# Abstract

Write abstract last

# 1. Introduction

Write Introduction after methods and results completed.

# 2. Methods

Multiple imputation seeks to address this issue by replacing missing values with plausible data values which minimize the impact to the natural variation of the dataset.

**2.1 Data Acquisition**

Data for this study was downloaded from Yahoo Finance utilizing the python packages “pandas\_datareader” and “fix\_yahoo\_finance”. The data returned from query is daily adjusted close stock prices from 1/1/2016 to 9/15/2018 for seven publicly traded stocks: Anadarko Petroleum (APC), Facebook (FB), Netflix (NFLX), Splunk (SPLK), Twitter (TWTR), Ubiquiti Networks (UBNT) and Wal-Mart (WMT). This data is returned into a Pandas data frame named “px”. “px” is indexed by the date of the adjusted close price. Table 1 shows a description of the “px” data frame.

| **Column Name** | **Type** |
| --- | --- |
| APC | Float64 |
| FB | Float64 |
| NFLX | Float64 |
| SPLK | Float64 |
| TWTR | Float64 |
| UBNT | Float64 |
| WMT | Float64 |

*Table 1. “px” data frame description*

Dow Jones adjusted close values are also retrieved and returned into a separate data indexed data frame named “djiPx”. The structure of this data frame is shown in table 2. “djiPx” will be utilized for comparisons to the overall “px” seven stock portfolio.

| **Column Name** | **Type** |
| --- | --- |
| DJI | Float64 |

*Table 2. “djiPx” data frame description*

**2.2 Data Processing**

Examination of the data in “px” and “djiPx” data frames showed no missing values, correct columns, correct indexing and correct data types. The focus of the data processing effort then shifted to creating daily returns based on these two data frames. First, the Pandas function “pct\_change()” was utilized to calculate day over day returns for “px” and “djiPx”. The results were saved in new data frames named “rets” and “djiRets”, respectively. Second, total portfolio data frames were calculated to allow for simpler comparisons of all seven stocks to the Dow Jones Index. The “pxTot” data frame shows the average adjusted close price for all seven stocks on a daily basis. The “pxTotRet” data frame contains daily returns for the seven stock portfolio as a whole. Table 3 summarizes the data frames in existence at this point in the process.

| **Data Frame** | **Description** |
| --- | --- |
| px | Daily adjusted close values for all seven stocks |
| djiPx | Daily adjusted close values for the Dow Jones Index |
| rets | Day over day returns for the seven stocks in the px data frame |
| djiRets | Day over day returns from the Dow Jones Index |
| pxTot | Daily average adjusted close values for the portfolio of seven stocks |
| pxTotRet | Day or day return for the portfolio of seven stocks |

*Table 3. “djiPx” data frame description*

**2.3 Calculations**

# 3. Results

**3.1 Daily Returns**

**3.2 Moving Window Average**

**3.3 Exponentially Weighted Function**

**3.4 Binary Moving Window**

**3.5 Sharpe Ratio Parameter Grid Output**

**3.6 Decision Making Based on Calculations**

# 4. Conclusion

Write Conclusion after Introduction, Methods and Results.

# 5. Literature Review

“Sharpe Ratio”; From: <https://www.investopedia.com/terms/s/sharperatio.asp>

Paulsen, Dirk and Sohl, Jakob; “Noise Fit, Estimation Error and a Sharpe Information Criterion: Linear Case”; From: <https://arxiv.org/pdf/1602.06186.pdf>

“[Volatility And Measures Of Risk-Adjusted Return With Python](https://www.quantinsti.com/blog/volatility-and-measures-of-risk-adjusted-return-based-on-volatility/)”; From: <https://www.quantinsti.com/blog/volatility-and-measures-of-risk-adjusted-return-based-on-volatility/>

“What is a “lookback”?”; From: <https://www.mystockoptions.com/content/what-is-a-lookback>

Wesley, William; “Python for Data Analysis” McKinney (O’Reilly). Copyright 2012 William McKinney, 978-1-449-31979-3.”

“Portfolio Optimization Using Monte Carlo Simulation”; From: <https://www.quantinsti.com/blog/portfolio-optimization-maximum-return-risk-ratio-python/>

“Interpreting the Sharpe Ratio”; From: <https://www.aaii.com/journal/article/interpreting-the-sharpe-ratio.mobile>

“Adjusted Closing Price”; From: <https://www.investopedia.com/terms/a/adjusted_closing_price.asp>

Keen, Ben; “Resampling Time Series Data with Pandas”; From: <http://benalexkeen.com/resampling-time-series-data-with-pandas/>

# Appendix A – Python Code

/\* Import carmpgdata\_26.2 data set \*/

%web\_drop\_table(WORK.carmpgdata);

FILENAME REFFILE '/home/gsturrock0/QTW/CaseStudy2/carmpgdata\_26\_2.csv';

PROC IMPORT DATAFILE=REFFILE

DBMS=CSV

OUT=WORK.carmpgdata;

GETNAMES=YES;

RUN;