A High-dividend Stock Classification Technique based on Multi-Layer Perceptron

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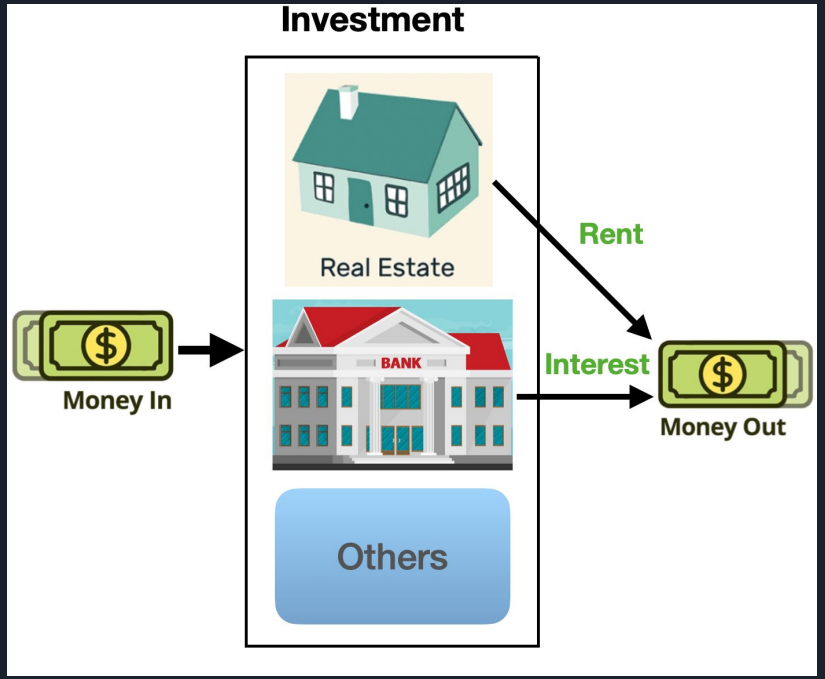
Outline

- Introduction
- Related Works
- Proposed Work
- Dataset Collecting
- Differences
- Experiments
- Conclusion & Future Works

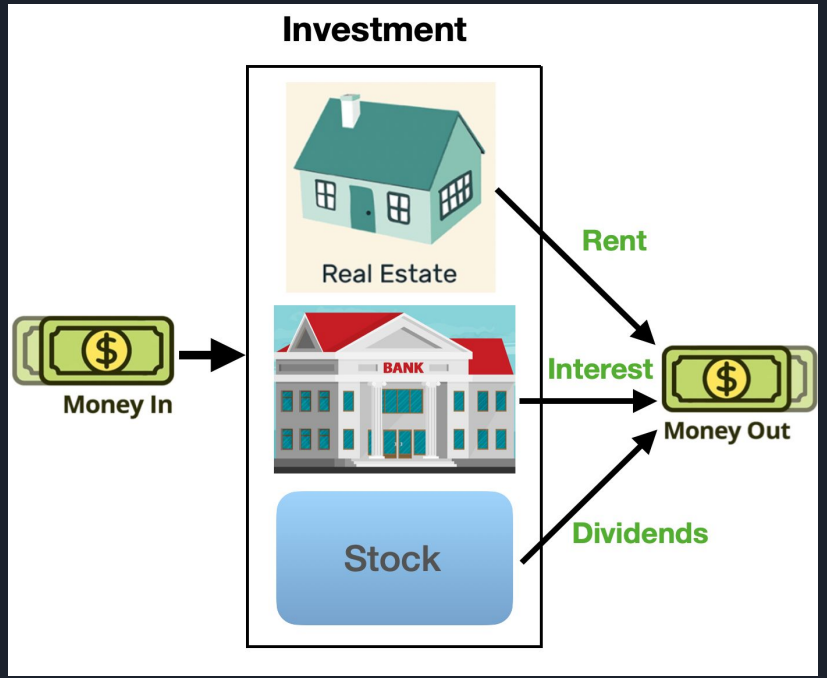
Introduction(1/3)

- What is investment ?
  - money
  - target
  - period
  - profit
  - risk



Introduction(2/3)

- Stock dividends
  - share profits with shareholders
  - quarterly / annually
  - No need to sell the stock
  - better than saving accounts
  - the company is trustworthy?



