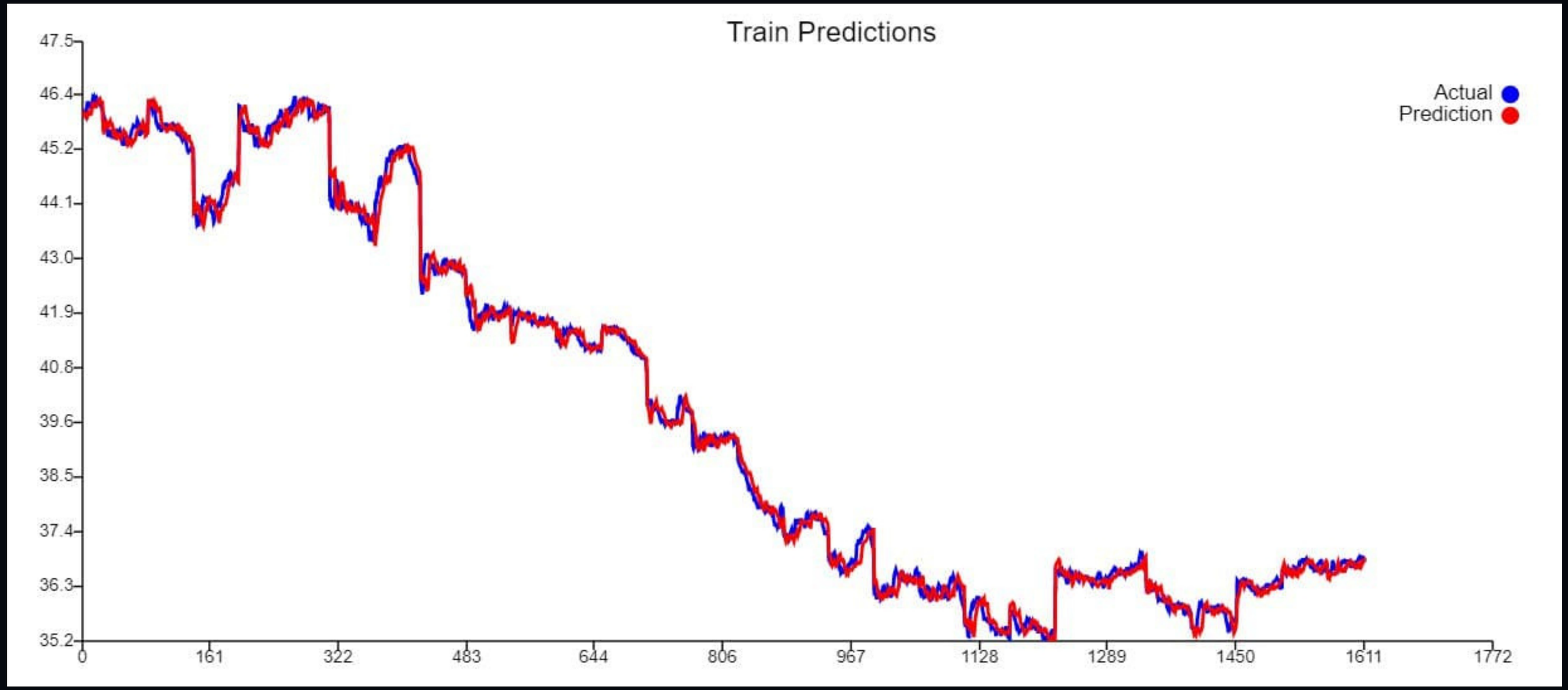
- Open
- log(Volume + 1)
- High - Open
- Low - Open
- Close - Open
- Time

