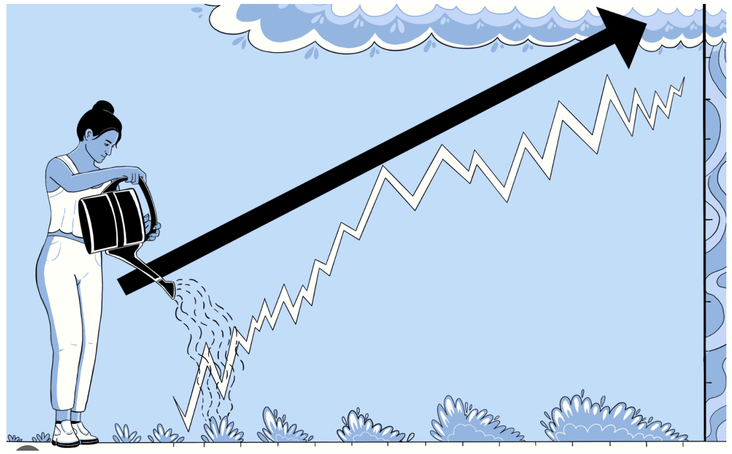
Modeling Stocks Data For Portfolio Prediction



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Business Problem:

- I want to invest money in stocks
- Find profitable and less risky portfolios to invest money in stock market

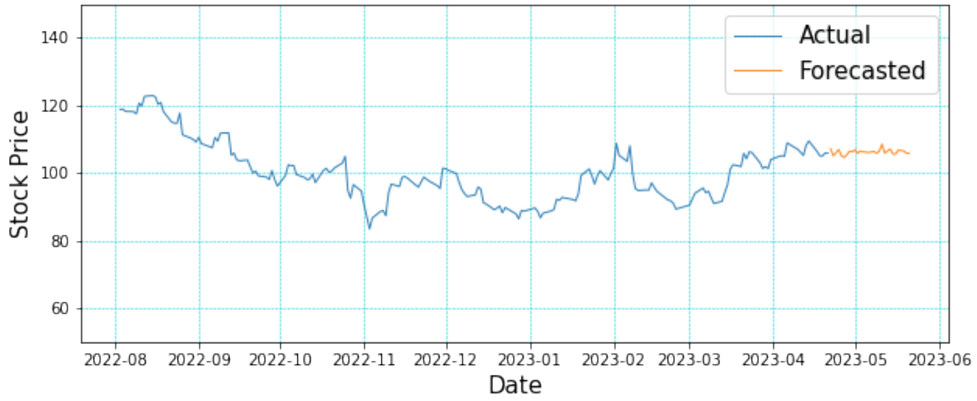
Data:

- Data is obtained from **Yahoo Finance**
  - Looked at the top **29 stocks** that form **S&P index**

Goal:

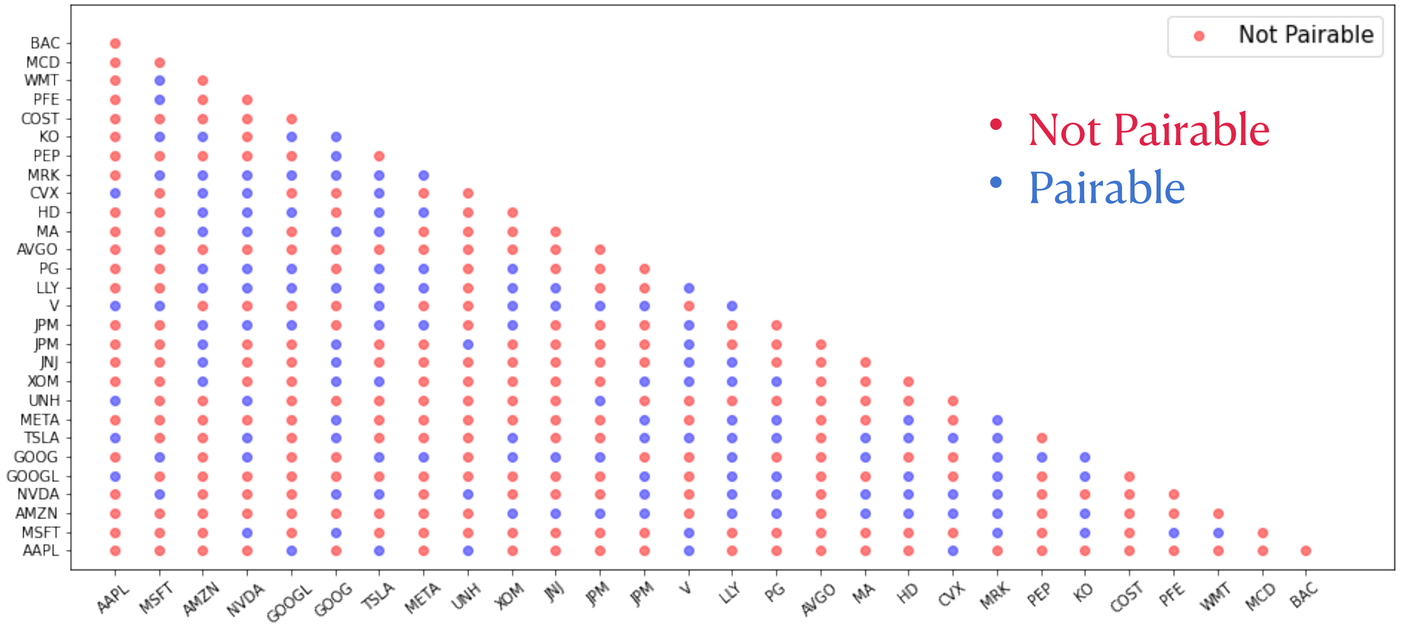
- **Model** the Stocks to predict the **overall trend** in movement
- Build portfolios with the **stocks that are least correlated**
- Calculate the **portfolio returns**
- Quantify the **risks**