Introduction(3/3)

- My definition of reliable companies
  - profitable
  - consistent/seasonal business
  - not easily affected by events
- My ideas:
  - Using financial indicators as the dataset
  - Classify high-dividend stocks by Multi-Layer Perceptron (MLP)

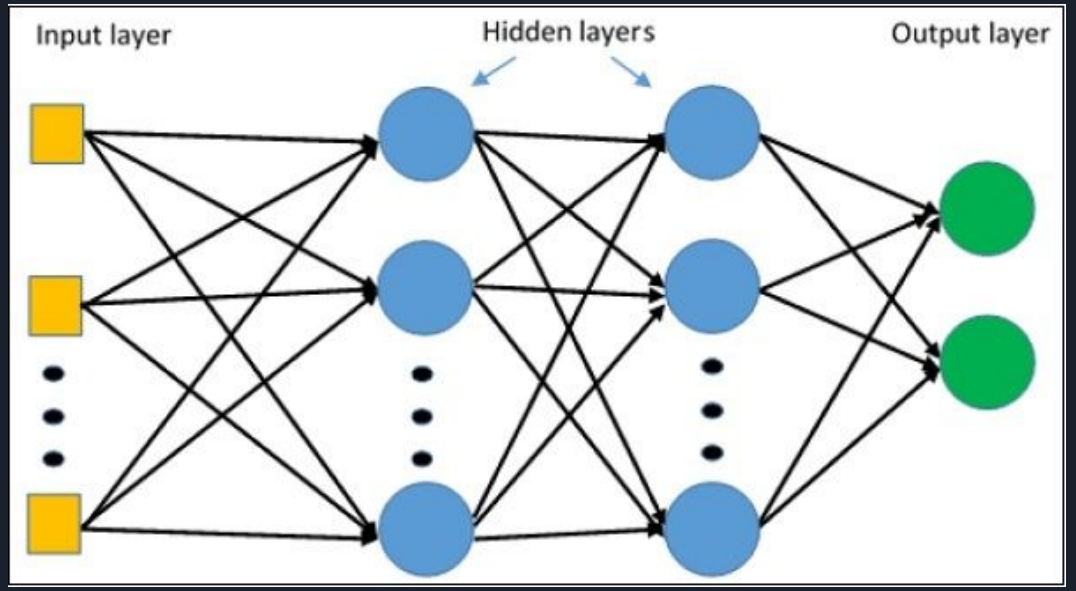
Related Works

- Predicting stock prices in Time series
- Some Forecasting methods
  - Long Short-Term Memory (LSTM)
  - AutoRegressive Integrated Moving Average (ARIMA)
  - Recurrent Neural Network (RNN)
- Others add financial news or big events to evaluate

Proposed Work (1/5)

MLP layers:

- Input Layer
- Hidden Layer(s)
- Output Layer



Proposed Work (2/5)

- MLP Input Layer
  - EPS (Earnings Per Share) = Total earnings / shares
  - P/E (Price-Earnings ratio) = Stock Price / EPS
  - ROE (Return on Equity Ratio)

