User Guide

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What the program does

This is a stock analysis program. It provides statistical analyses and graphs for you to track the performances of stocks. You can also build a portfolio to see its return over a period. This program only analyzes the closing prices of stocks, since closing price is an accurate indicator of a stock's daily performance.

How to run the program

The program extracts data from Yahoo! Finance, so you need to get Internet access before you run the program. You also need to install python2.7, its libraries NumPy, pandas, matplotlib, Tkinter and requests. Please run the program under Linux and see the detailed installation guide below.

Step1:

- Connect to the Internet

Step2:

- Open the terminal

Step3:

- Check whether you have python2.7 by typing the following command in the terminal:
    - $ python --version
- If python2.7 is not installed, use this command to install python2.7:
    - $ sudo apt-get install python2.7

Step 4:

- Install Numpy, pandas, matplotlib using the following command:
    - $ sudo apt-get install python-numpy python-matplotlib python-pandas

Step 5:

- Install Tkinter using the following command:
    - $ sudo apt-get install python-tk

Step 6:

- Install requests using the following command:
    - $ sudo easy_install requests

Step 7:

- Using the following command to run the program:
    - $ cd python_project
    - $ python -u Main.py

Libraries used in the program

NumPy: Numpy is an extension package to python, adding support for large, multidimensional arrays and matrices, along with a large library of high-level mathematical functions to operate on these arrays. Numpy arrays are a much more efficient way of storing and manipulating numerical data than the other built-in Python data structures.

Pandas: Pandas provides rich data structures and functions designed to make working with structured data fast, easy, and expressive. One of the most important objects in pandas is

DataFrame, a two-dimensional tabular and column-oriented data structure with both row and column labels. It provides sophisticated indexing functionality, making it easy to reshape, slice and dice, perform aggregations, and select subsets of data. For financial users, pandas features rich, high-performance time series functionality and tools well-suited for working with financial data.

Matplotlib: Matplotlib is the most popular Python library for producing plots and other 2D data visualizations. It provides a comfortable interactive environment for plotting and exploring the data. The plots are interactive; you can zoom in on a section of the plot and pan around the plot using the toolbar in the plot window.

Tkinter:

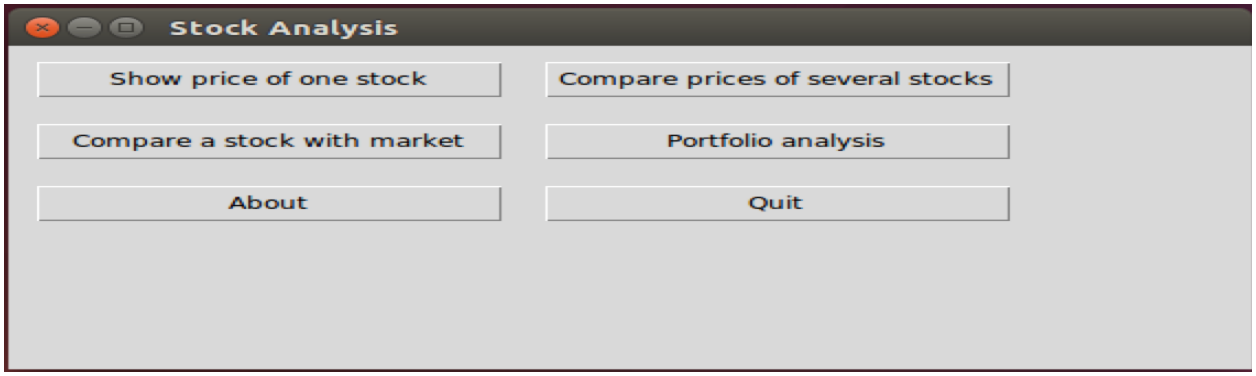
Tkinter is a GUI (graphical user interface) widget set for Python. Tkinter provides various controls, such as buttons, labels and text boxes used in a GUI application. These controls are commonly called widgets. widgets used in our project are:

- Button: The Button widget is used to display buttons in your application.
- Entry: The Entry widget is used to display a single-line text field for accepting values from a user.
- Frame: The Frame widget is used as a container widget to organize other widgets.
- Label: The Label widget is used to provide a single-line caption for other widgets. It can also contain images.

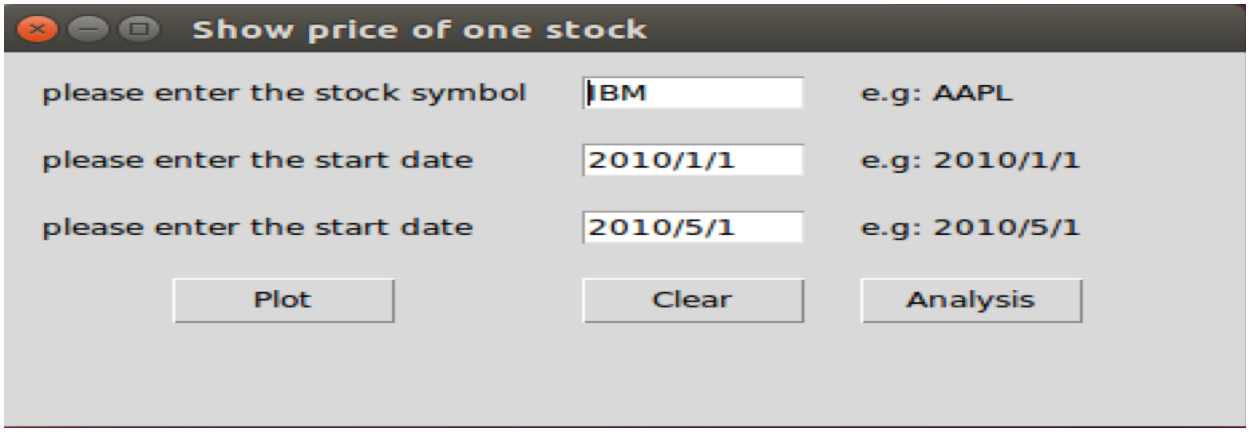
- LabelFrame: A labelframe is a simple container widget. Its primary purpose is to act as a spacer or container for complex window layouts.
- tkMessageBox: This module is used to display message boxes in your applications.

