Building a Stock Rating System

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Presentation by Max Bosse

Presentation Overview

Project Roadmap

Goal - Build a classification model that rates a stock as a Buy/Hold/Sell

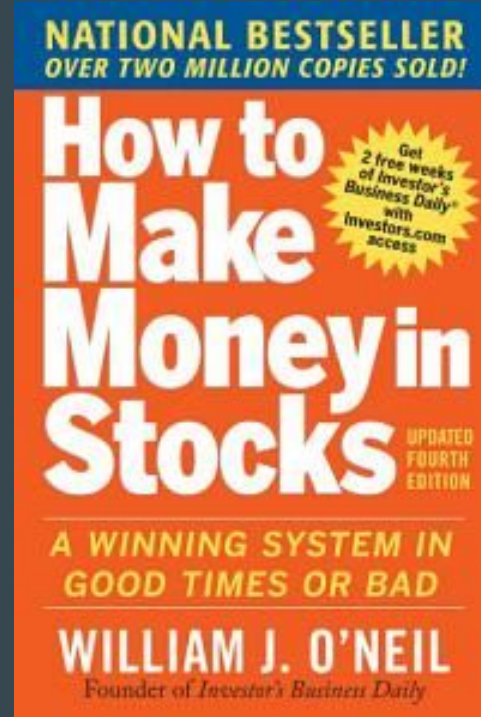Input: Ticker/Stock - ZM/Zoom Video Communications
Output: Buy/Sell + Reasons Why

Step 1	Step 2	Step 3	Step 4
Obtain all data for a specific stock/ticker	**Aggregate the data into a single dataframe**	**Run time series models to generate a predicted price**	**Use methodology (CAN SLIM) and predicted price values to classify a stock as a Buy, Hold or Sell**
Measures range from basic time series data to technical indicators and fundamental factors like the launch of new products	Merged on a datetimeindex	SVM, ARIMA (VAR Soon)	

Methodology - CANSLIM

CAN SLIM - A growth stock investment strategy designed by William O'Neil

Objective - To discover leading stocks before they make major price advances.

Strategy encourages cutting all losses at no more that 7-8% below the buy point.

CAN SLIM

C	Current Quarterly Earnings	*Strong and Accelerating*
A	Annual Earnings Growth	*Strong over last 3 years*
N	New Product/Management/Price High	-
S	Supply and Demand	*Increasing Volume on Price Increases*
L	Leader or Laggard	*Focus on top-stocks in respective industry group*
I	Institutional Sponsorship	*High sponsorship, Increasing Quarter over quarter*
M	Market Direction	*¾ Stocks follow market direction. Follow the trend.*

Data Acquisition

Time Series Data - AlphaVantage API (requests)

Earnings Data - AlphaVantage API (requests)

Technical Indicators - AlphaVantage API (requests)