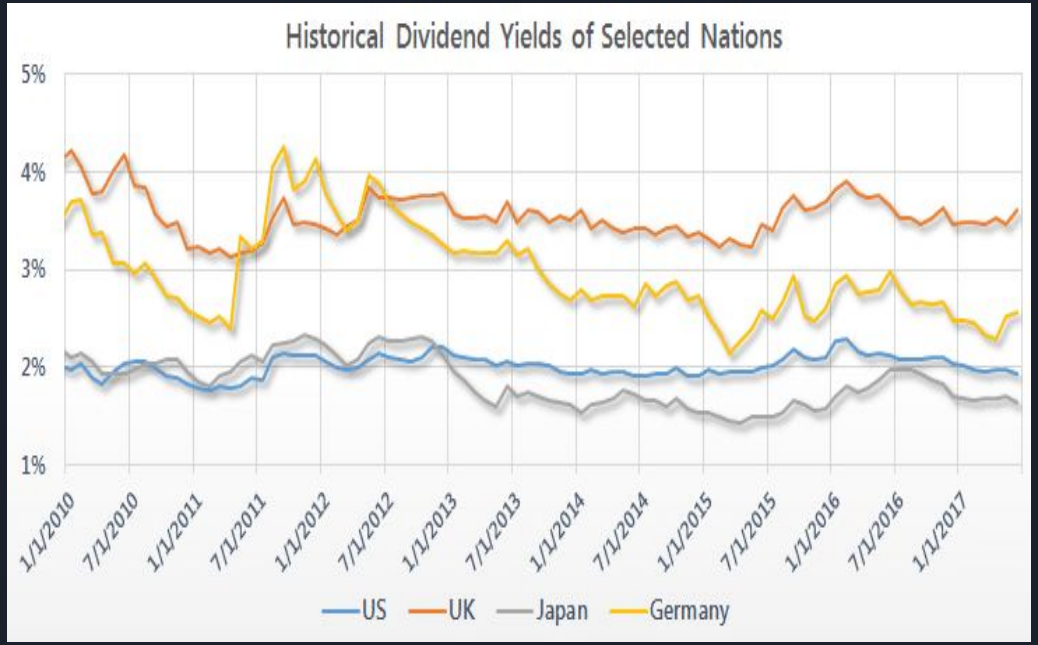
    = Net Income / Equity

  - P/B (Price-to-Book ratio)

    = Market Price per share / Total Book value

Proposed Work (3/5)

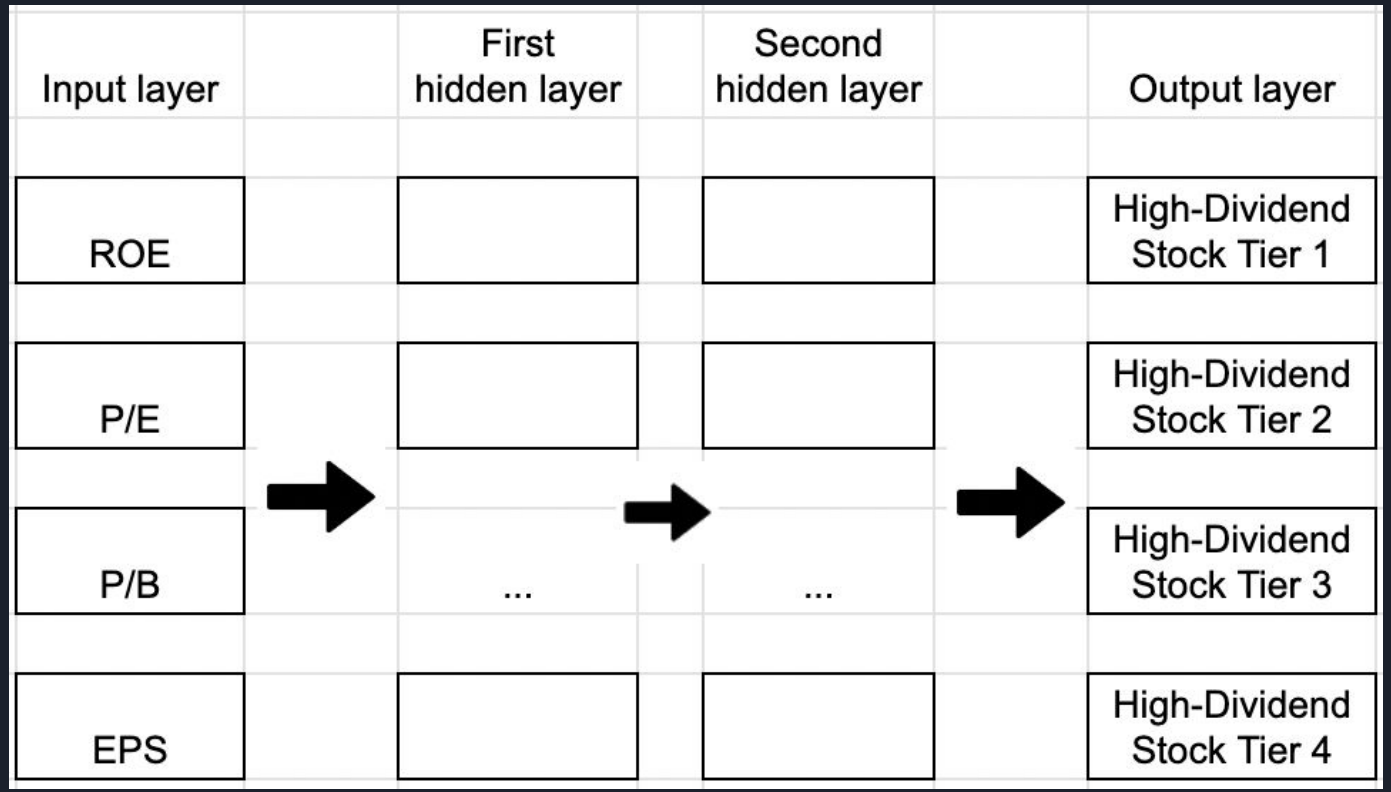
- Annual Percentage Rate (APR)