What inputs the program take and what outputs the program produce

After entering the command $ python -u Main.py in the terminal, it will create a window that consists of 6 buttons. This program has 4 main parts.



The "Show price for one stock" part below takes a stock symbol and a trading period from the user. The user can then choose to see the stock's daily price with volume in a plot and its descriptive statistics (e.g., maximum, minimum and mean price) in a data frame over the period.



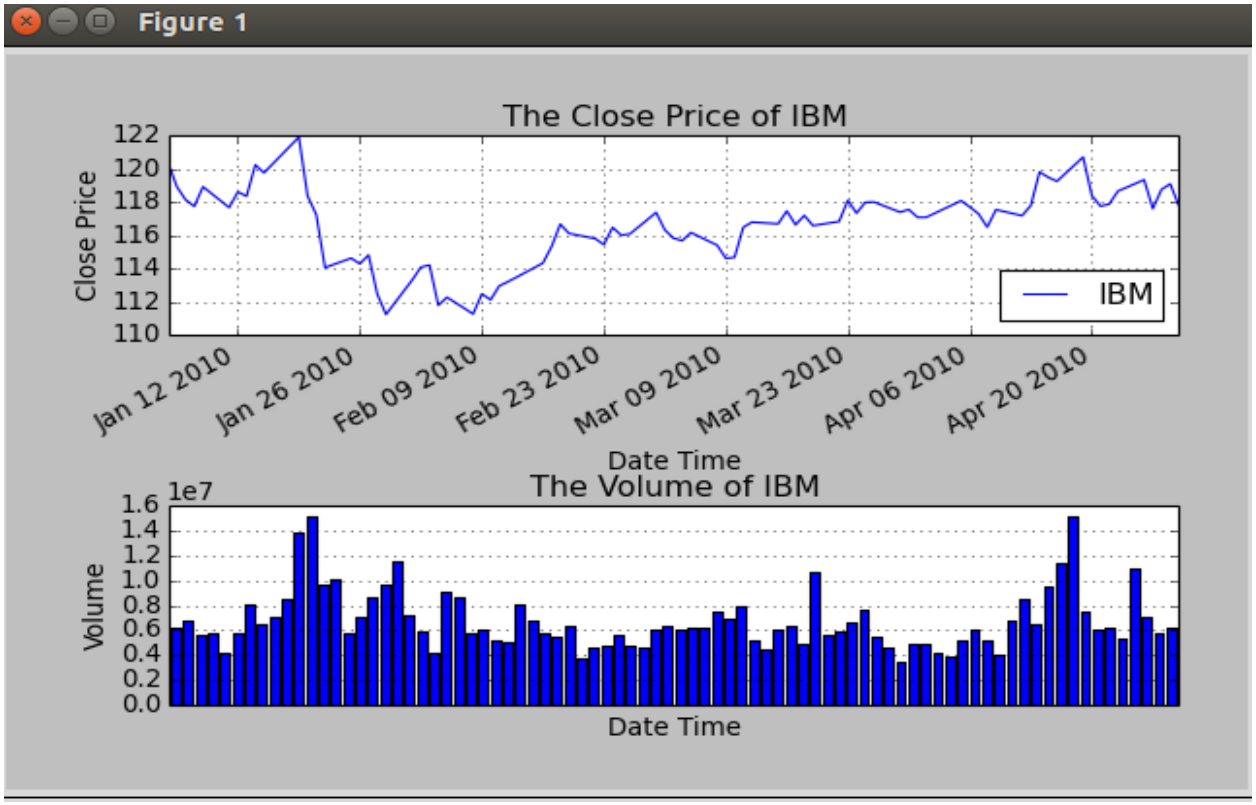
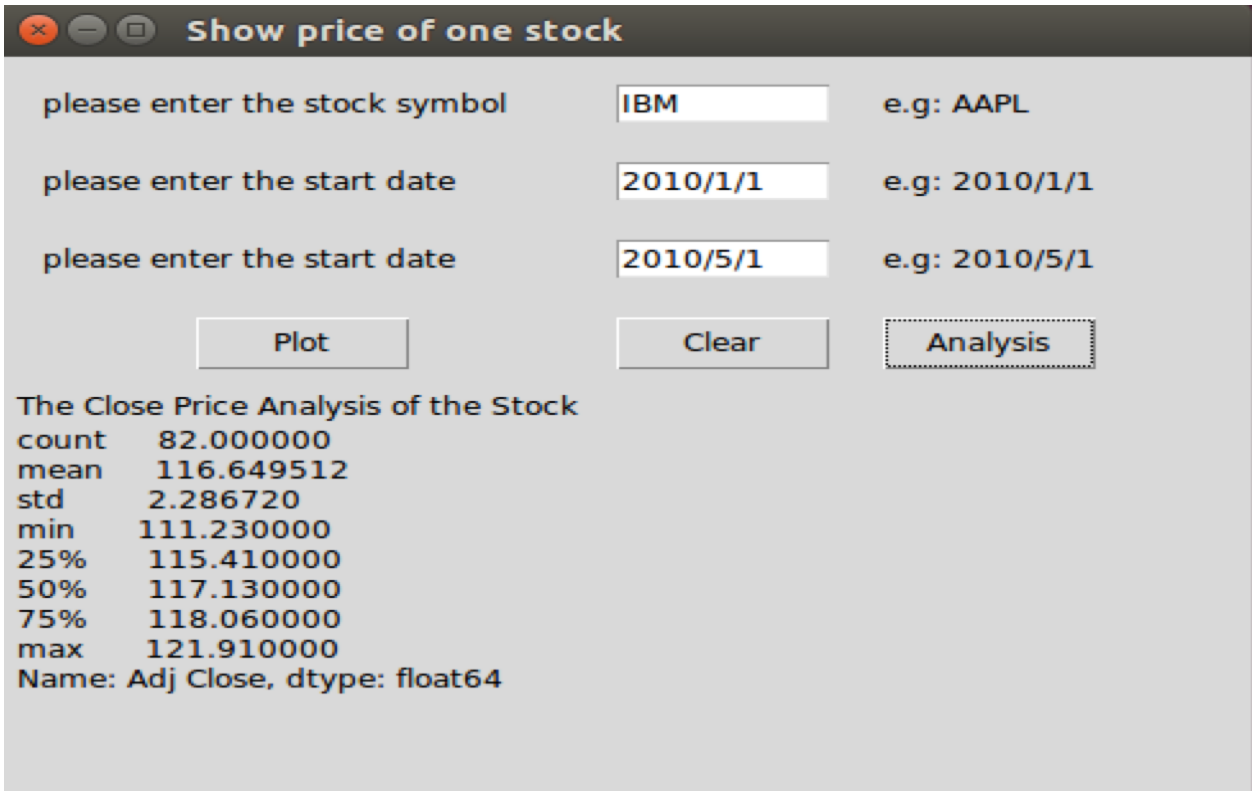
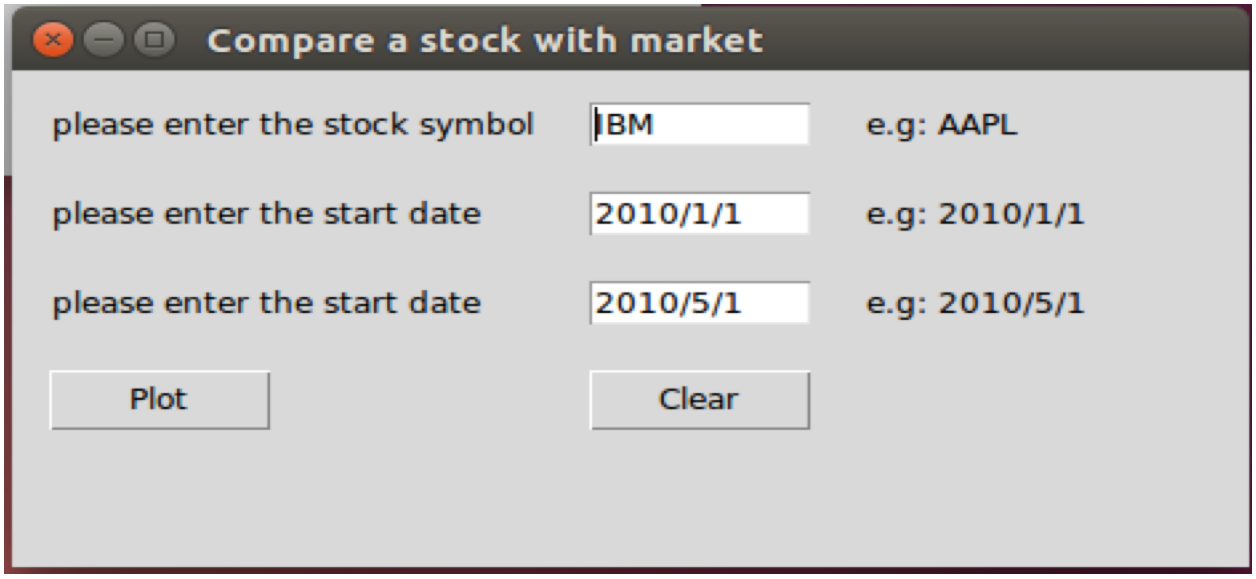
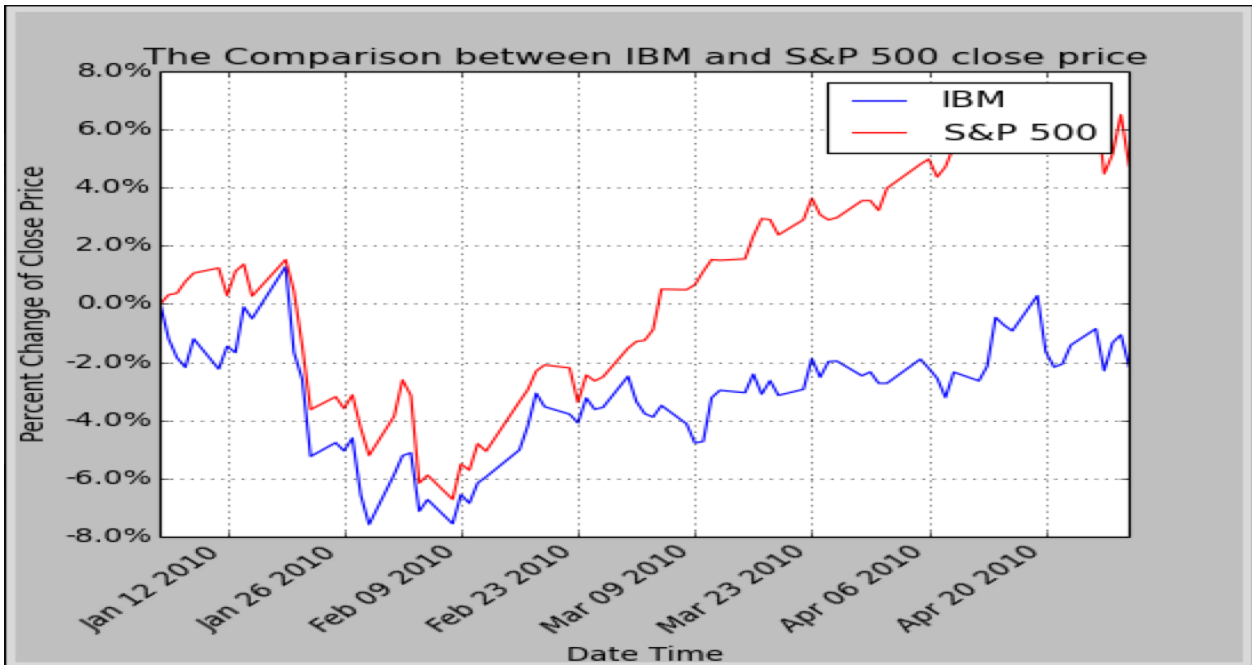


