Time Series Data
Model Performance

By: Ivan Sapozhnikov & Christian Peterson
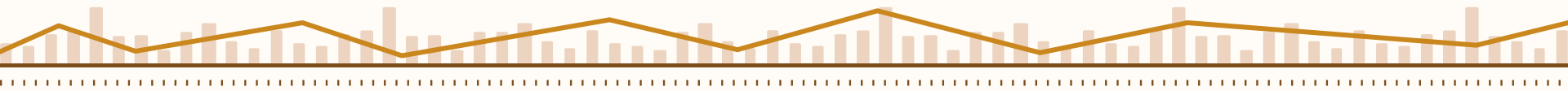
Mission Statement: Forecasting

Can ML can provide insight on predicting:

- Volatility
- Variation over time

Can a model predict return on investment?

- Will it be accurate?
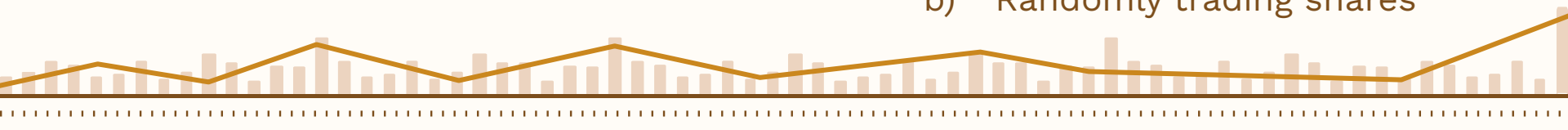- Can we increase model accuracy?

Our Project's Background

The PROBLEM!

1) Investment modeling is inaccurate

2) Especially for predictions after "tomorrow"

3) Quality of data is needed with full consistency

Exploring the problem

1) Can the model predict one industry with more accuracy than another?

2) After automating the model, could we gain a positive return greater than:
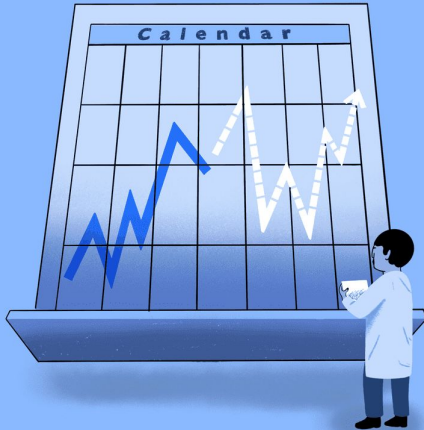   a) Holding the shares
   b) Randomly trading shares

Model & Dataset

ARIMA Model

- Fancy regression for time series
- Takes 2 factors into account
    - Previous patterns
    - Random noise

Yahoo Finance Dataset (Public Mkts & OTC)

- Data collected from 5 industries:
    1. Technology
    2. Automotive
    3. Health Sciences
    4. Oil
    5. Filmmaking

Autoregressive Integrated Moving Average Prediction Model

[ˌȯ-tō-ri-ri-ˈgre-siv ˈin-tə-ˌgrā-təd ˈmü-viŋ ˈa-v(ə-)rij pri-ˈdik-shən ˈmä-dᵊl]

A statistical analysis model that uses time series data to predict future trends.

