Predicting S&P500 Daily Prices

By Niko Ganev

Disclaimer

NOT FINANCIAL ADVICE!

The content of this presentation and associated Github Repository and webpage are meant to showcase data science and programming skills, not to provide investment advice. The SPY ETF predictions in this project are only a sample of what kind of model and visualizations could be built with appropriate data, statistical analysis and programming tools. Keep in mind investing involves risk that can sometimes be significant. Investments fluctuate and you may potentially lose up to your total invested capital or even more. It is very important to do your own analysis based on your own circumstances and speak to a professional before making any investments. The underneath model is a student's project focusing on the technical aspects of the analysis and visualization and does not intend to achieve any returns. Any past performance is no guarantee of future return, nor is it necessarily indicative of future performance.

Summary

I- Assembling Dataset

-Correlated Assets
-News
-Technical indicators

II- Exploratory Data Analysis

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III- Modelling

-ARIMA
-LSTM Neural Network
-KNN Cross Validation

IV- Trading

Establishing a Trading Strategy and checking Returns

I - Gathering the Data

The Data Sources

Reuters Headlines

Historical financial headlines from January 2007 to December 2017 found on Harvard University Website. 16M headlines

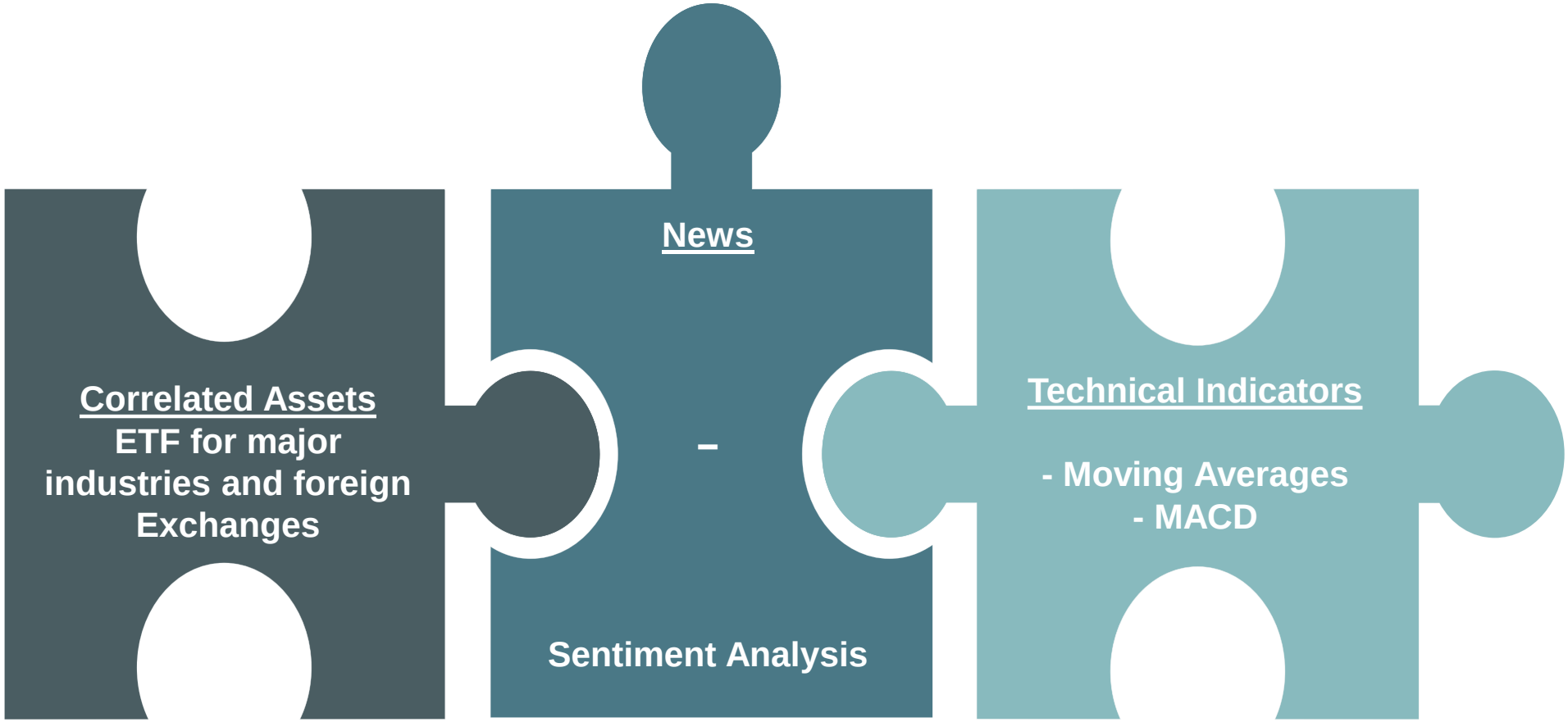
NewsApi

Using NewsApi to stream daily news for free in production environment.

Yahoo Finance

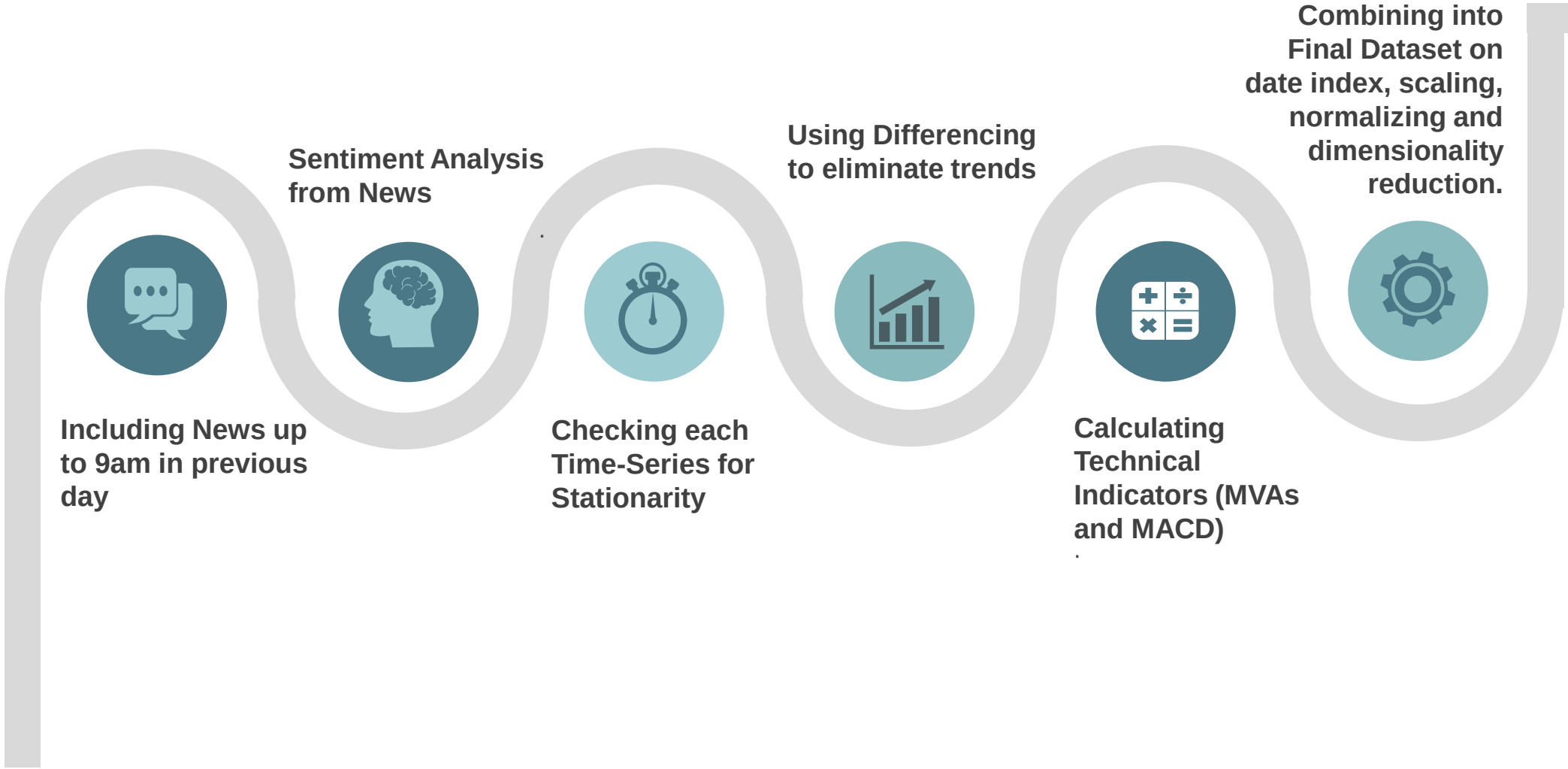
Using Pandas Data Reader API to get live data from Yahoo finance.