Figure 1
The Close Price of IBM
Close Price
122
120
118
116
114
112
110
IBM
Jan 12 2010
Jan 26 2010
Feb 09 2010
Feb 23 2010
Mar 09 2010
Mar 23 2010
Apr 06 2010
Apr 20 2010
Date Time
The Volume of IBM
1e7
Volume
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Date Time

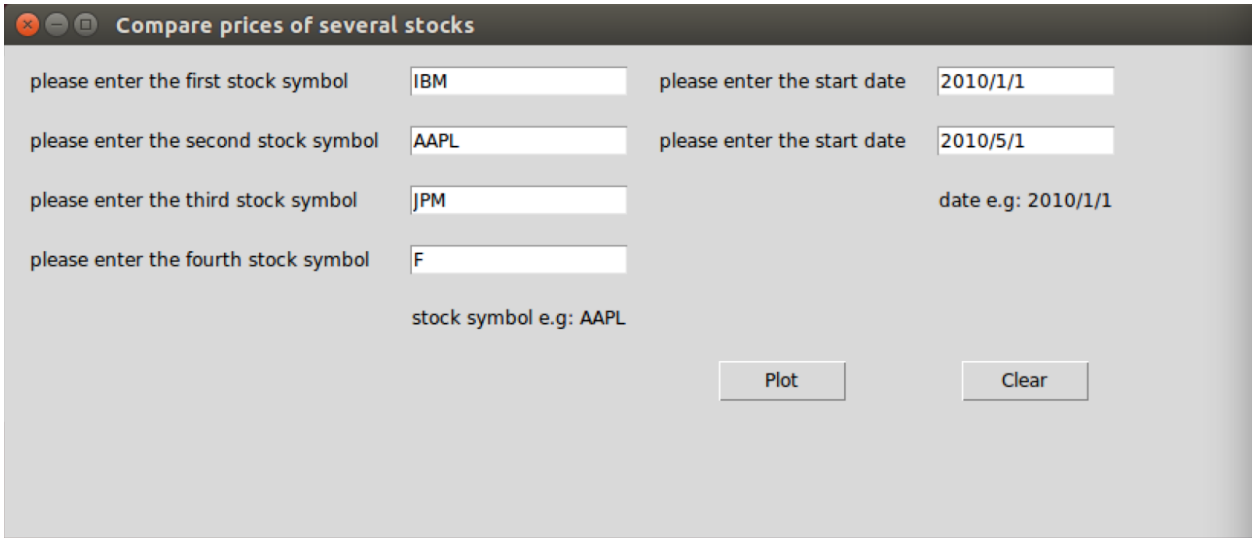

Show price of one stock
please enter the stock symbol
IBM
e.g: AAPL
please enter the start date
2010/1/1
e.g: 2010/1/1
please enter the start date
2010/5/1
e.g: 2010/5/1
Plot
Clear
Analysis
The Close Price Analysis of the Stock
count 82.000000
mean 116.649512
std 2.286720
min 111.230000
25% 115.410000
50% 117.130000
75% 118.060000
max 121.910000
Name: Adj Close, dtype: float64

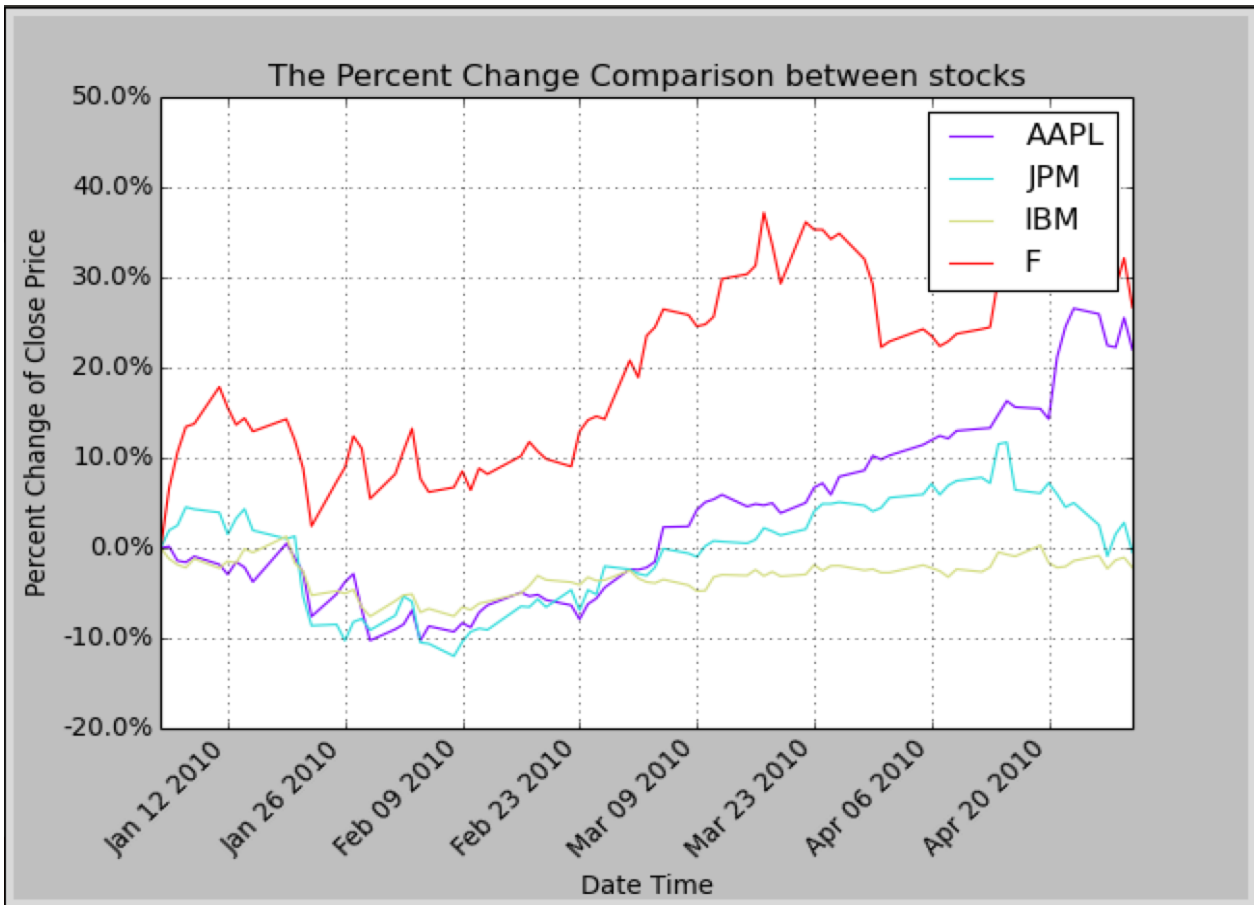
The second part “Compare a stock with market” asks the user for a stock symbol and a trading period as well, after which it plots a graph comparing the stock’s daily performance against the S&P 500 (stock market index) throughout the trading period. In the program, daily performance is calculated as the percentage change between the starting price and the daily price in the period.