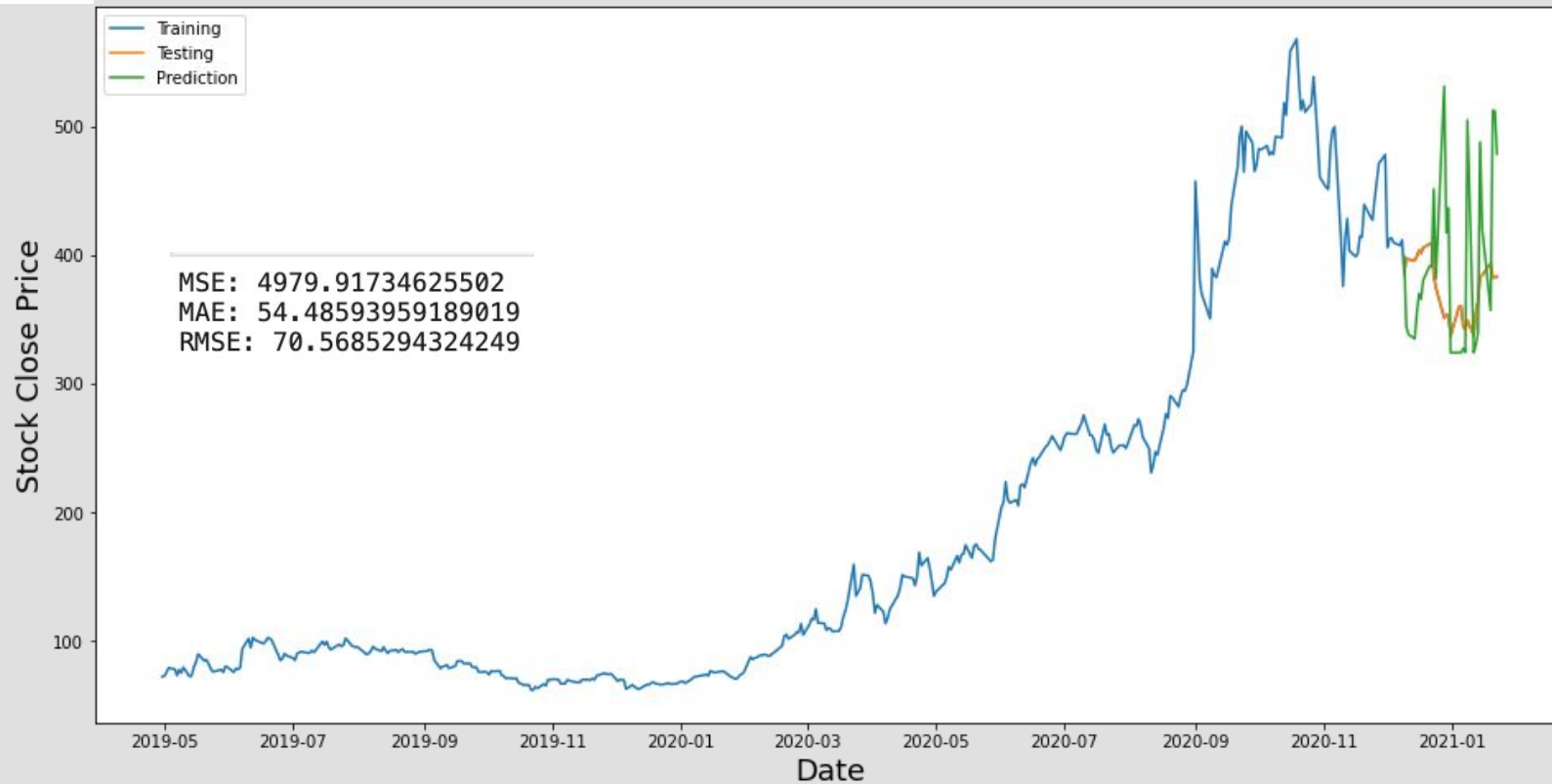Institutional Sponsorship Data - FinViz (BeautifulSoup)

Modeling

Starting Point

- Utilize Multiple Time Series Models to Forecast Stock Price
- Models Used
    - SVM
    - ARIMA
    - Coming Soon - VAR

Next Steps

- Use output from time series models within classification models as a feature alongside CANSLIM criteria (categorical features).

SVM Model

MSE: 4979.91734625502
MAE: 54.48593959189019
RMSE: 70.5685294324249

Improved Modeling

ARIMA (Autoregressive Integrated Moving Average) - 3 parameters to tune - (p, d, q)

Key - Data needs to be stationary (i.e statistical attributes constant over time)