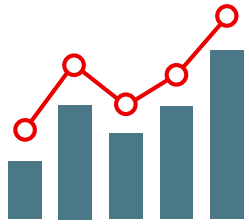
The Features



II - Exploratory Data Analysis

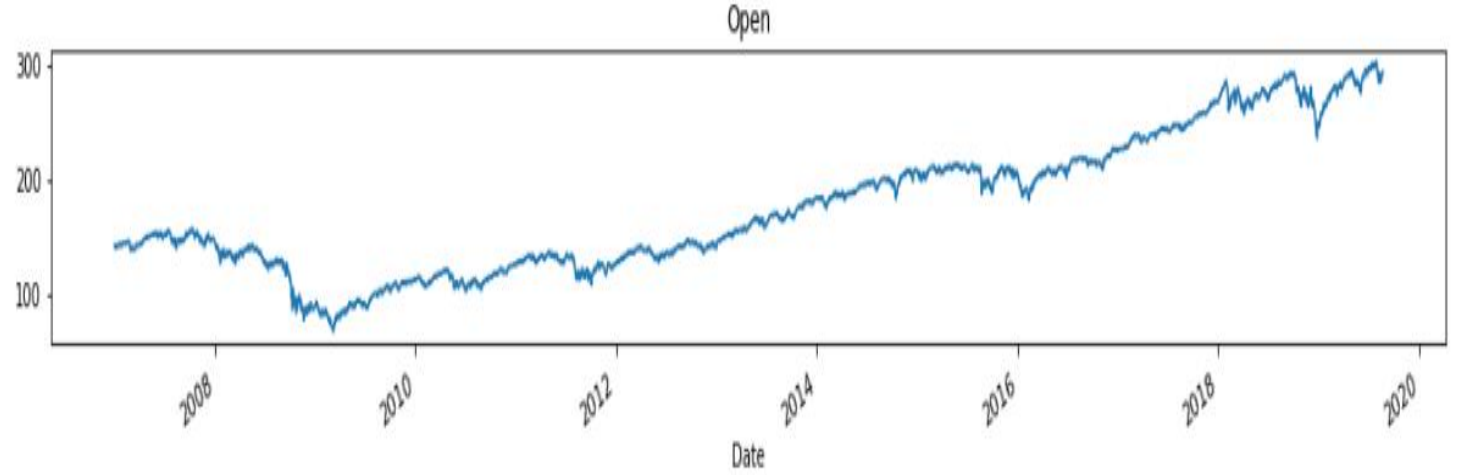
EDA Milestones

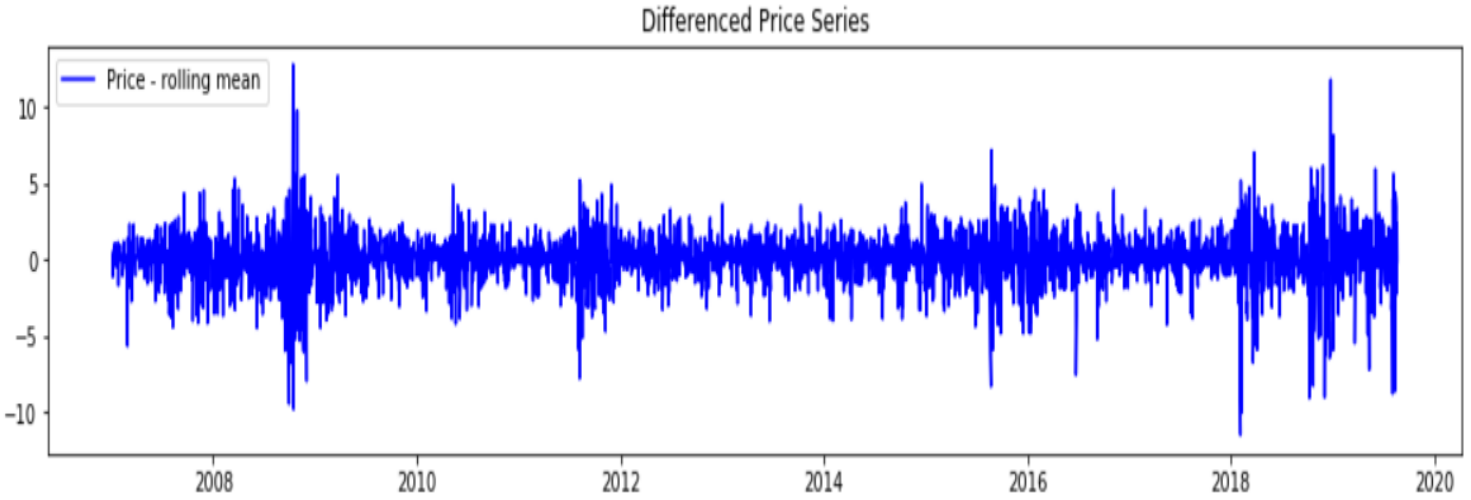




