Portfolio Analysis and Suggestions for Jabre Capital

Sponsored by Jabre Capital

Presenter:
T. Luo

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Outline

Jabre Captial's Basic Information

Jabre Capital is an alternatve asset management platform founded in 2006. It provides sevices and products including:

1. Cayman-based collective investment schemes
2. UCITS IV regulated strategies
3. Individually managed accounts

Jabre Capital is a diversified fund, which contains a wide array of securities to reduce the amount of risk in the fund.

Jabre Capital's Changllenges

The comparasion below clearly illustrates the challenge Jabre Capital faces:

1. As of December 31th 2010, Jabre Capital had portfolio value of $4,133,365,000
2. A year later, the portfolio value was only $793,966,000

In one year, the hedge fund's value was down by around 80%, which made it among the 10 worst hedge funds 2011.

Manager's Puzzle

Mr. Philippee Jabre, the fund manager, has the following puzzles:

1. He had difficulties in finding support and resistance lines for call and put of a stock,
2. Mr. Jabre did not have the right recipe for reducing risk and increasing diversification.

in 2012 Q2, the return of his S&P's pick was -6.5%, compared to total market gain 0.1%.

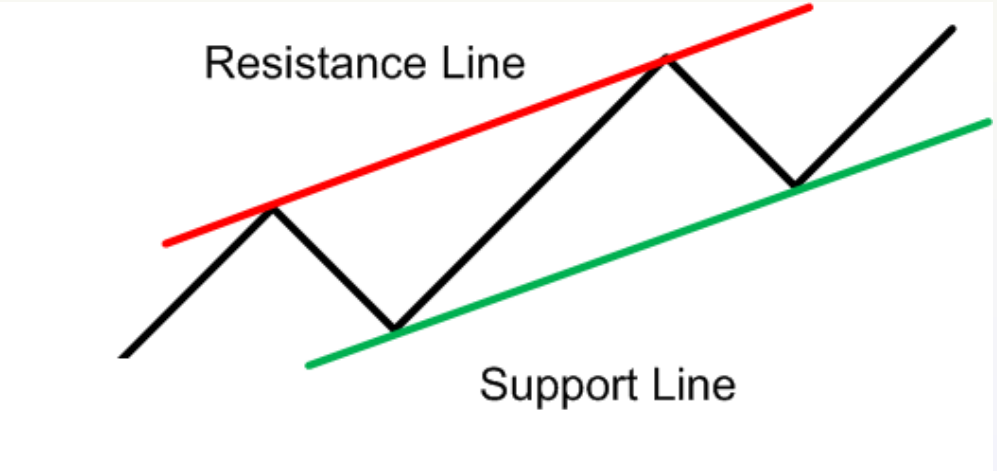
Piechart of Stock Selection

Analysis of Manager's Puzzle

Support and resistance represent key junctures where the forces of supply and demand meet.

- Support is the price level at which demand is thought to be strong enough to prevent the price from declining further,
- Resistance is the price level at which selling is thought to be strong enough to prevent the price from rising further.

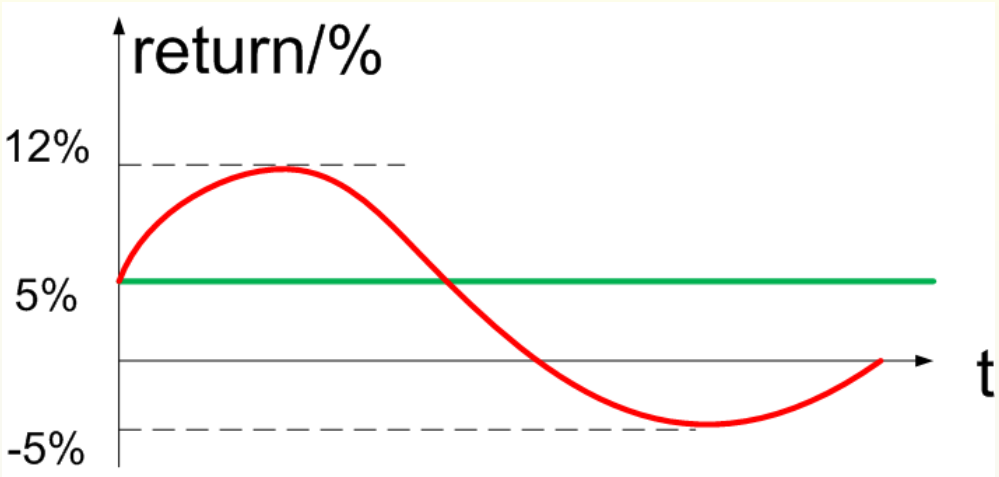
If we can find lines where the price won't go above or below, they are support and resistance lines.