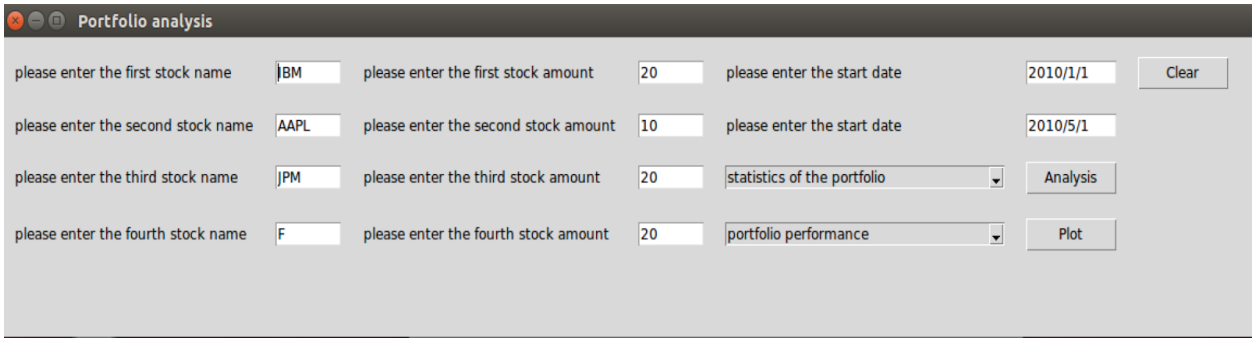


The third part “Compare prices of several stocks” allows the user to enter at most four stock symbols and date range. It can then plot the daily performances of the stocks in a line graph.

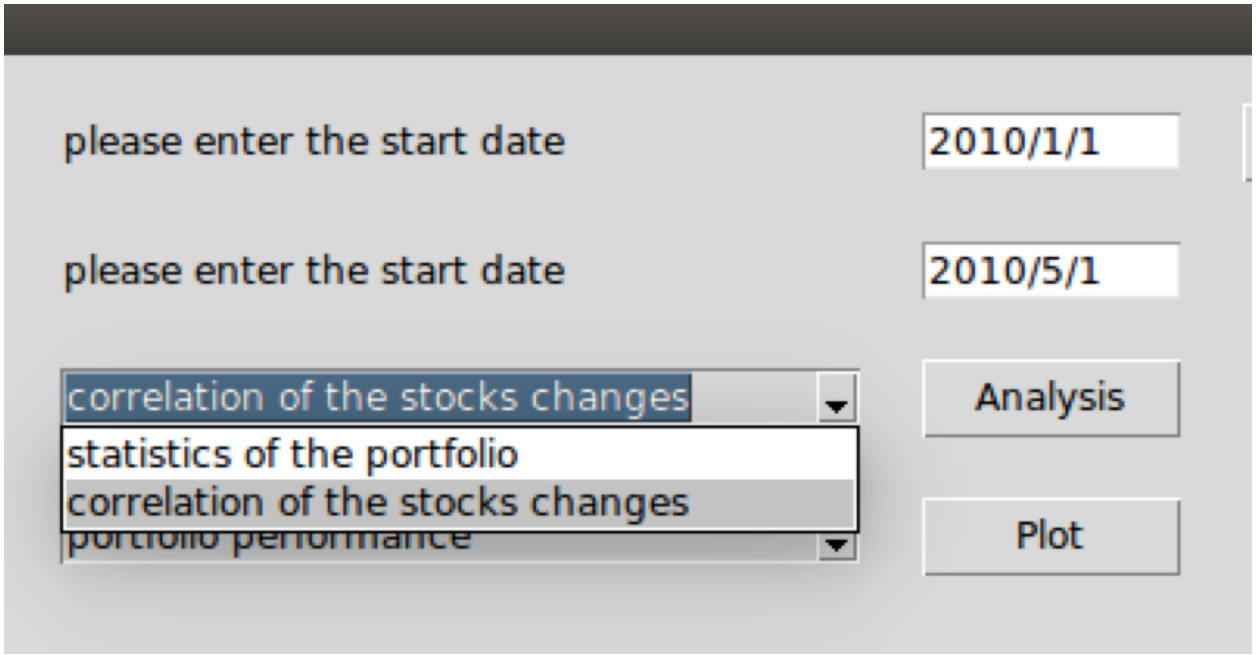




The last part is a portfolio analysis, which inputs are a date range, at most four stock symbols and each stock's trading volume. It provides statistical analyses and dynamic graphs.