Stationary Time Series

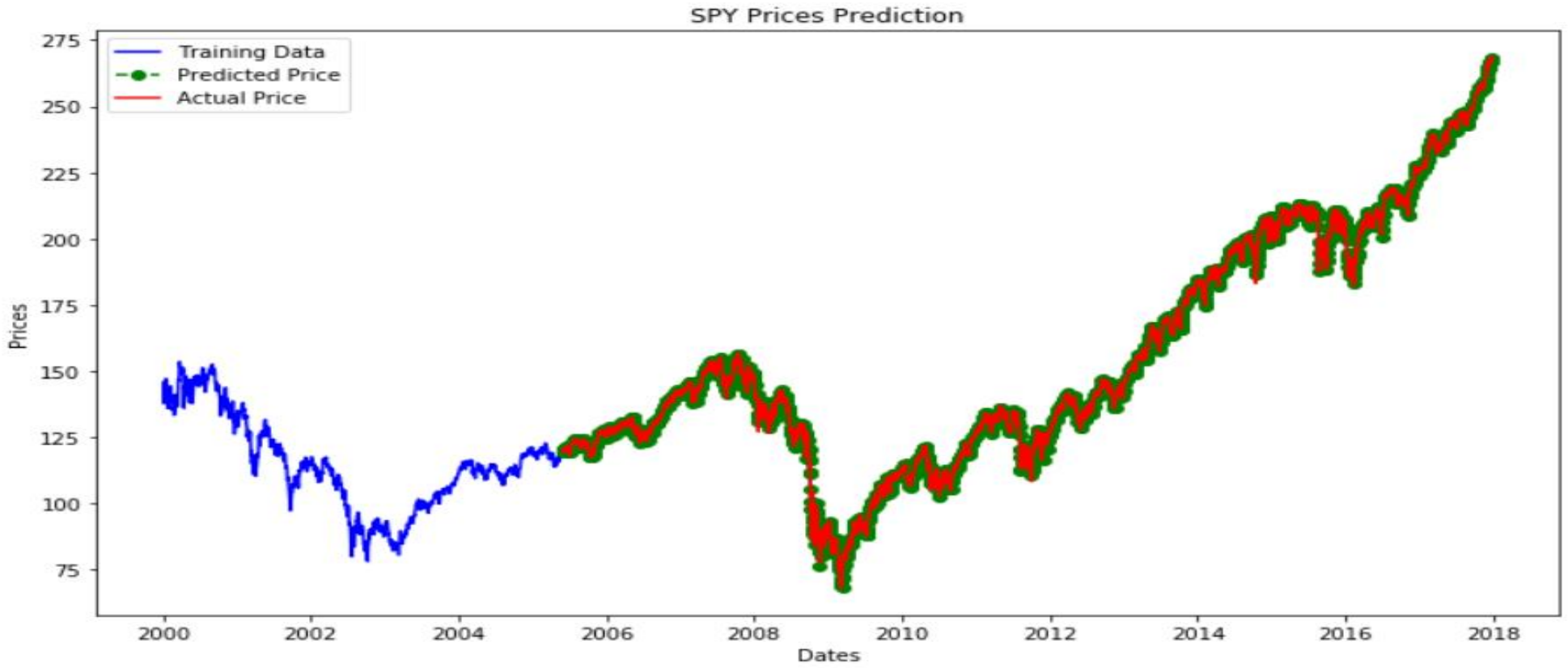
Differencing to remove trend





III - Modelling

ARIMA



UP

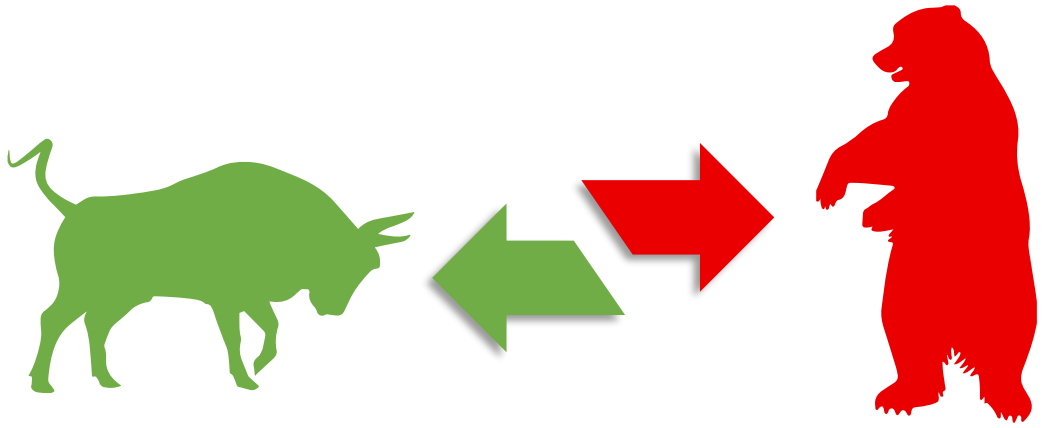
- Much easier to implement than a time series neural network