Model the Stocks (LSTM (Long-Short Term Memory)Model



- Example of **LSTM** model **fit predictions** and **forecast** to GOOGLE stock data

Stocks to be Paired together



- **Pair** the stocks that have **correlations <0.5**

Sharpe Ratio, Portfolios Returns, Portfolios Volatility

$$\text{Sharpe Ratio} = \frac{R_P - R_f}{\sigma_P}, \textit{where :}$$

R_p : *Portfoilio Return*

R_f : *Risk Free Rate*

σ_P : *Standard Deviation of Returns*

- **Sharpe Ratio:**
  - $>$ **1 (Good);**
  - $>$**2(Very Good);**
  - $>$ **3(Excellent)**

$$R_p = \sum_{i=1}^{n} w_i \cdot r_i, \textit{where :}$$

w_i : *Weight of the ith Stock*

r_i : *Return of the ith Stock*

- **Portfolio Returns:**
  - Tells how much **profit (positive)** or **loss (negative)** one makes

- **Volatility**: Frequency and magnitude of market movement
- Measured as a standard deviation of returns

- **Higher** the **Volatility**, **higher** the **risk** and vice-versa

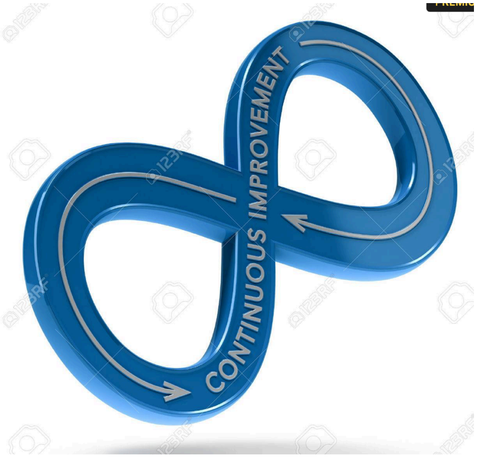
Results: Best Portfolio

	Portfolio	Weights	Sharpe Ratio	Portfolio_Returns	Portfolio_Volatility
0	[AMZN, META, JPM, LLY, MRK]	[0.06165540540540541, 0.1258445945945946, 0.10219594594594594, 0.4028716216216216, 0.30743243243243246]	2.582864	11.64	35.074324
1	[NVDA, MRK]	[0.31555555555555553, 0.6844444444444444]	2.999636	10.46	32.084729
2	[XOM, GOOGL, JPM, LLY]	[0.134029590948651, 0.13228894691035684, 0.35509138381201044, 0.3785900783289817]	2.089932	11.47	33.519018

- If we **invest 10K$** in this portfolio:
  - We will have **11164$** after 1 year (10K+**0.1164***10K)
  - Individual Stocks weights: AMZN (0.06), META(0.13), JPM(0.1), LLY(0.4), MRK(0.31)
  - But with somewhat higher volatility (risky)(~below 20 is good)

Recommendations

- **Invest** in one of the **top 3** portfolios !



Limitations:

- Use **other models** (GARCH, Random Forests etc) to predict stock market movement.
- Include the **sentient analysis** which includes web-scrapping news articles.
- Implement information from **SEC reports** submitted by companies.
- **Hyperparameter tuning** of models.
- Study **other stock-market indicators**
- Include all the stocks listed in the S&P

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