Proposed Work (4/5)

- MLP Output Layer
  - High-Dividend Stock Tier 1 (APR 4%)
  - High-Dividend Stock Tier 2 (APR 3%)
  - High-Dividend Stock Tier 3 (APR 2%)
  - High-Dividend Stock Tier 4 (APR 1%)

Proposed Work (5/5)

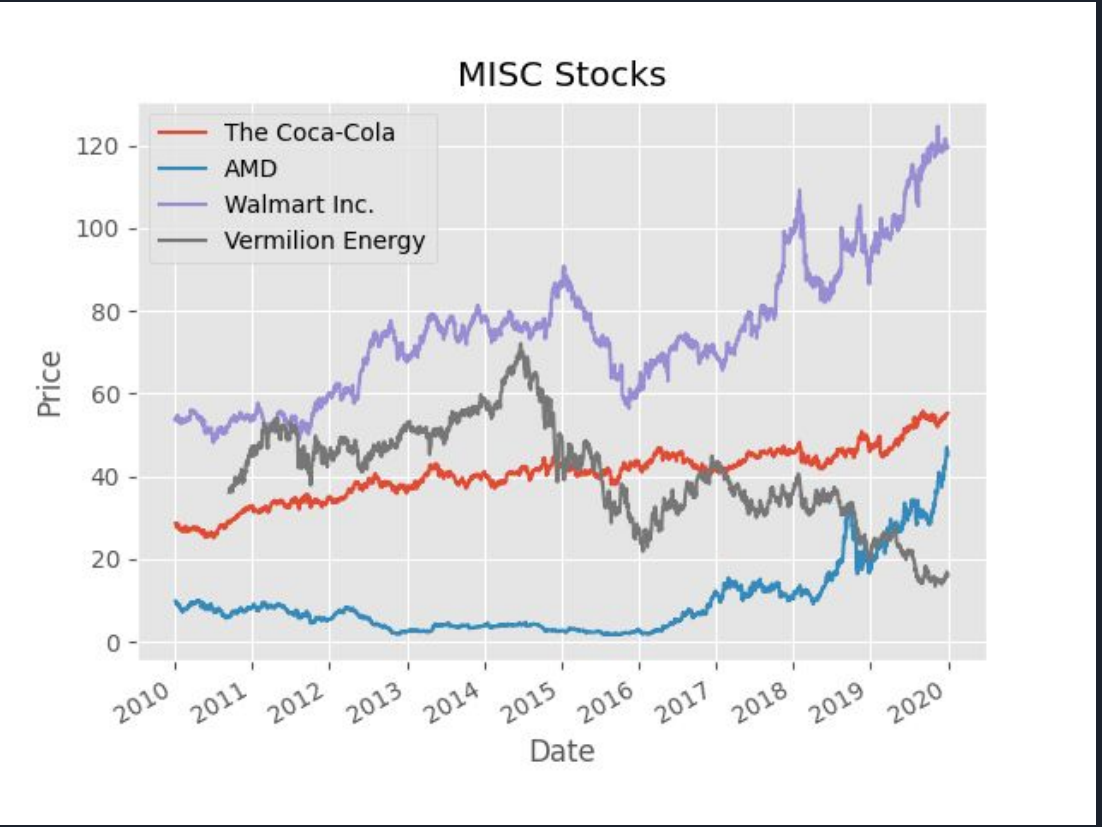


Dataset Collecting

- Yahoo Finance API
- www.marcotrend.net
- 5 years of data (2016~2020)
- Targeted Companies:
  - Profitable
  - Consistent