  Note: Stock data is rarely stationary

Heavy lifter - pmdarima library
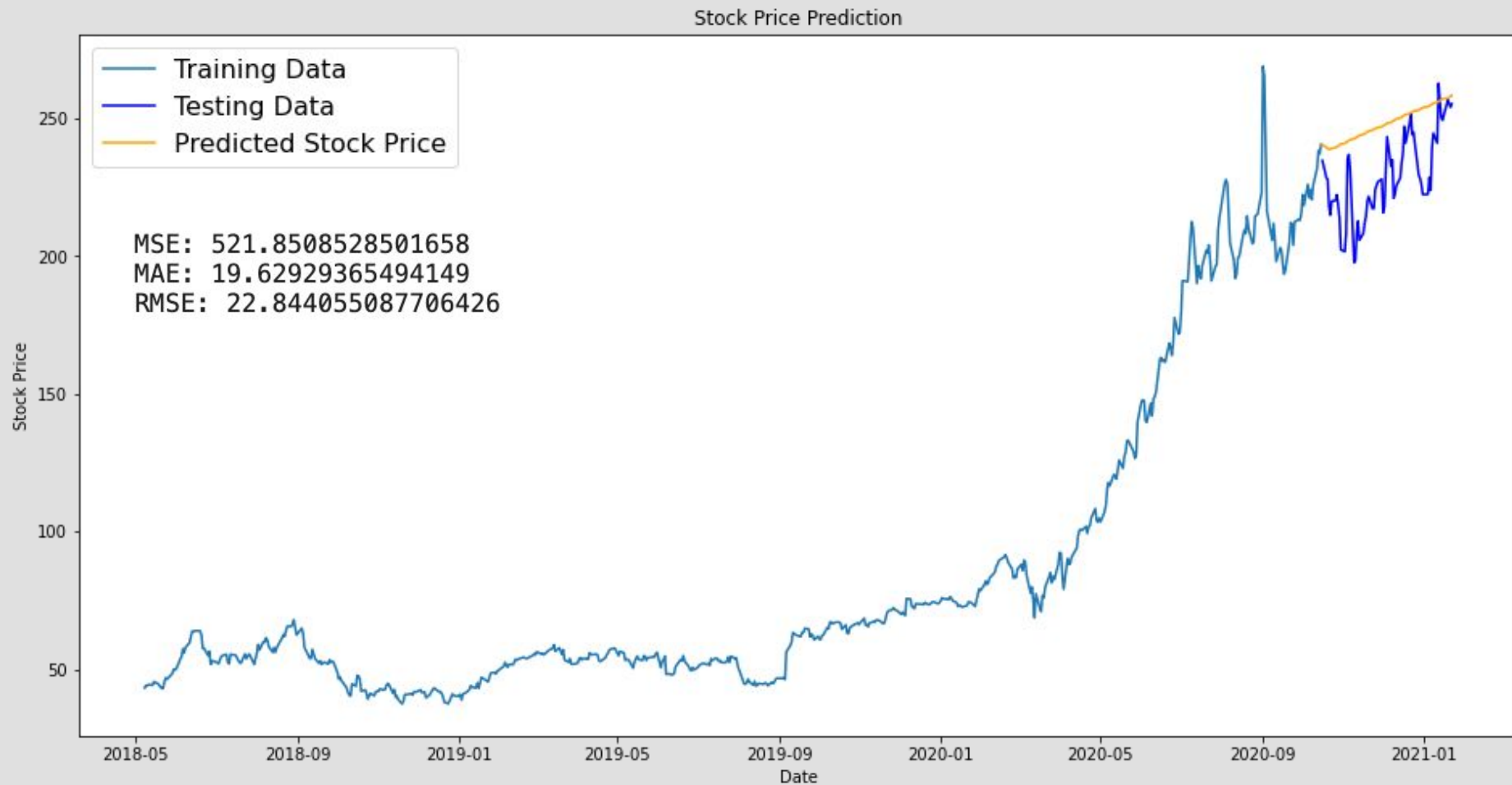
- Helps tune the parameters in ARIMA model

Stock Price Prediction

MSE: 3366.4472224988235
MAE: 49.189040362033865
RMSE: 58.021092910241045

Stock Price Prediction

MSE: 521.8508528501658
MAE: 19.62929365494149
RMSE: 22.844055087706426

Next Steps

Incorporate CANSLIM criteria as categorical features in a (multi)classification model

- Rate a stock as Buy/Sell
- Rate a stock as Buy/Hold/Sell

Progress -

Built CANSLIM function that screens a stock for which CANSLIM criteria are met. (Features for classification model)

	C	A	S	I	M
ZM	0	0	0	1	1

Next Steps

- Obtain data for two outstanding criteria
  - "N" - New Products/Leadership/Price High
    - Scape most recent 10-K filing for instances of "new product"
    - Scape Finviz News section for relevant keywords
  - "L" - Leader or Laggard
    - Scrape or create own industry groups manually.