Investopedia

Model Performance Across Industries
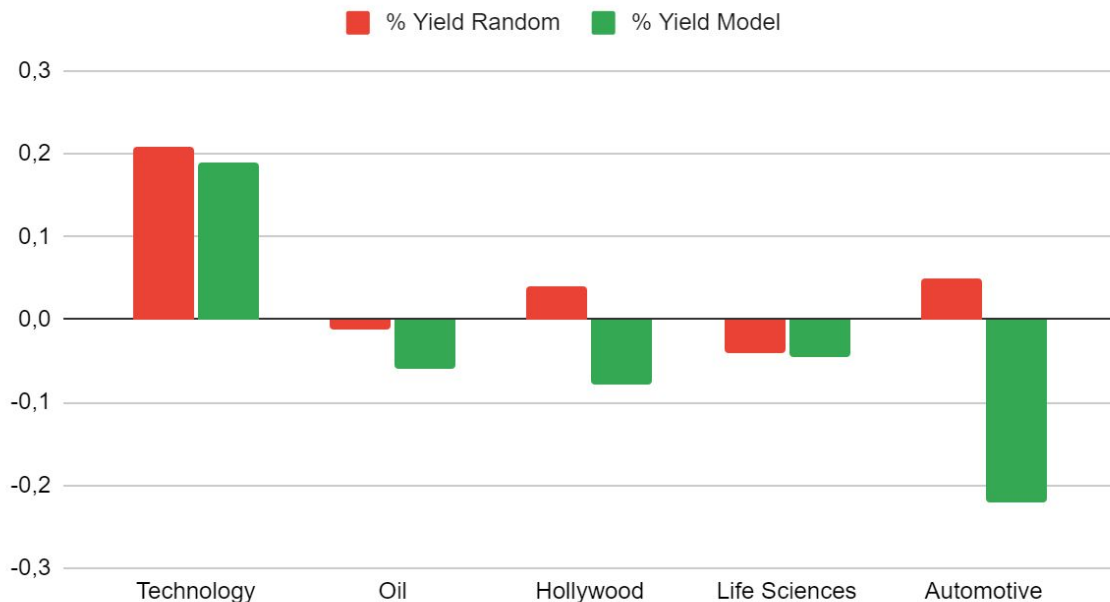
Poor Performance

Never outperforms random

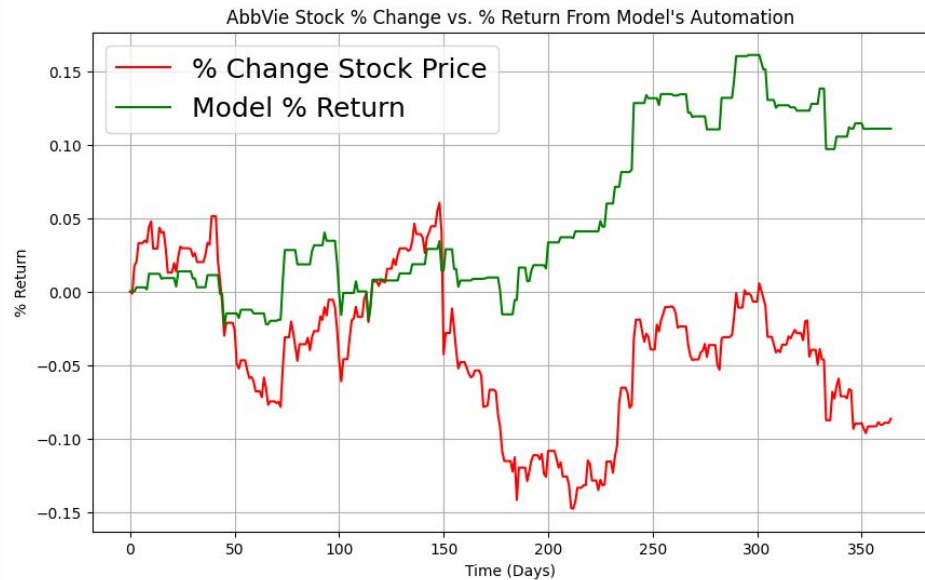Does not capture effect for industries

Effective on some

There are specific stocks which achieved superior gains

% Yield of Random Trading vs Model

■ % Yield Random ■ % Yield Model

Model Performance – An Outlier

We evaluated 50 Stocks (4 outperformed holding the stock)

