NYC Weather and Trading Behavior

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CSPB 4502 - Data Mining

Description

Project Goal:

To quantify the effect that weather has on the stock market

Questions:

- Does inclement weather have an effect on stock trading activity in New York City?
- Are notable weather events (e.g hurricanes, blizzards etc.) correlated with effects on the stock market?
- How do seasonal weather patterns affect stock trading behavior?

Prior Work

The Effect of Weather on Stock Trading

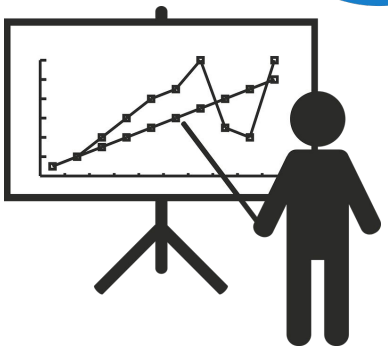
- Examines the effects of weather on stock return and trading volume specifically in New York and Chicago

Weather Effects on Stock Market Returns in the United States

- Looked at link between weather changes/average monthly temp. on returns of NYSE and NASDAQ
- 4 regions - Eastern, Central, Southern, and Western

Weather vs. the Stock Market

- Tries to answer whether or not weather affects the financial markets or determine if there is a correlation between the two



Financial Data

- Obtained from Kaggle
- Contains full historical daily price data to 2017
- Pulled from both NYSE and NASDAQ
  - Over 7000 stocks and 1300 ETFs
  - Contains daily high, low, open/close prices, and volume

Sample Data

AAPL
Date, Open, High, Low, Close, Volume, OpenInt
1984-09-07, 0.42388, 0.42902, 0.41874, 0.42388, 23220030, 0
1984-09-10, 0.42388, 0.42516, 0.41366, 0.42134, 18022532, 0
1984-09-11, 0.42516, 0.43668, 0.42516, 0.42902, 42498199, 0
1984-09-12, 0.42902, 0.43157, 0.41618, 0.41618, 37125801, 0
1984-09-13, 0.43927, 0.44052, 0.43927, 0.43927, 57822062, 0
1984-09-14, 0.44052, 0.45589, 0.44052, 0.44566, 68847968, 0
1984-09-17, 0.45718, 0.46357, 0.45718, 0.45718, 53755262, 0
1984-09-18, 0.45718, 0.46103, 0.44052, 0.44052, 27136886, 0
1984-09-19, 0.44052, 0.44566, 0.43157, 0.43157, 29641922, 0
.....

Weather Data

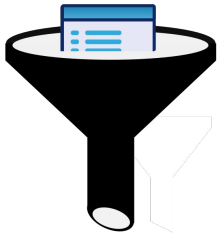
- Obtained from NOAA
- Daily weather data for New York City
  - Data from 1948 - 2022
  - Includes weather type (snow, rain, fog, etc.)
  - Temperature (tenths of degrees C)
  - Precipitation (10ths of mm)
  - Snowfall (mm)

Sample Data

ELEMENT	ACMH	ACSH	AWND	DAPR	FMTM	MDPR	PGTM	PRCP	SNOW	SNWD	...	WT13	WT14	WT15	WT16	WT17	WT18	WT19	WT21	WT22	WV01
1948-07-17	NaN	NaN	NaN	NaN	NaN	NaN	NaN	15.0	0.0	0.0	...	NaN	NaN	NaN	1.0	NaN	NaN	NaN	NaN	NaN	NaN
1948-07-18	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.0	0.0	0.0	...	NaN	NaN	NaN	1.0	NaN	NaN	NaN	NaN	NaN	NaN
1948-07-19	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.0	0.0	0.0	...	NaN	NaN	NaN	1.0	NaN	NaN	NaN	NaN	NaN	NaN
1948-07-20	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.0	0.0	0.0	...	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1948-07-21	NaN	NaN	NaN	NaN	NaN	NaN	NaN	622.0	0.0	0.0	...	NaN	NaN	NaN	1.0	NaN	NaN	NaN	NaN	NaN	NaN

Proposed Work

- Data cleaning
  - Stock data from Kaggle previously cleaned
  - Price processed to reflect stock splits and dividends
- Data preprocessing
  - Weather data cut to match frequency of stock data
  - Reduce unused data (windspeed, wind direction, etc.)
- Data integration
  - Combine weather and stocks data based on time order



List of Tools

Data Visualization

- Python
  - Matplotlib
  - Plotly
- PowerBI & Tableau

Data Analysis

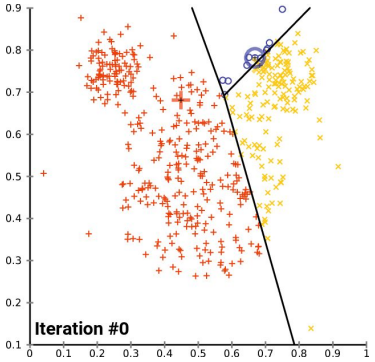
- Python
  - Numpy
  - Pandas

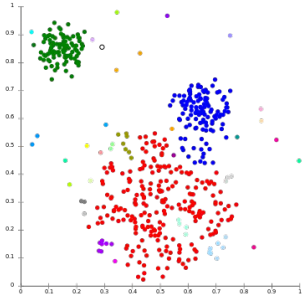
Data Interchanging

- JSON

Pattern Evaluation

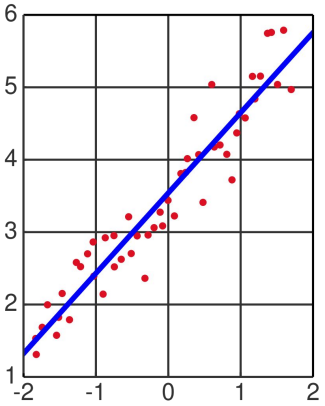
- Clustering
  - K-Means algorithm
  - Partition vectors of data into groups
  - Iterates to minimize euclidean distance between data points within clusters
  - Evaluation based on distance between clusters and sphericality of individual clusters
  - Visual analysis of plotted data





Pattern Evaluation (cont.)

- Least Squares Classification
  - Predict outcome based on grouped data vector
  - Outcome is True or False
  - Create classifier (model)
  - Evaluation using confusion matrix



		Predicted Class: Yes	Predicted Class: No
Actual Class	Yes	TP	FN
	No	FP	TN

The End