Two analyses are displayed in data frames. One analysis is the descriptive statistics of the portfolio (e.g., maximum and minimum of the portfolio price, start and end weight of each stock), the other one is the correlation among stock performances in the portfolio.



Statistics of the portfolio.

	AAPL	JPM	IBM	F	Portfolio
trading days	82.000000	82.000000	82.000000	82.000000	82.000000
mean	299.209756	766.990244	2332.990244	229.519512	3628.709756
std	28.891960	45.015914	45.734401	20.300748	124.152431
min	259.800000	676.400000	2224.600000	190.400000	3367.400000
25%	274.825000	727.250000	2308.200000	211.100000	3530.750000
50%	290.450000	776.000000	2342.600000	232.900000	3657.650000
75%	319.175000	803.250000	2361.200000	247.350000	3720.400000
max	366.400000	858.600000	2438.200000	268.000000	3840.100000
start weight	0.079187	0.210236	0.658497	0.052080	1.000000
end weight	0.095089	0.205901	0.634073	0.064936	1.000000
total return	0.220035	-0.004944	-0.021683	0.266807	0.016002

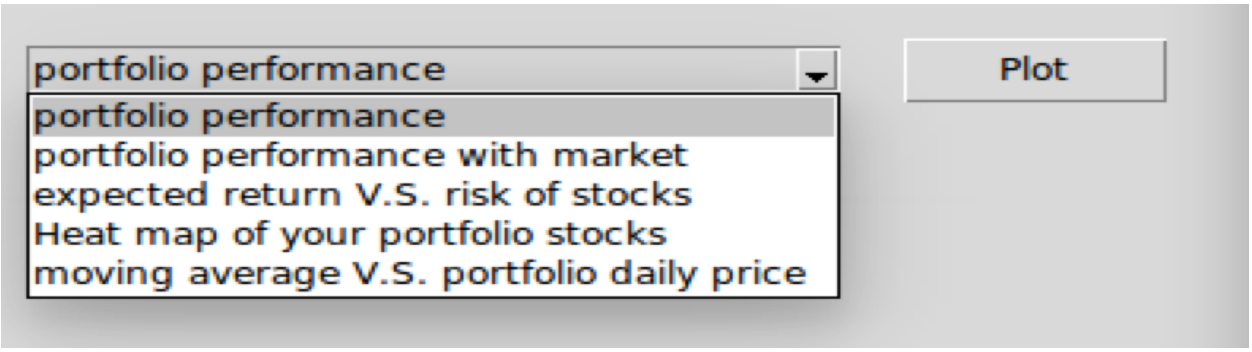
[11 rows x 5 columns]

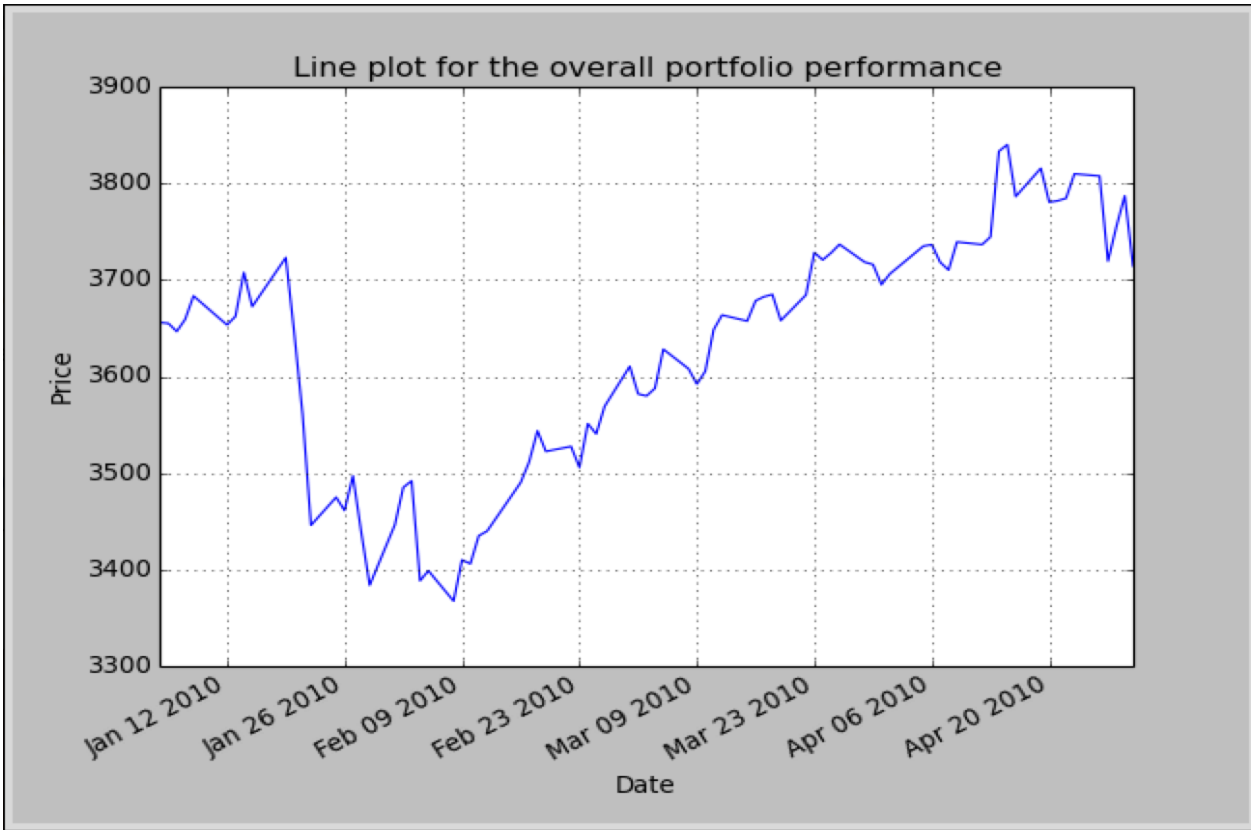
Correlation of the stocks changes.

