

Twitter Equity Firm Value

Nathan Guinn, Rohan Rane, Christian Wiskur, Jacob Smith, and Erik Agren

CS 4624 Multimedia, Hypertext, and Information Access

Instructor: Dr. Fox

Virginia Tech, Blacksburg VA 24061

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Outline

- Project Overview
- Data Scraping and Gathering
 - Twitter and Stock
- Data Analysis
- Company Guide
- Limitations
- Acknowledgements

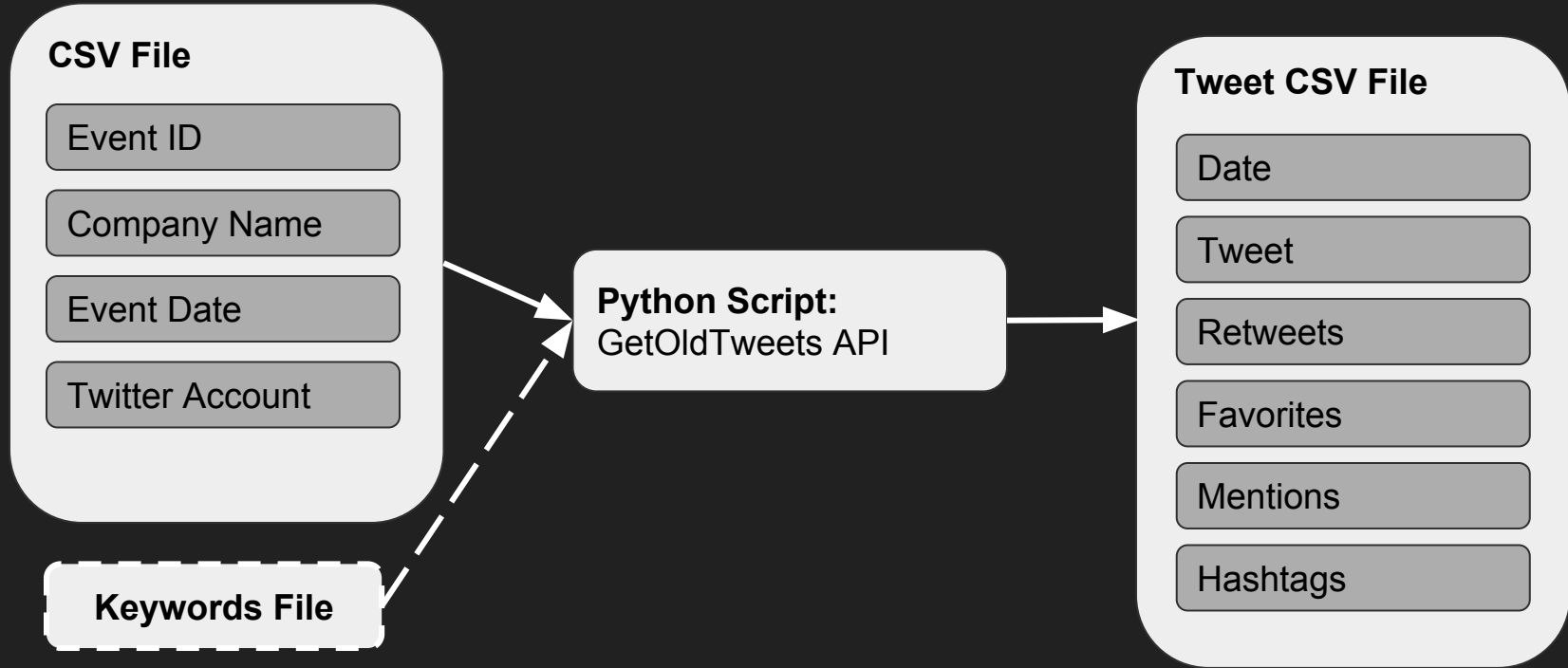
Our Goal

1. Analyze the ways companies can mitigate stock failure following a data breach using Twitter
2. Research the role of users
3. Provide a company guide
 - Guidelines following a data breach using social media

Data Scraping

- Gather firm tweet data for 707 Data Breaches
 - 120 days before and 30 days after
- Gather user tweet data
 - 10 days before and 30 days after
 - Keywords: security breach, hacker, theft, fraud, steal
- Gather stock price of the companies
 - 3 days before and after the breach

Tweet Collection Method



Additional Tweet Data Collection

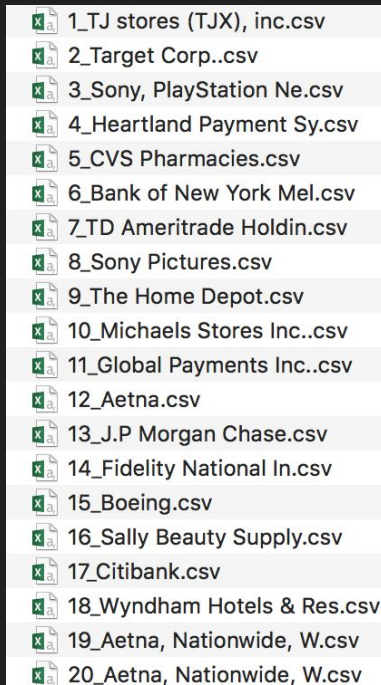
- Announcements vs. Replies
- Hyperlinks
- User biography, followers, following, verified