- Predictions are very close to actual prices

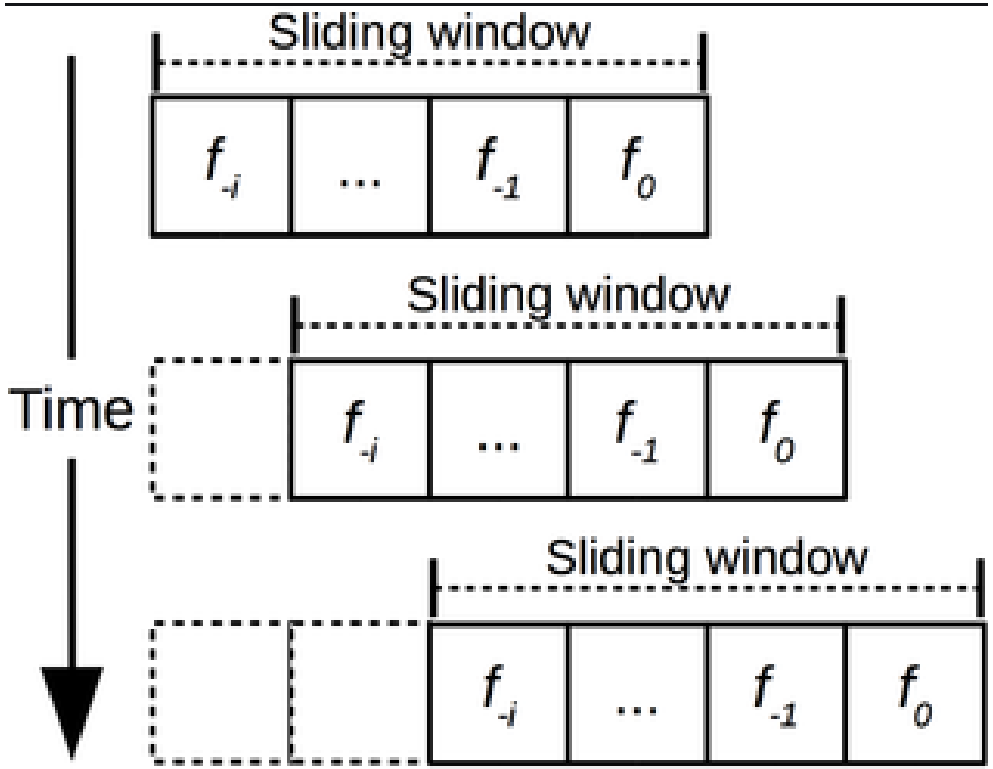
- Not precise enough to build a trading algorithm
- Hard to incorporate news into it