	AAPL	JPM	IBM	F
AAPL	1.000000	0.747880	0.612636	0.818090
JPM	0.747880	1.000000	0.806191	0.704992
IBM	0.612636	0.806191	1.000000	0.493712
F	0.818090	0.704992	0.493712	1.000000

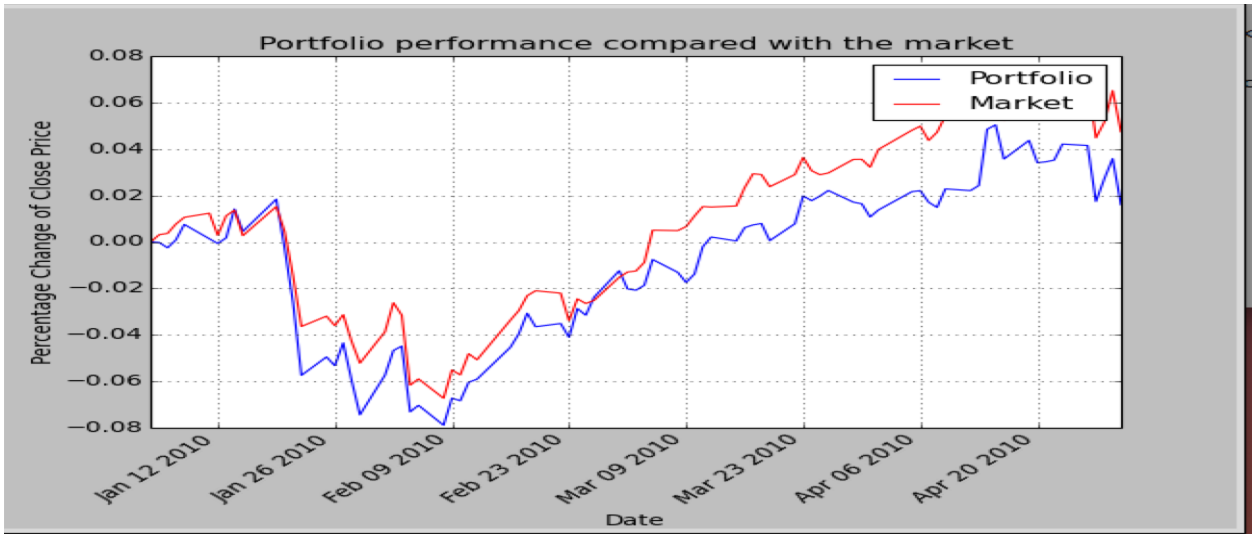
[4 rows x 4 columns]

Besides the analyses, it has five plots for the user to choose from. The first one is a line plot showing the portfolio price during over the period.