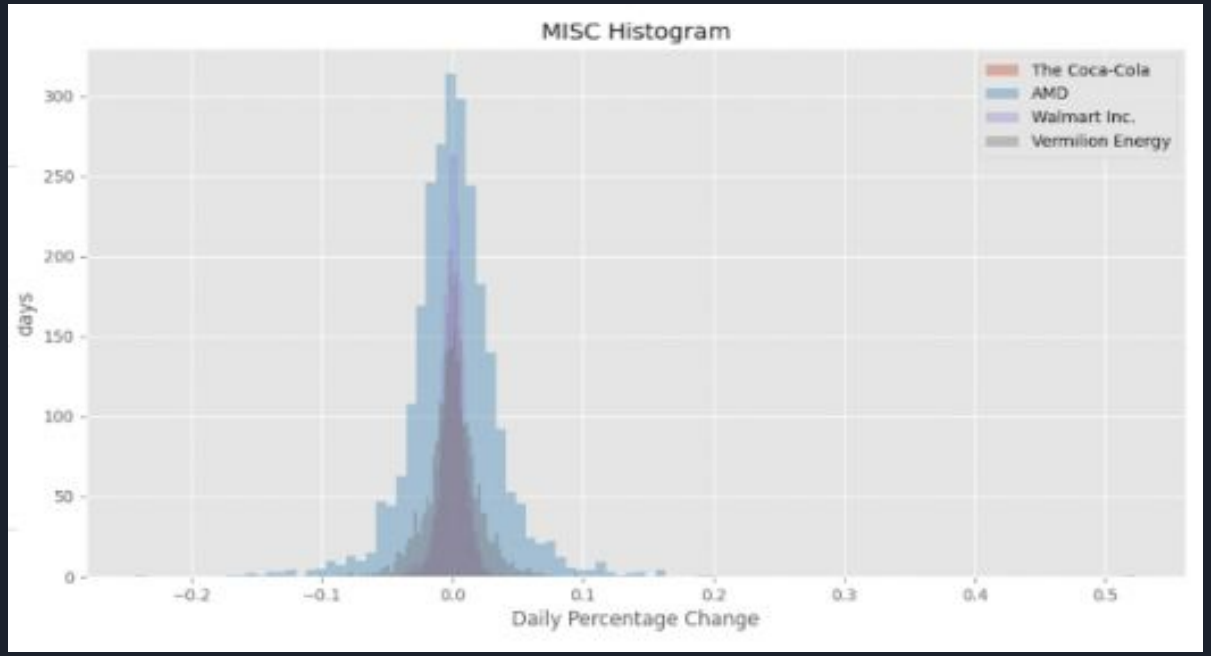
Dataset Collecting

Stock Prices change (2010~2020)



