

USING NLP
TO PREDICT THE
IMPACT ON STOCK
PRICE FROM
PHARMACEUTICAL
NEWS

GA Project 4
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#### Problem Statement

Use Natural Language Processing (NLP) to predict the impact of publicly available pharmaceutical company information on stock price.

This tool will help retail investors better understand market reaction to news events.

### Introduction

- Retail investors need help trying to determine which stocks to buy
- Many resources are too high level and detailed to understand, ex. earnings reports, SEC filings
- News can influence stock prices
  - Good news can cause prices to increase, ex. new products, corporate acquisition
  - Bad news can cause prices to fall, ex. earnings miss, geopolitical uncertainty
- NLP Sentiment analysis determines if news is good or bad

# Executive Summary

This tool is aimed at individuals with limited investment experience and is intended to be:

- Part of a toolkit for making timely informed investment decisions
- Employee benefit or self employed
- Health Savings Account (HSA)
- Contribute pre-tax dollars for investing
- Can be managed until medical expenses arise & withdrawn tax-free

### Process

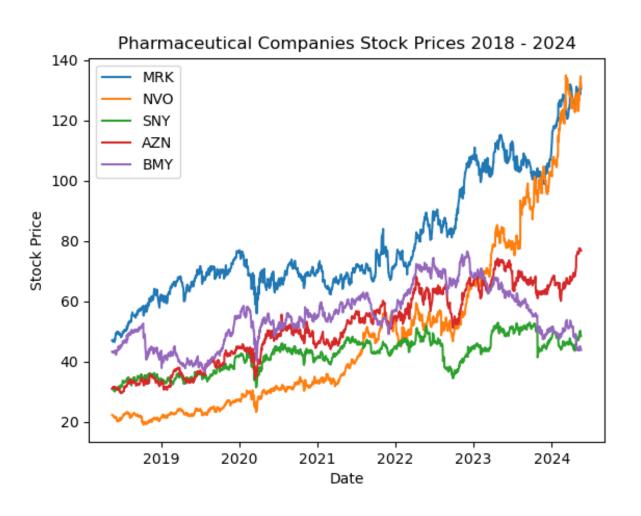
- Load the data
- EDA
- Preprocess data
  - Tokenizing, lemmatizing, & stemming
  - Stop word removal
- Sentiment analysis
  - VADER (Valence Aware Dictionary and sEntiment Reasoner) lexicon
- Tools
  - NLTK natural language toolkit (<a href="https://www.nltk.org/modules/nltk/tokenize/regexp.html">https://www.nltk.org/modules/nltk/tokenize/regexp.html</a>)
  - Yahoo! Finance https://pypi.org/project/yfinance/

## Data

• Yahoo! Finance market data

• News data from PR Newswire, Business Wire

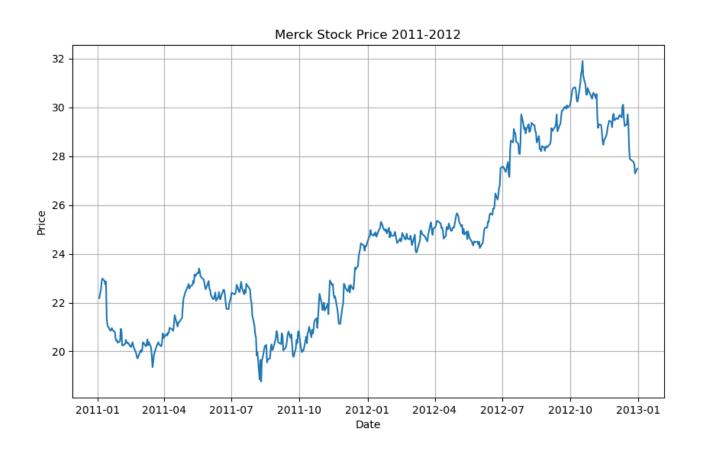
# Pharmaceutical Companies Stock Price (Market Close)



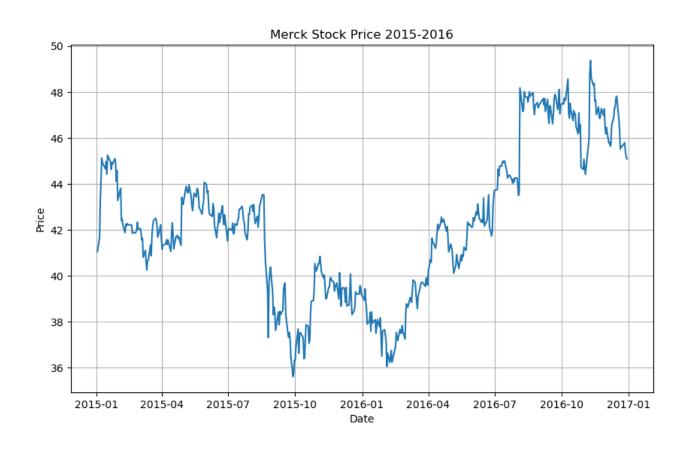
## Merck Stock Price (Market Close)



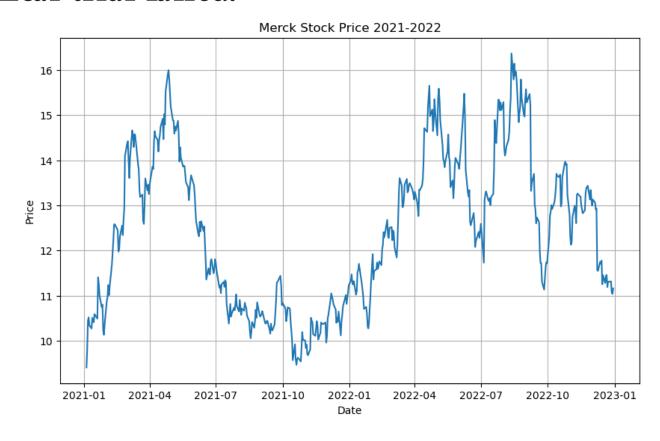
# Merck Stock Price (Market Close) – April 2011 Headline: Tender Offer for all outstanding shares of Inspire Pharma



# Merck Stock Price (Market Close) – April 2015 Headline: Sold the consumer care business



Merck Stock Price (Market Close) – October 2021 Headline: FDA Approvals for cancer drug, COVID-19 oral meds & rival med clinical trial failed.



#### Conclusions & Recommendations

#### In conclusion:

- This tool can predict the impact of publicly available pharmaceutical company information on stock price.
- This tool will help retail investors better understand market reaction to news events
- We recommend incorporating the tool into a toolkit for making informed investment decisions

Future improvements to this tool include adding more news feeds, varying the sources of news