<http://www.londonlovesbusiness.com/londons-best/twillionaires-the-7-richest-people-on-twitter/5441.article>

Stock Data

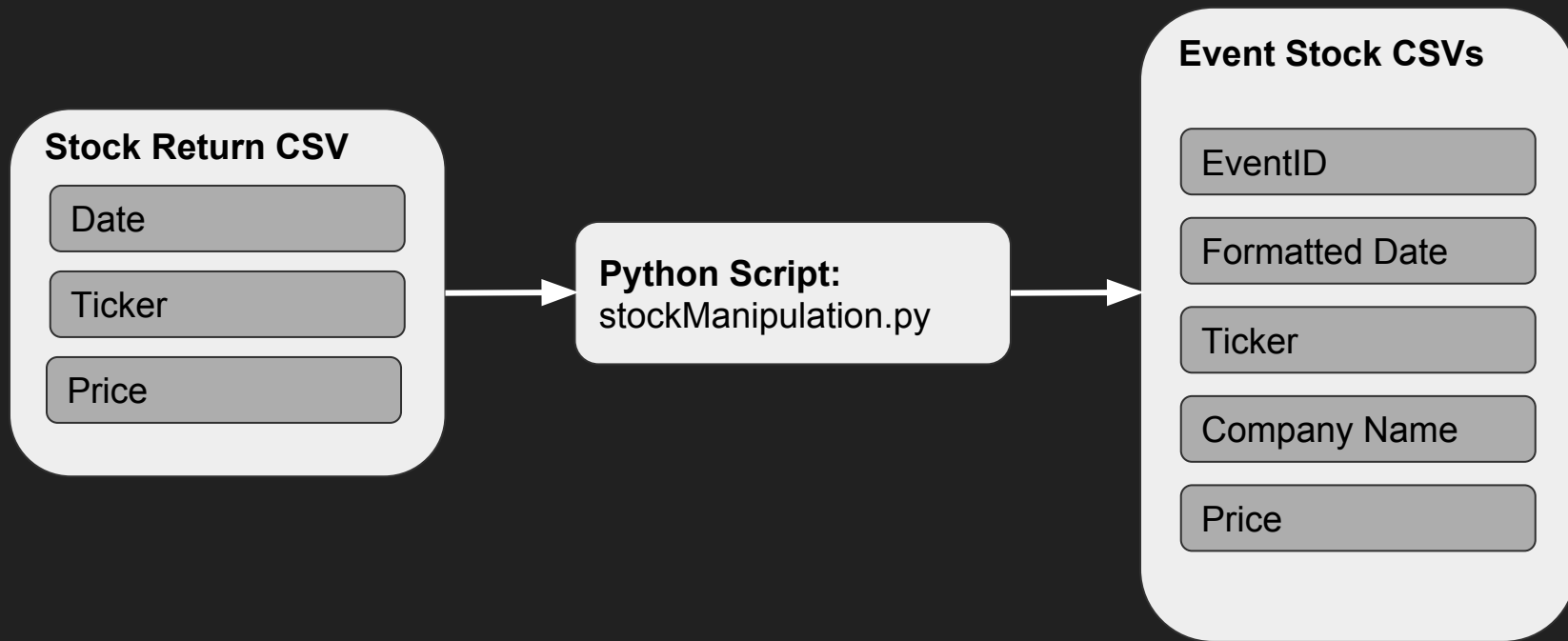
- Client provided stock data
- Raw stock data - unusable
 - Over one million rows
 - Scrub and clean
- Join with breach information
- Create new CSV for each event



A screenshot of a file explorer window displaying a list of 20 CSV files. Each file name is preceded by a small icon representing a CSV file. The files are numbered 1 through 20 and list various companies and organizations.

- 1_TJ stores (TJX), inc.csv
- 2_Target Corp..csv
- 3_Sony, PlayStation Ne.csv
- 4_Heartland Payment Sy.csv
- 5_CVS Pharmacies.csv
- 6_Bank of New York Mel.csv
- 7_TD Ameritrade Holdin.csv
- 8_Sony Pictures.csv
- 9_The Home Depot.csv
- 10_Michaels Stores Inc..csv
- 11_Global Payments Inc..csv
- 12_Aetna.csv
- 13_J.P Morgan Chase.csv
- 14_Fidelity National In.csv
- 15_Boeing.csv
- 16_Sally Beauty Supply.csv
- 17_Citibank.csv
- 18_Wyndham Hotels & Res.csv
- 19_Aetna, Nationwide, W.csv
- 20_Aetna, Nationwide, W.csv