TRAINING AND TEST LOSSES MODEL 3



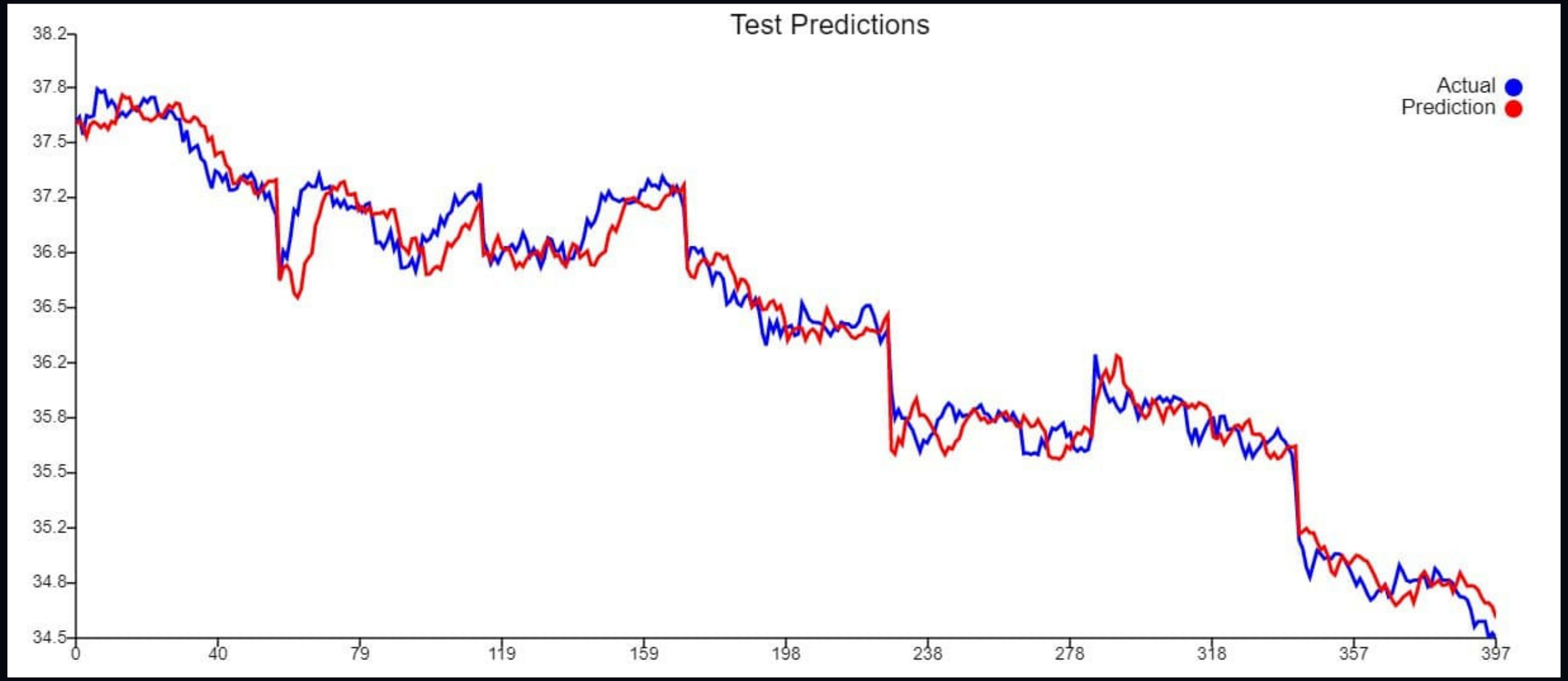
TRAINING PREDICTIONS

MODEL 3



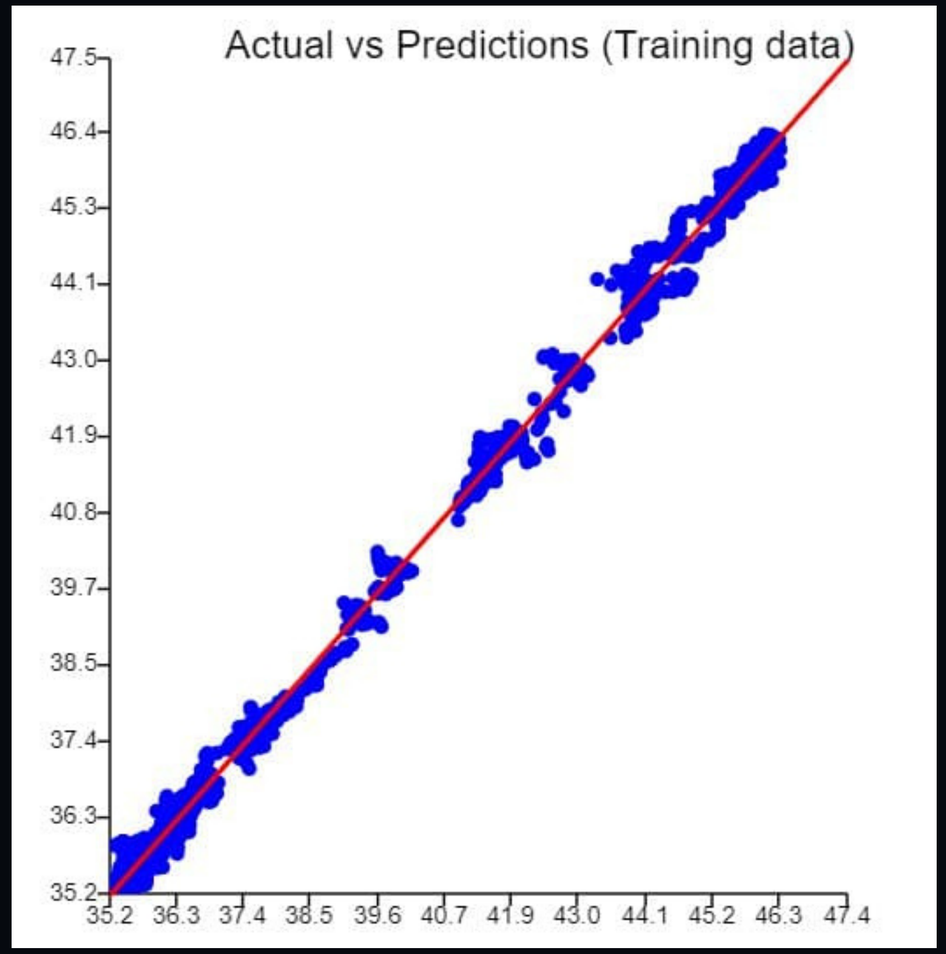
TEST PREDICTIONS

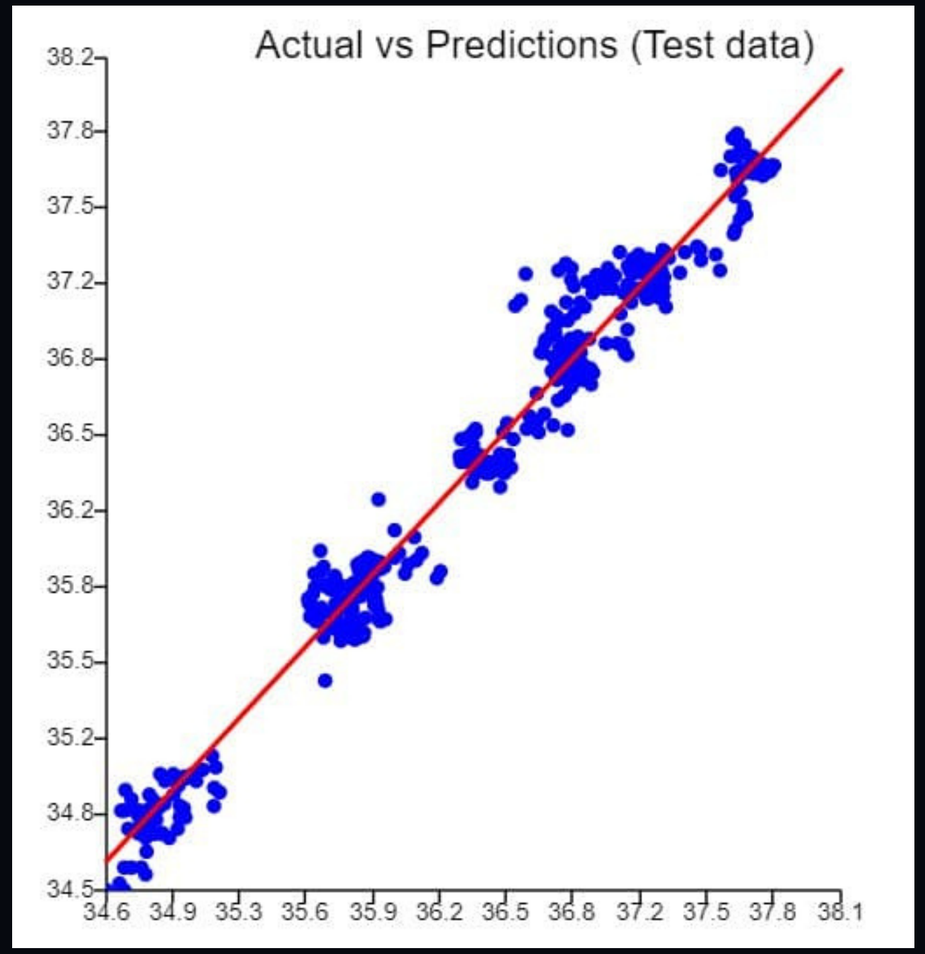
MODEL 3



ACTUAL VS PREDICTIONS

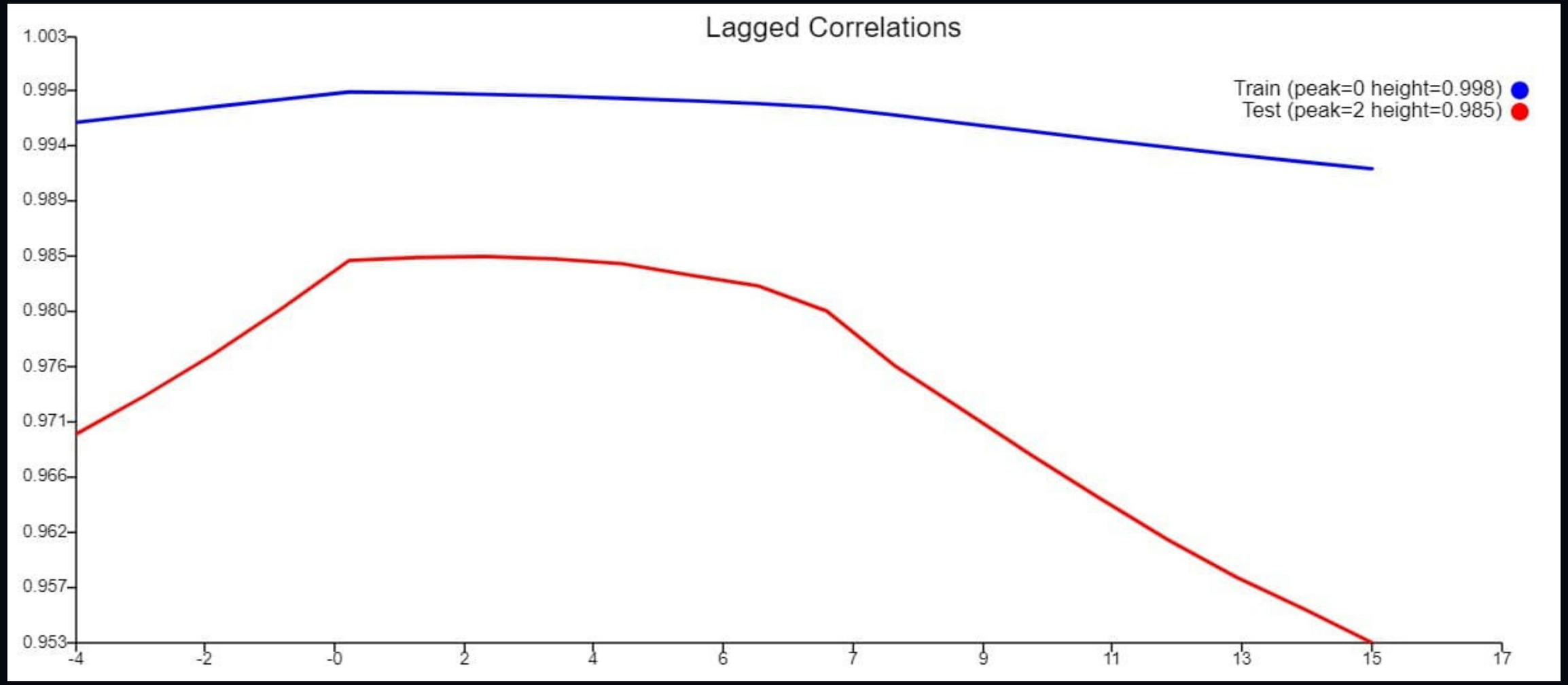
MODEL 3





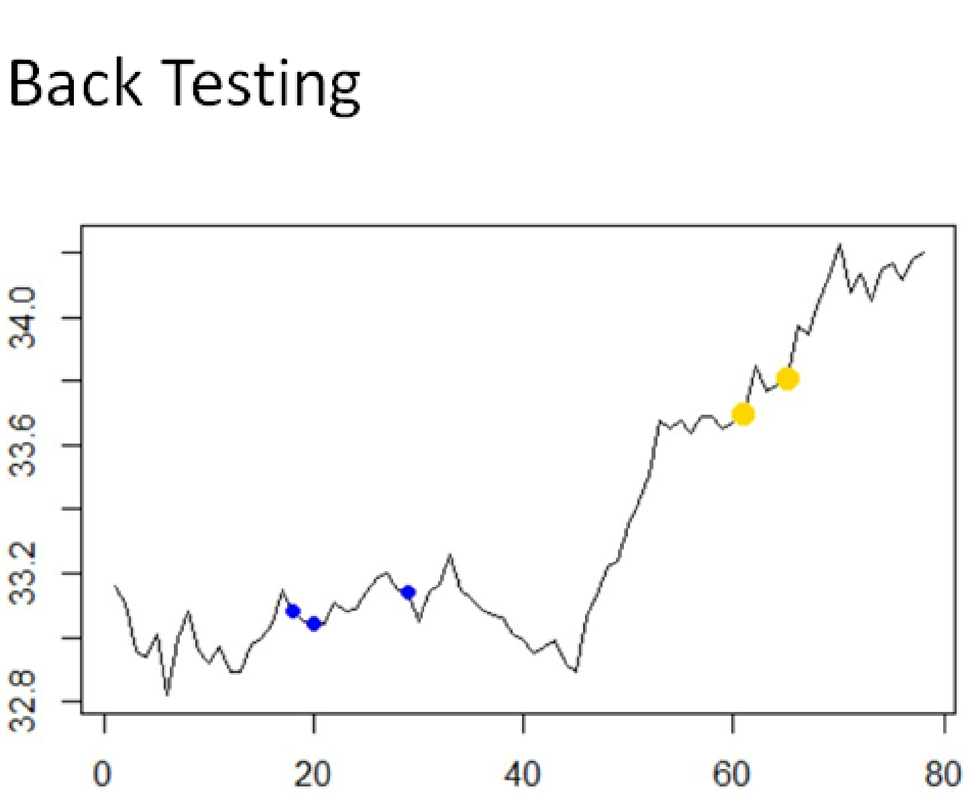
LAGGED CORRELATIONS