Dataset Collecting

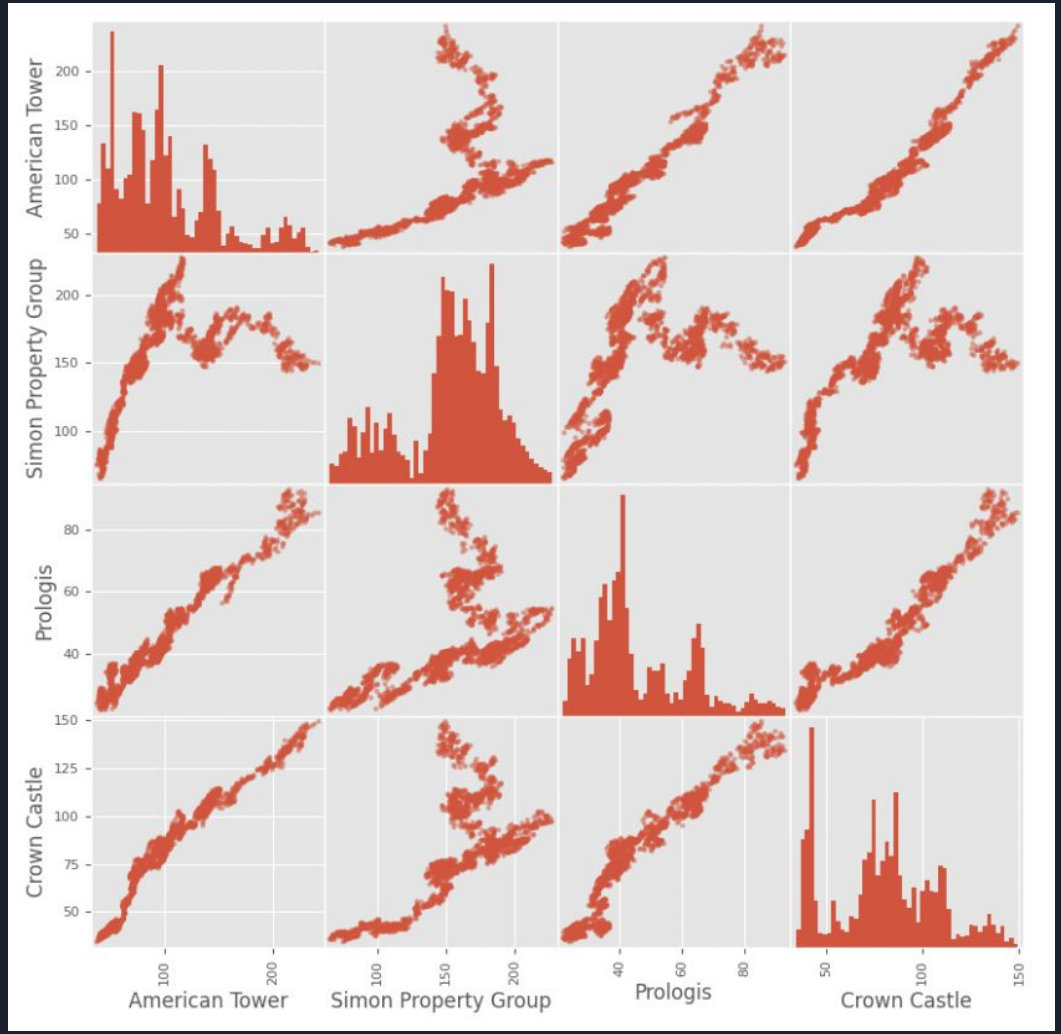
- Find the **Standard Deviation** of Daily Percentage Price Change



Dataset Collecting

Another indicator for choosing:

- correlation between companies in the same industry



Dataset Collecting

MMM_ROE

	Date	TTM Net Income	Shareholder's Equity	Return on Equity
4	2020-12-31	$5.45B	$12.93B	47.38%
5	2020-09-30	$4.96B	$11.94B	45.93%
6	2020-06-30	$5.11B	$10.92B	48.68%
7	2020-03-31	$4.93B	$10.21B	47.86%
8	2019-12-31	$4.52B	$10.13B	44.30%
9	2019-09-30	$4.95B	$10.76B	48.86%
10	2019-06-30	$4.91B	$10.14B	49.01%
11	2019-03-31	$5.64B	$9.76B	55.90%

Dataset Collecting

Price / Equity

MMM_PE-Ratio

	Date	Stock Price	TTM Net EPS	PE Ratio
5	2020-12-31	167.69	$9.25	18.13
6	2020-09-30	152.37	$8.53	17.86
7	2020-06-30	147.05	$8.82	16.67
8	2020-03-31	127.4	$8.52	14.95
9	2019-12-31	163.15	$7.81	20.89
10	2019-09-30	150.72	$8.42	17.9
11	2019-06-30	157.47	$8.28	19.02
12	2019-03-31	187.13	$9.43	19.84

Dataset Collecting

MMM_PB-Ratio

	Date	Stock Price	Book Value per Share	Price to Book Ratio
5	2020-12-31	167.69	$22.38	7.49
6	2020-09-30	152.37	$20.70	7.36
7	2020-06-30	147.05	$18.95	7.76
8	2020-03-31	127.4	$17.75	7.18
9	2019-12-31	163.15	$17.60	9.27
10	2019-09-30	150.72	$18.72	8.05
11	2019-06-30	157.47	$17.63	8.93
12	2019-03-31	187.13	$16.93	11.06