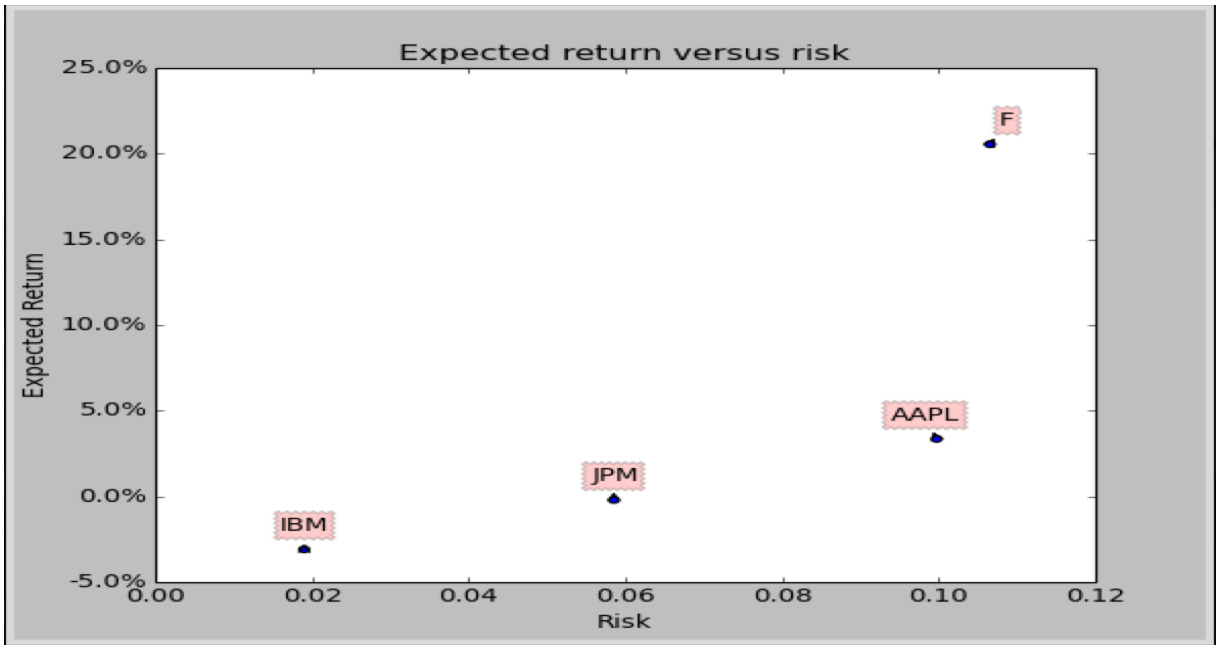




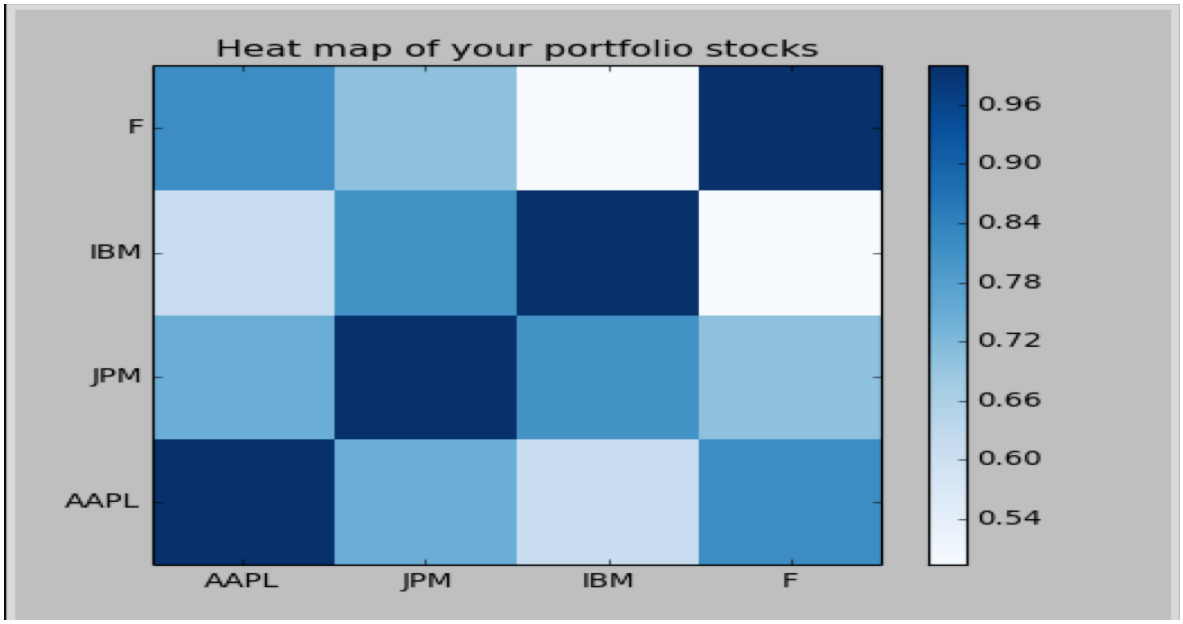
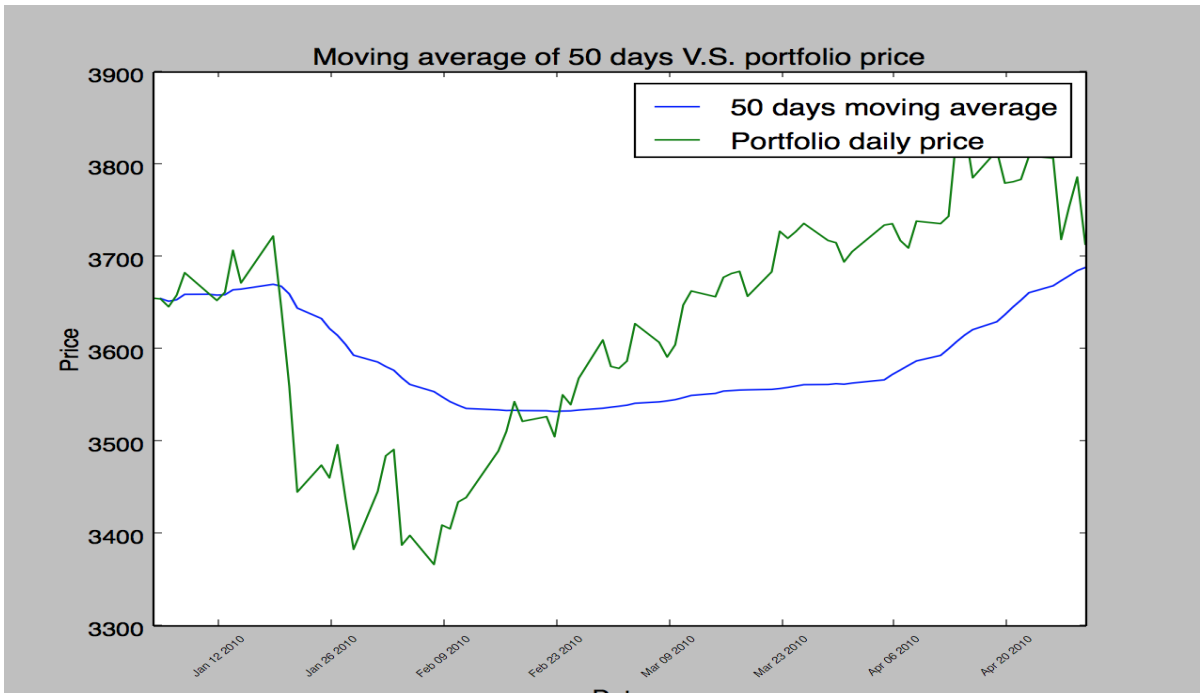
The second plot below compares the daily performance of the portfolio against the S&P 500.



The third graph plots the the mean versus standard deviation of each stock performance. This plot is useful in examining the trade off between the expected return and the risk of the portfolio. The program uses each stock's daily performance, i.e., the daily percentage change in price, to calculate the standard deviation and the mean.



The fourth plot is a heat map that displays the stock correlation.



The last one is a line plot that allows the user to compare the 50 days moving average price with the daily price of the portfolio.