MODEL 3

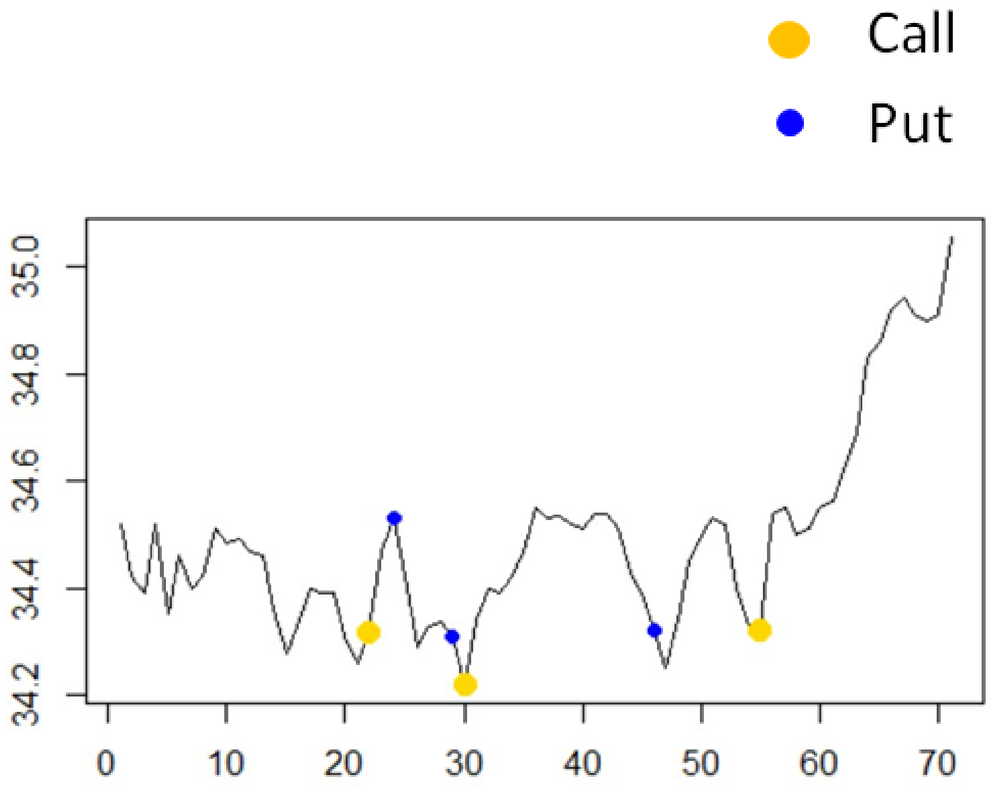


BACK TESTING

MODEL 3



16 Sep, Lost $69, threshold: 0.07



17 Sep, Lost $96, threshold: 0.07

NEURAL NETWORK MODEL 2

- Solver type: Adam
- Regularisation type: L2
- Drop-out probability: 0.05
- 4 layers : 32-20-12-8
- L2 reg 1E-4 weight
- Square perceptron
- no autoencoder
- force losses
- Early stop 50 25