- Try testing new models on 1 industry group
- Link output to Tableau with other visuals
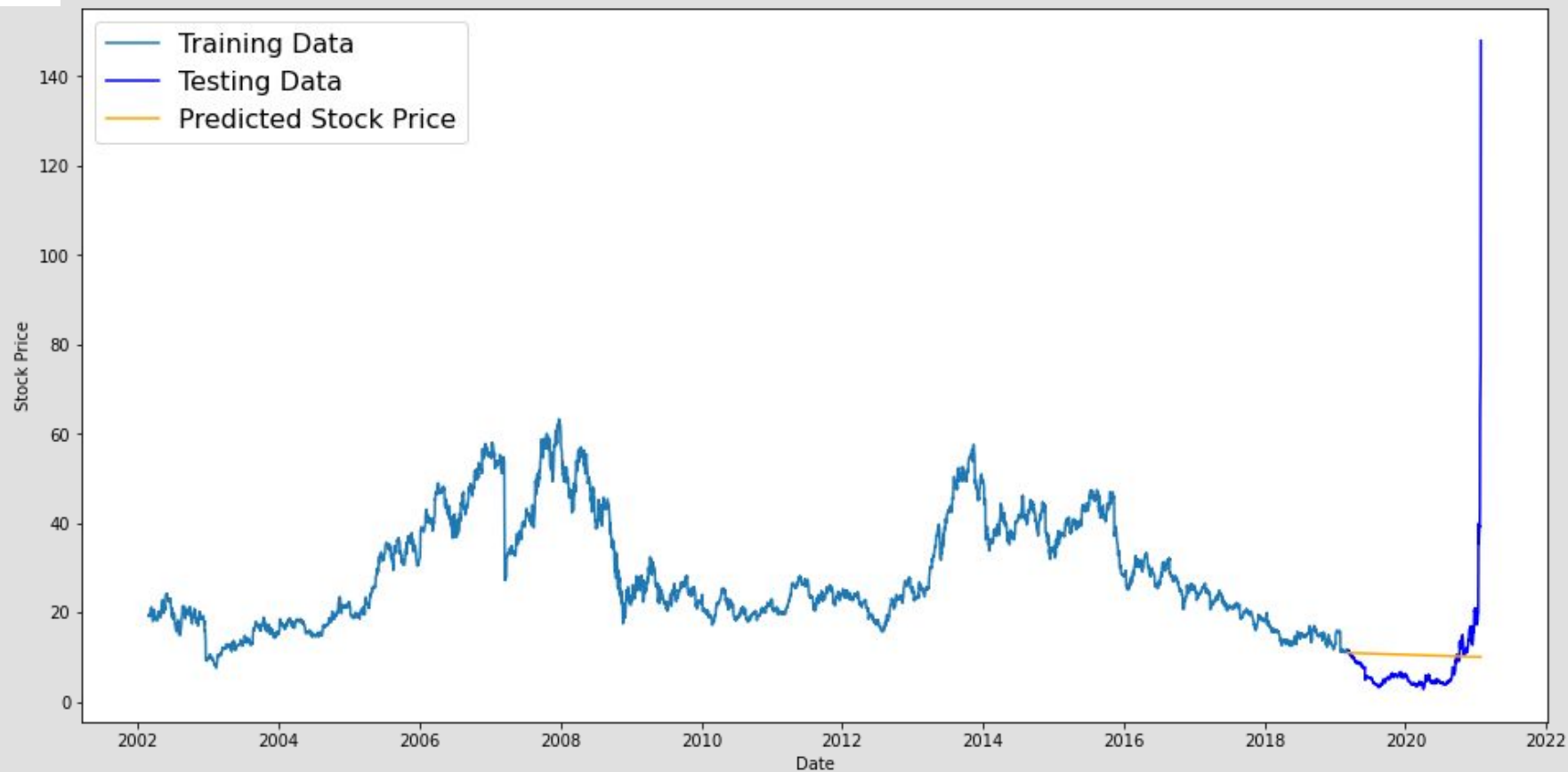 - First Tableau Visuals

1	BB	BlackBerry Limited	$	18.92
2	SHOP	Shopify Inc Cl A	$	1,159.77
3	APPS	Digital Turbine Inc	$	61.94
4	FIVN	Five9 Inc	$	164.00
5	DOCU	Docusign Inc	$	235.11
6	RNG	RingCentral Inc Cl A	$	374.00
7	NOW	Servicenow Inc	$	532.46
8	BZUN	Baozun Inc Cl A Ads	$	48.00
9	ZM	Zoom Video Comm Cl A	$	374.39
10	EBIX	Ebix Inc	$	48.14
11	DDOG	Datadog Inc Cl A	$	103.52
12	TWLO	Twilio Inc Cl A	$	355.15
13	AVYA	Avaya Holdings Corp	$	23.25
14	SNCR	Synchronoss Technologies	$	5.64
15	WDAY	Workday Inc Cl A	$	235.60
16	FSLY	Fastly Inc CL A	$	106.99
17	BAND	Bandwidth Inc Cl A	$	171.99
18	ATEN	A10 Networks Inc	$	10.62
19	ECOM	ChannelAdvisor Corp	$	21.33
20	QADB	Q A D Inc Cl B	$	48.04
21	DT	Dynatrace Inc	$	43.53
22	QADA	Q A D Inc Cl A	$	67.00
23	PCTY	Paylocity Holding Corp	$	191.86
24	ZEN	Zendesk Inc	$	145.36
25	SHSP	Sharpspring Inc	$	21.58
26	EGHT	8X8 Inc	$	36.67
27	NET	Cloudflare Inc Cl A	$	77.03
28	UPLD	Upland Software Inc	$	49.10
29	DOMO	Domo Inc Cl B	$	66.90

Limitations

- Stock market volatility has ramped up.
- Company valuations have ballooned.
- Covid impact on market has greatly impacted all models.
    - Impacts tail-end of training data, majority of testing.
- Predicting a stocks price can be a fool's errand. (See next slide)

Disclaimer: Model use is educational, not intended to be investment advice.

Stock Price Prediction

Thank you for your time!

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Github