DOWN

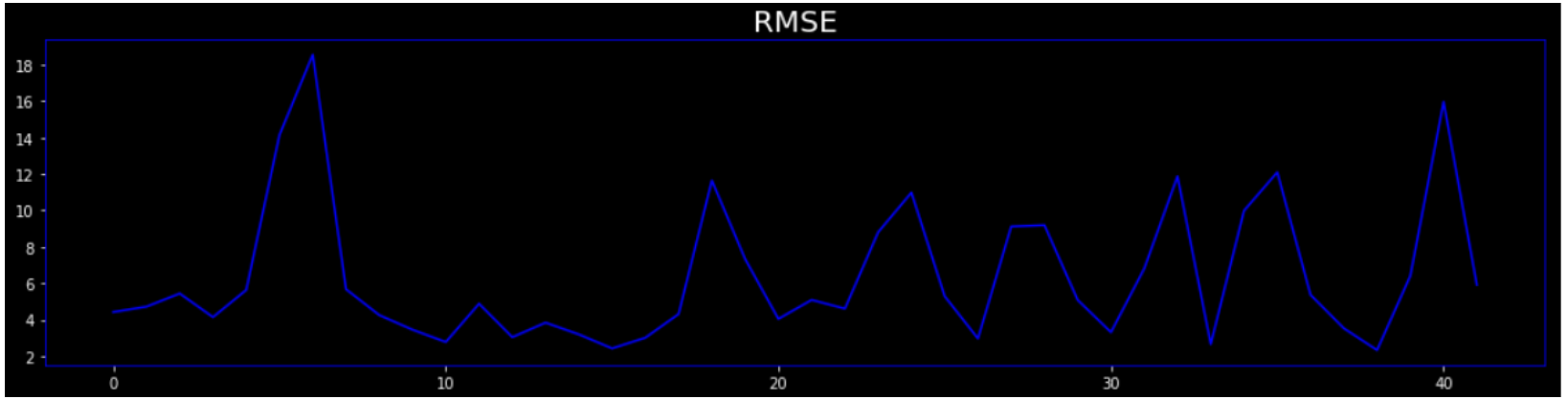
LSTM Neural Network with sliding window

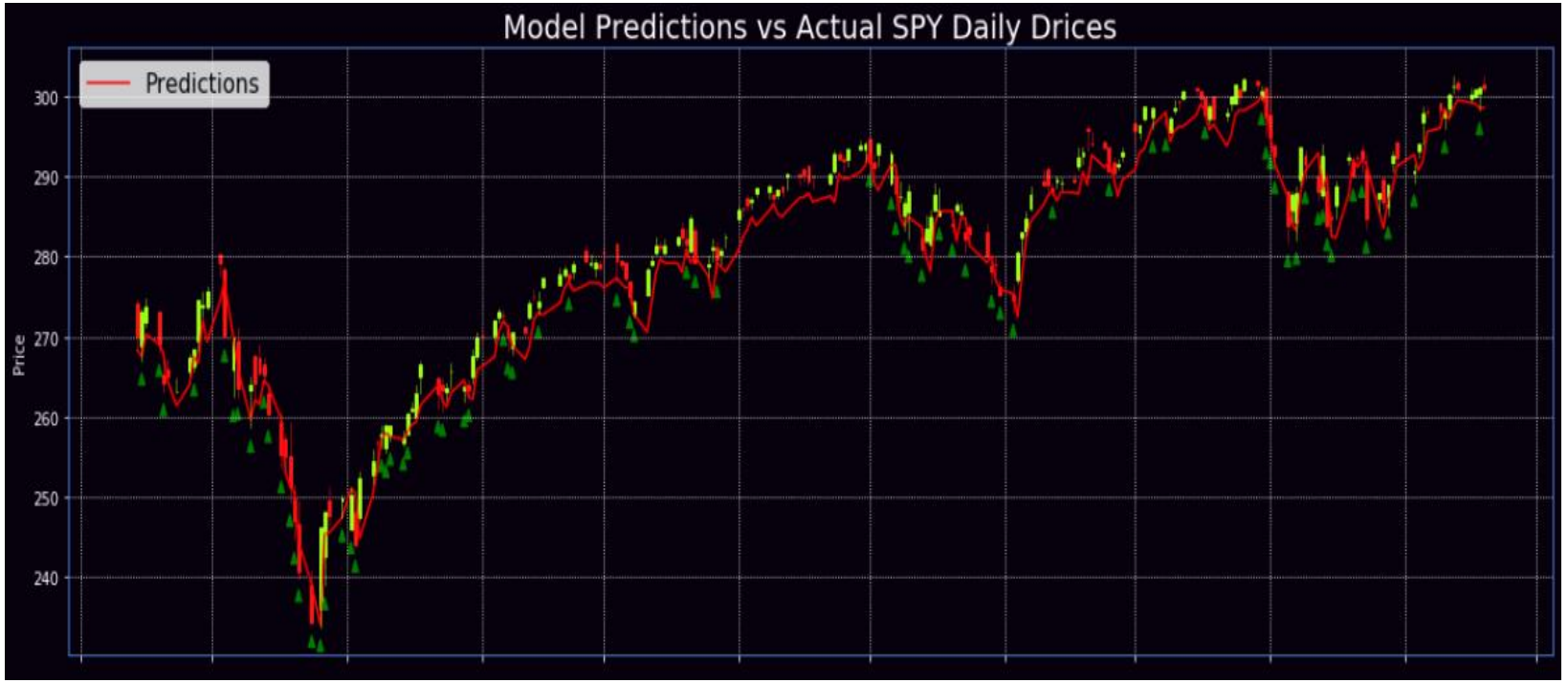
- Low number of epoch to avoid over-fitting
- Five to seven days sliding window produced best results
- Model still showed lower performance on test set indicating over-fitting.
- Necessity to chose optimal train set size.





