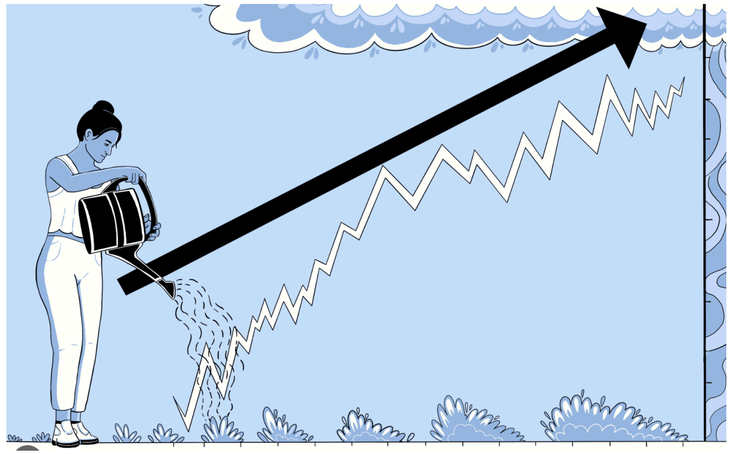
Modeling Stocks Data For Portfolio Prediction



Deepali Sharma

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- **Stakeholder**

- Myself: I want to invest some money in stocks

- **Business Problem:**

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

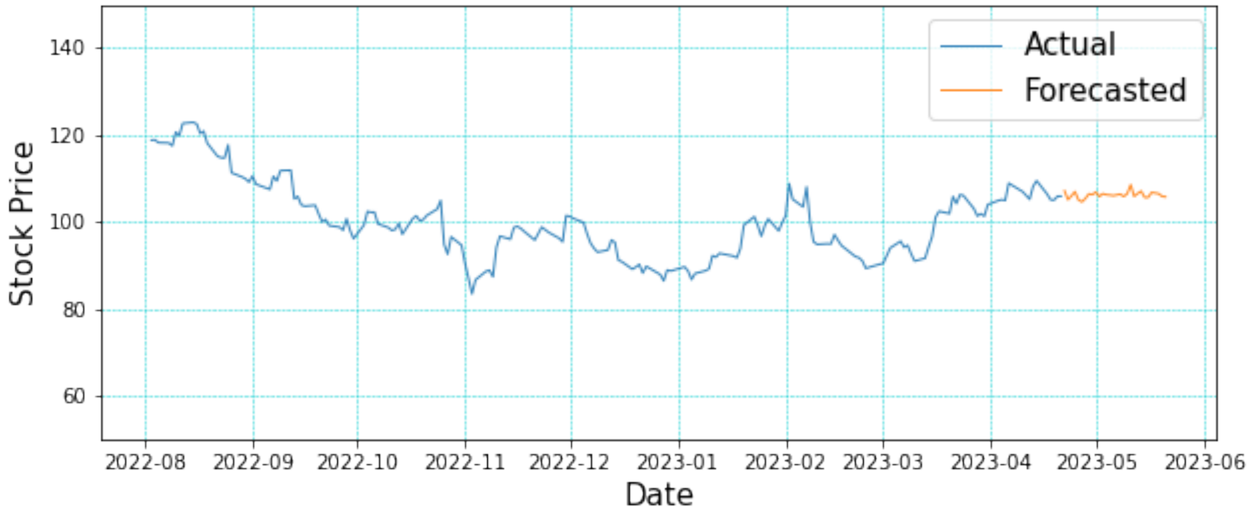
Data:

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

Goal:

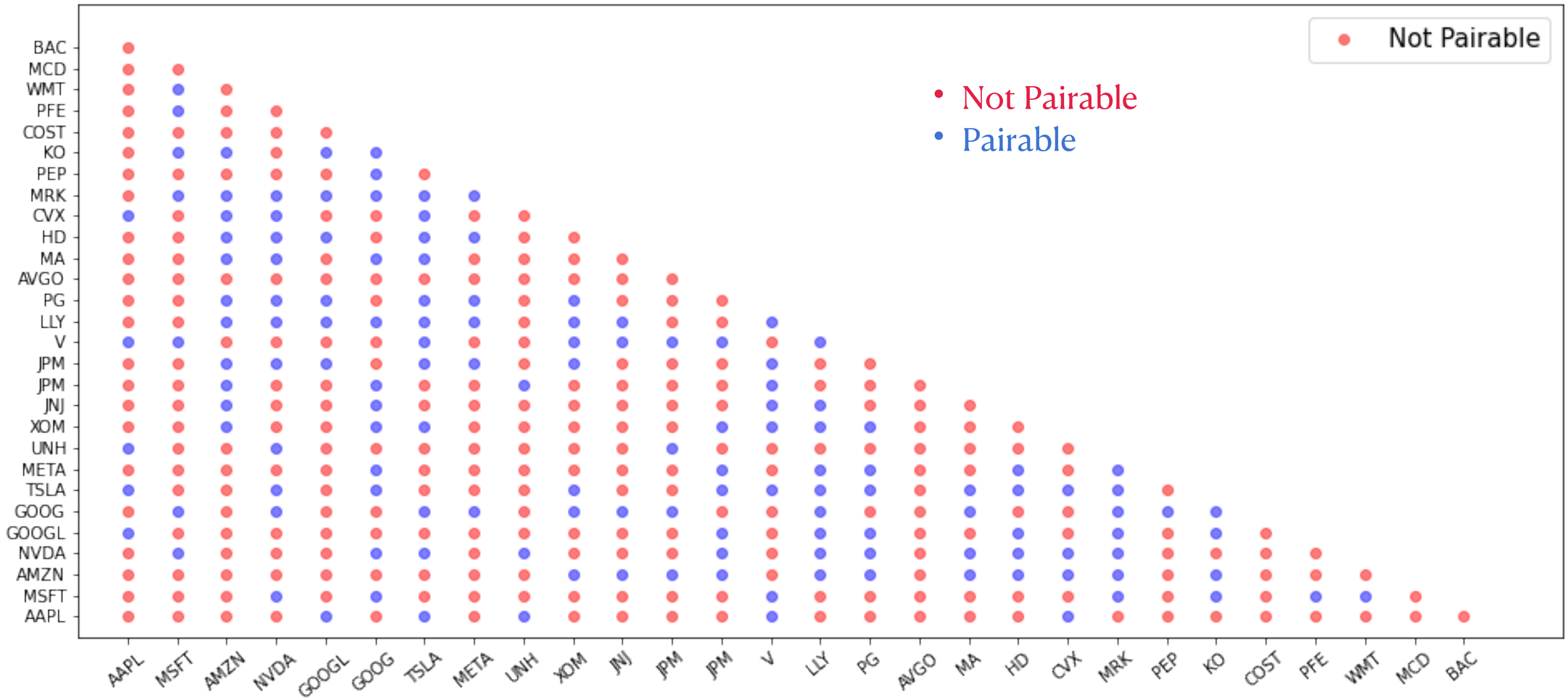
- **Model** the Stocks to predict the **overall trend** in movement
- Build portfolios with the **stocks that are least correlated**
- Calculate the **portfolio returns**
- Quantify the **risks**

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** (Ones in **Blues)**

Sharpe Ratio, Portfolios Returns, Portfolios Volatility

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

- **Sharpe Ratio**: Indicator of goodness of portfolio.
- Calculated using:
  - Portfolio Returns,
  - Market Risk Free Rate
  - Standard deviation of Portfolio

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

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

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

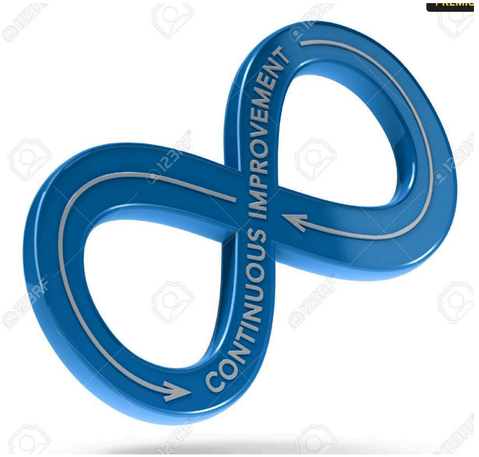
Results: Best Portfolio

	Portfolio	Weights	Sharpe Ratio	Portfolio Returns	Portfolio Volatility
1	AMZN, META, JPM, LLY, MRK	0.06, 0.13,0.10,0.40, 0.31	2.6	11.64	35.1
2	NVDA, MRK	0.32, 0,68	3.0	10.64	32.1
3	**XOM, GOOGL, JPM, LLY**	**0.13,0.13,0.36,0.38**	**2.1**	**11.47**	**33.5**

- If I **invest 10K$** in 3rd portfolio:
  - I will have **11147$** after 1 year (10K+**0.1147***10K)
  - Individual Stocks weights: XOM (0.13), GOOGL(0.13), JPM(0.36), LLY(0.38).
  - But with somewhat higher volatility (risky)(~below 20 is good)

Recommendations

- **Invest** in 3rd potfolio:
    - Less risky amongst the three
    - Has diversity and similar Sharpe Ratio



Limitations:

- Use **other models** (GARCH, Random Forests etc) to predict stock market movement.
- Include the **sentiment 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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- **Back -Ups**

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*

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

w_i : *Weight of the ith Stock*

r_i : *Return of the ith Stock*

- **Volatility**: Frequency and magnitude of market movement
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- **Sharpe Ratio:**
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  - $>$**2(Very Good);**
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- **Portfolio Returns:**
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