FEATURES

Pre-calculated Features:

- Close_diff_1
- Close_diff_3
- Close_force_1
- Close_frac_diff_d_0.6_win_50
- Close_std_win_20
- Close_skew_win_20
- Close_kurt_win_20
- Close_alm_std_win_20
- log_vol
- log_vol_sd_win_20

RESULTS

DYNA DRAGON

TRAIN AND TEST LOSSES

To create your own, choose a topic that interests you.

Our findings

PREDICTIONS

To create your own, choose a topic that interests you.

Our predictions

BACKTESTING

To create your own, choose a topic that interests you.

Our backtesting

CONCLUSIONS

WHAT IS THE CORRELATION BETWEEN THE DATA AND THE MODEL TO GET PROFIT WITH THE STRATEGY THAT WE MADE?

ESSENTIALLY THE VOLATILITY. THE RATE AT WHICH PRICES DIVERGE.OUR MODEL CAN ONLY DETECT WHICH DIRECTION THE MARKET IS TRENDING. BUT BUYING OPTIONS IS ONLY PROFITABLE WHEN THERE IS SUFFICIENT VOLATILITY. IN ONE OF THE BACK TEST DAYS, MY MODEL PROFIT JUST BY FOLLOWING TREND AND BUYING 60 MIN OPTIONS WHICH GIVES SUFFICIENT TIME FOR PRICES TO DIVERGE. BUT DURING LIVE TRADING THE PRICES WERE NOT SUFFICIENTLY VOLATILE TO PROFIT.

THANK YOU

FOR WATCHING