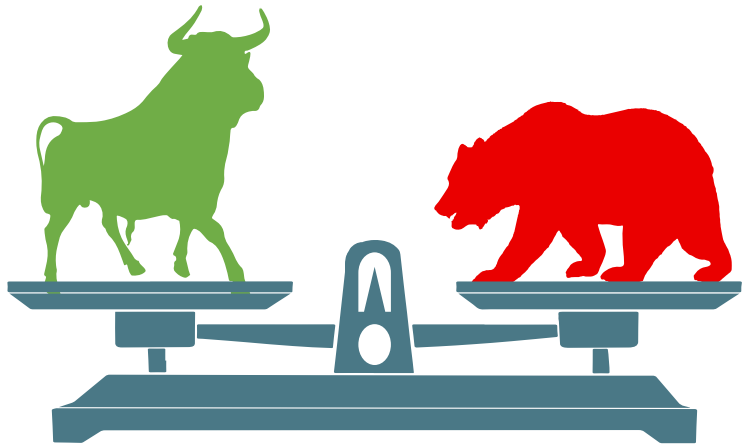
K-Fold Cross-Validation





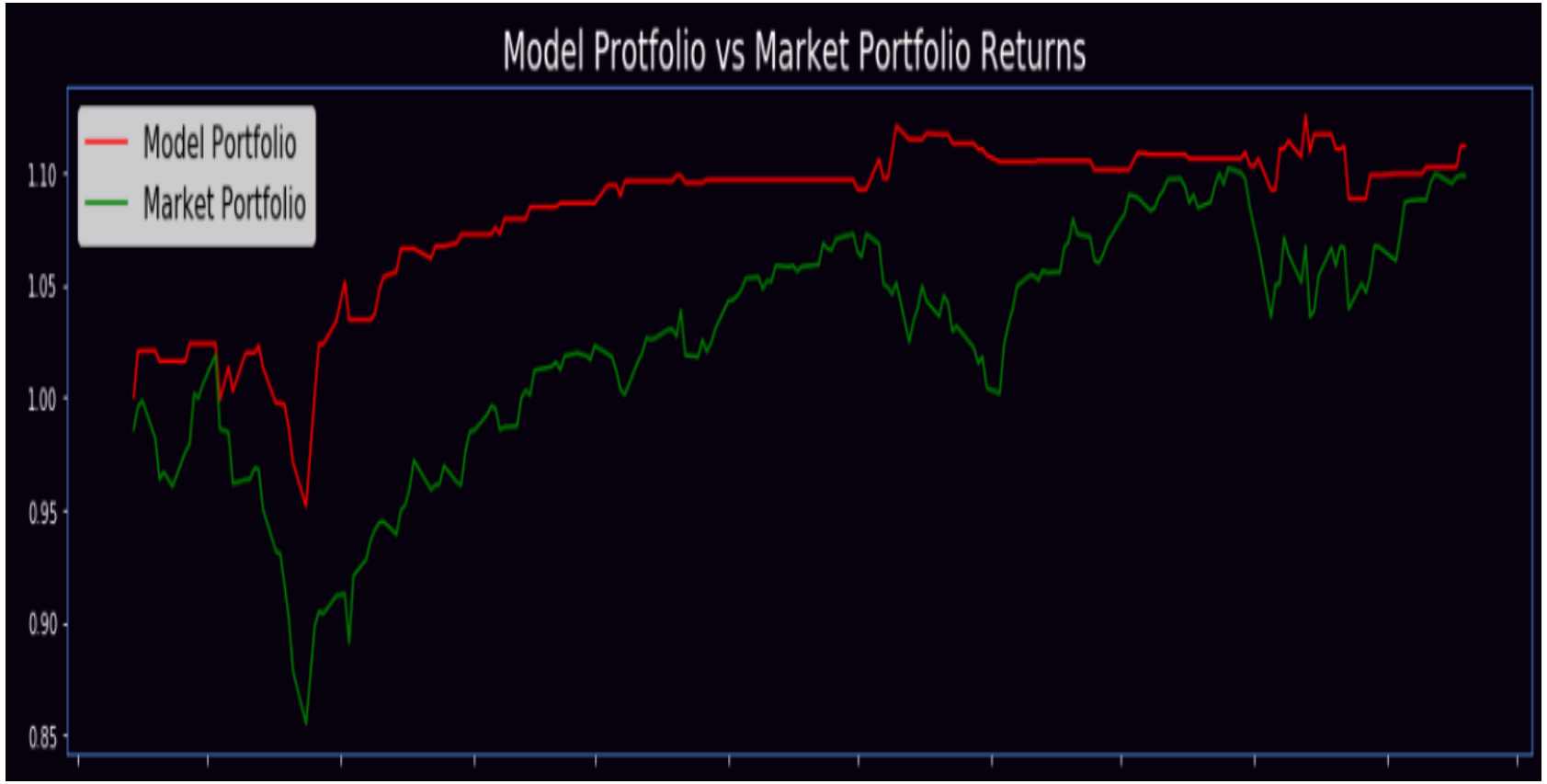
-RMSE lowest for train sets between 600 and 900 days

-Rerunning Neural Network at 900 days significantly improves results.



IV - Trading Strategy

Trading rules and returns



- ✓ BUY as soon as prices is or below model predicted price
- ✓ SELL at day close


Thank You!