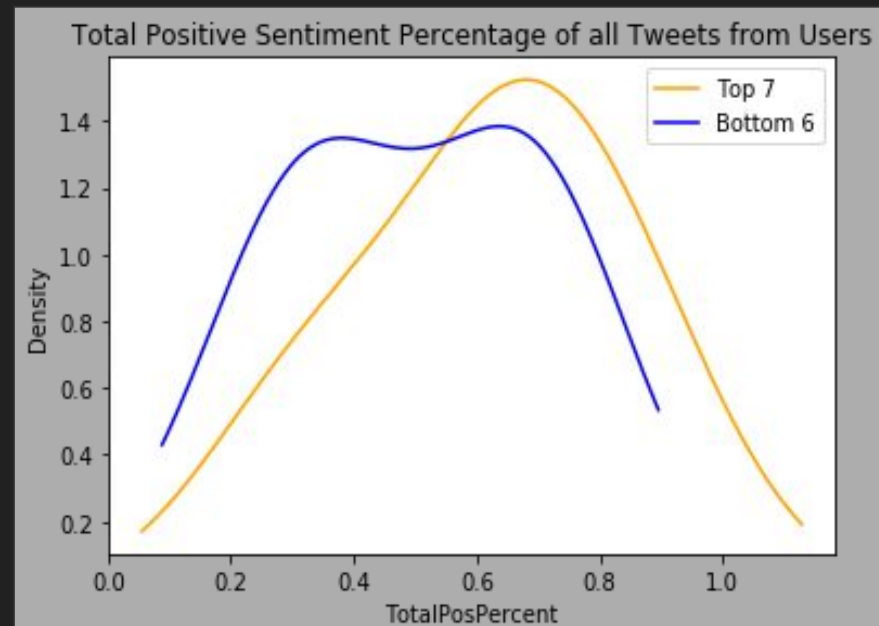
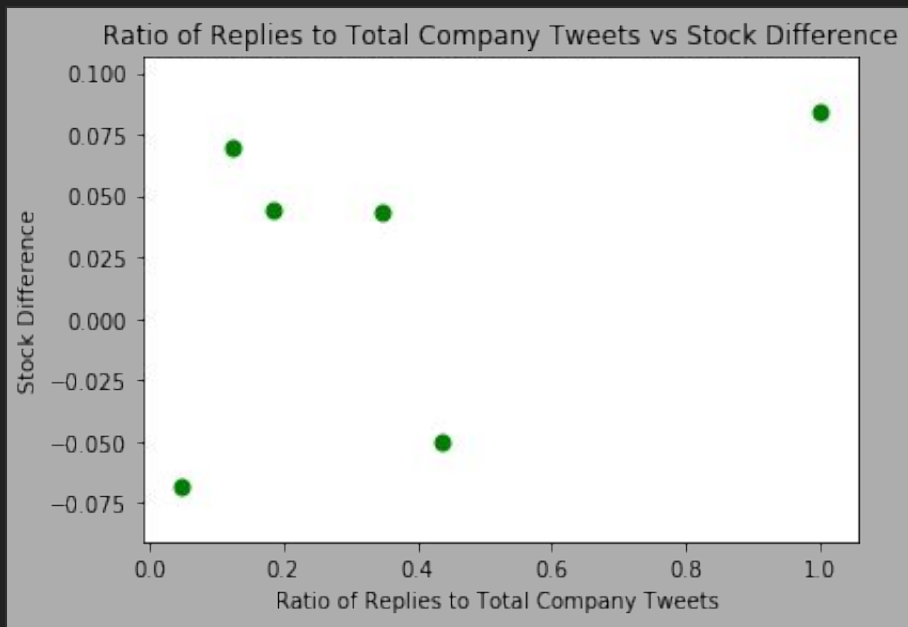
Stock Data



Data Analysis

1. Use Fama French Model to analyze stock data
 - Expected stock price vs actual stock price
 - 3 days before and after
2. Compute sentiment analysis
 - Specifically the user tweets
3. Analyze abnormally good and abnormally bad stock performance
 - 2.5 standard deviations above and below
 - i. Many didn't have tweet data

Plotting Our Data



Company Guide

1. Focus on replying to customers instead of making announcements
 - a. This will help fight against tweets of Negative Sentiment
2. Always reply to influential users
 - a. Verified
 - b. High Follower Count
3. Try to keep tweet count down
 - a. The breaches most tweeted about had the largest drops

Limitations

- Twitter data on breaches before 2010
- Some breaches had an excessive amount of tweets to analyze
 - Equifax breach had 90,000 tweets
 - This limited how many abnormal companies to include in analysis
- Scope of project wasn't well defined initially
 - New requirements added to project throughout
- Underestimation of machine learning difficulty
 - Data collection was delayed

Possible Improvements

- Add parallelization to several scripts
- Have a different data sharing platform than Google Drive
- Dedicate more time towards data analysis

Acknowledgements

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References

Hendricks, Kevin, et al. “Article Tools.” *Management Science*, Institute for Operations Research and the Management Sciences, 14 Oct. 2015, pubsonline.informs.org/doi/abs/10.1287/mnsc.2014.1987.

Lee, Lian Fen, et al. “The Role of Social Media in the Capital Market: Evidence from Consumer Product Recalls.” *Journal of Accounting Research*, 27 Mar. 2015, onlinelibrary.wiley.com/doi/10.1111/1475-679X.12074/abstract.