Likelihood of achieving result from random buy/sell:
p-value ≈ 0.016457

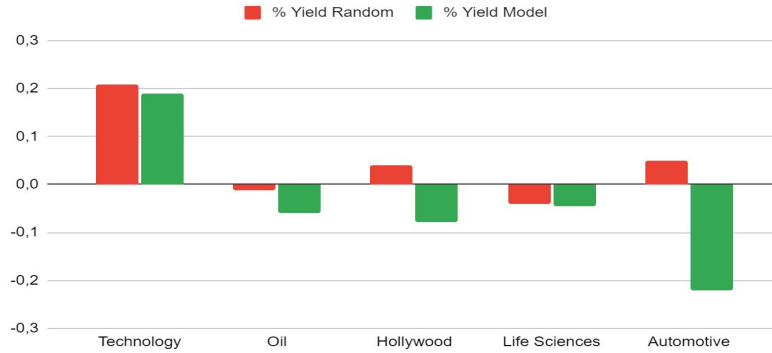Model Effectively predicted large drops for AbbVie Stock Price
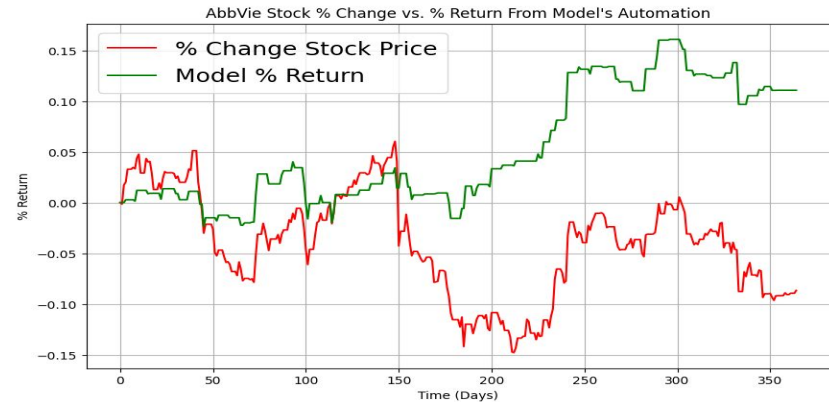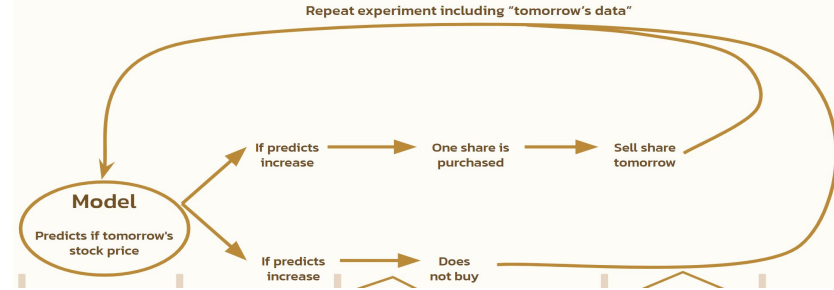
Thanks

Questions?

% Yield of Random Trading vs Model

- % Yield Random
- % Yield Model

Categories: Technology, Oil, Hollywood, Life Sciences, Automotive

Model Outline

Repeat experiment including "tomorrow's data"

Model — Predicts if tomorrow's stock price

If predicts increase → One share is purchased → Sell share tomorrow

If predicts increase → Does not buy

AbbVie: Automated Results vs Holding Stock vs Random Buy/Sell

Std. Dev. = 0.0857

Categories: Expected Return from Model, No Daily-Trading, Mean Return From Random Buy Sell

AbbVie Stock % Change vs. % Return From Model's Automation

- % Change Stock Price
- Model % Return

Time (Days)

List of Stocks within Industries

Technology

Apple, Microsoft, Amazon, IBM, Intel, Alphabet, Meta, Oracle, Cisco, Dell

Health

Johnson & Johnson, CVS, Abbott Labs, Pfizer, Merck & Co., Cardinal Health, Humana, AbbVie, Novartis, Stryker
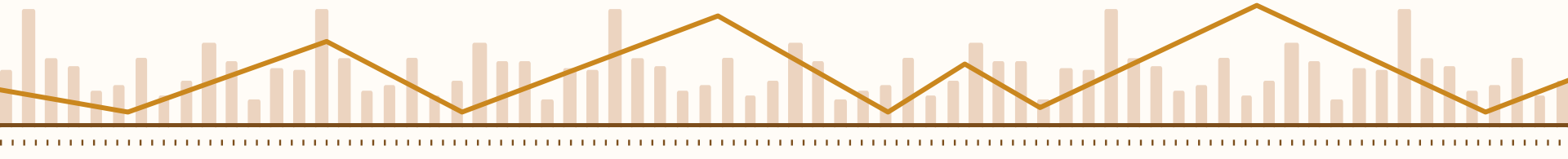
Oil

Exxon Mobil, Shell, Chevron, BP, Phillips 66, Total Energies, Conoco–Phillips, Saudi Aramco, Valero, EOG Resources

Automotive

General Motors, Ford, Toyota, BMW, Tesla, Honda, Mercedes Benz, Volkswagen, Hyundai, Nissan

Filmmaking

Disney, Warner Bros, Paramount, Universal, Sony, Lionsgate, Legendary Entertainment, Netflix, AMC, Comcast

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