Dataset Collecting

Earnings Per Share

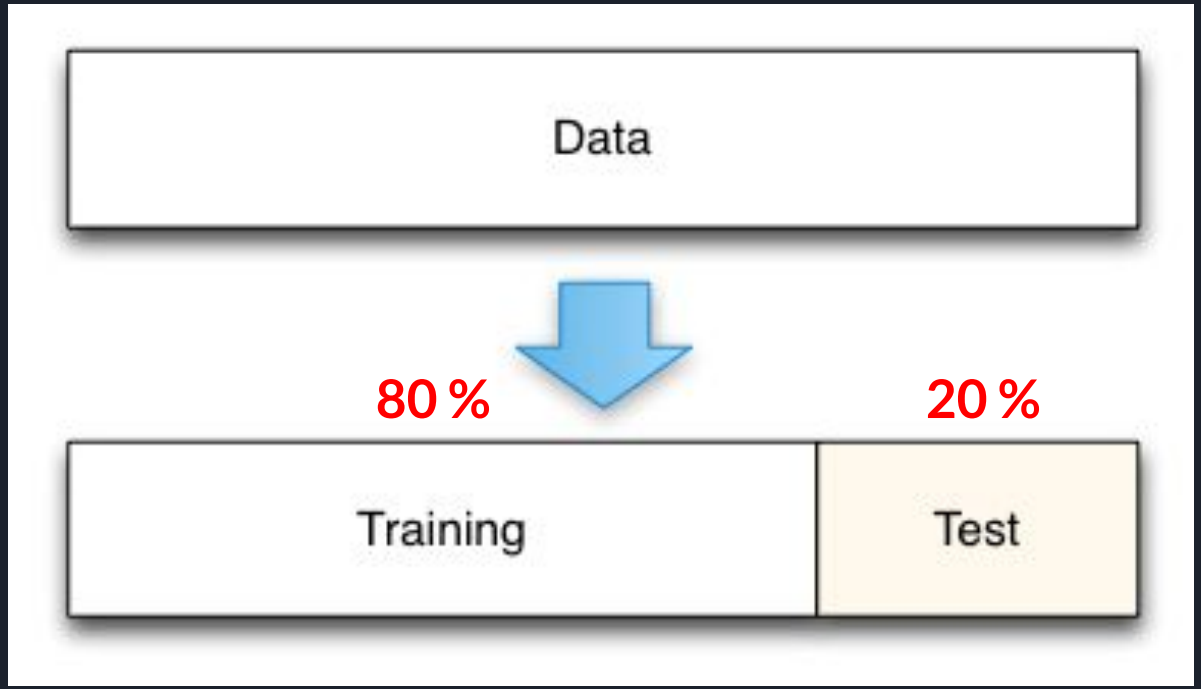
MMM_EPS

	3M Annual EPS	3M Annual EPS.1
1	2020	$9.36
2	2019	$7.72
3	2018	$8.89
4	2017	$7.93

Differences

- Trying to propose a safe and long-term method to invest.
- Based on fundamental indicators.
- Looking for consistent and profitable stocks.
- Not trying to forecast high-risk stock prices.
- Compare with bank saving accounts.

Experiments



Experiments

- Training the for 1-layer hidden layer sizes
- Accuracy: 60 ~ 70 %

Experiments

- Training the for 2-layer hidden layer sizes
- Accuracy: 70 ~ 80 %

Conclusion & Future Works

- Things change fast, recent 10 years of data is not always better than 5 years.
- Find more financial indicators.
- Find more companies or in similar industries.
- Finding profitable and consistent companies is more difficult than training the dataset.

Citation

1. Marco Fisichella;Filippo Garolla, “Can Deep Learning Improve Technical Analysis of Forex Data to Predict Future Price Movements?” IEEE Access Year: 2021, Volume: 9.
2. Shu-Yu Kuo;Yao-Hsin Chou, “Building Intelligent Moving Average- Based Stock Trading System Using Metaheuristic Algorithms” IEEE Access Year: 2021, Volume: 9.
3. Yaohu Lin;Shancun Liu;Haijun Yang;Harris Wu, “Stock Trend Prediction Using Candlestick Charting and Ensemble Machine Learning Techniques With a Novelty Feature Engineering Scheme” IEEE Access Year: 2021, Volume: 9.
4. Nagaraj Naik;Biju R. Mohan, “Novel Stock Crisis Prediction Technique—A Study on Indian Stock Market” IEEE Access Year: 2021, Volume: 9.
5. Saud S. Alotaibi, “Ensemble Technique With Optimal Feature Selection for Saudi Stock Market Prediction: A Novel Hybrid Red Deer-Grey Algorithm” IEEE Access Year: 2021, Volume: 9.


Thank you!