Support and Resistance Line

Analysis of Manager's Puzzle

The variance of return plot reflects how risky a stock is.



Return-time plots

In financial market, risk usually cosists of two parts:

- Systematic risk (undiversified risk): risk inherent to the entire market or entire market segment and cannot be avoided through diversification.
- Unsystematic risk (diversified risk): Company or industry specific risk that is inherent in each investment. The amount of unsystematic risk can be reduced through appropriate diversification.

Analysis of Manager's Puzzle

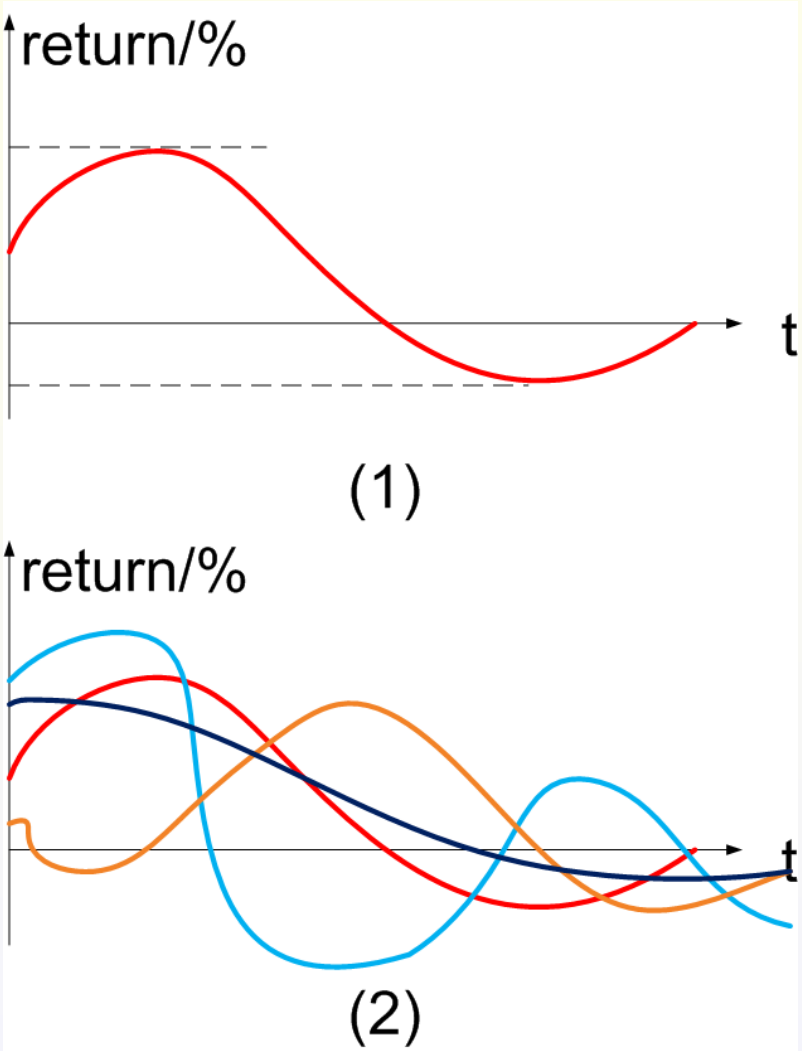
In our model, the independent and dependent variables are as follows:

- Exogenous variable: systematic part of return variance
- Endogenous variable: unsystematic part of return variance, the overal return variance

The challenges are:

- Systematic risk and unsystematic risk are mixed with each other.
- When the dimension of the data set increases, it becomes even harder to tell whether the diversification decreases the unsystematic risk of a specific portfolio.

Analysis of Manager's Puzzle



Comparasion of two portfolios

Our Task

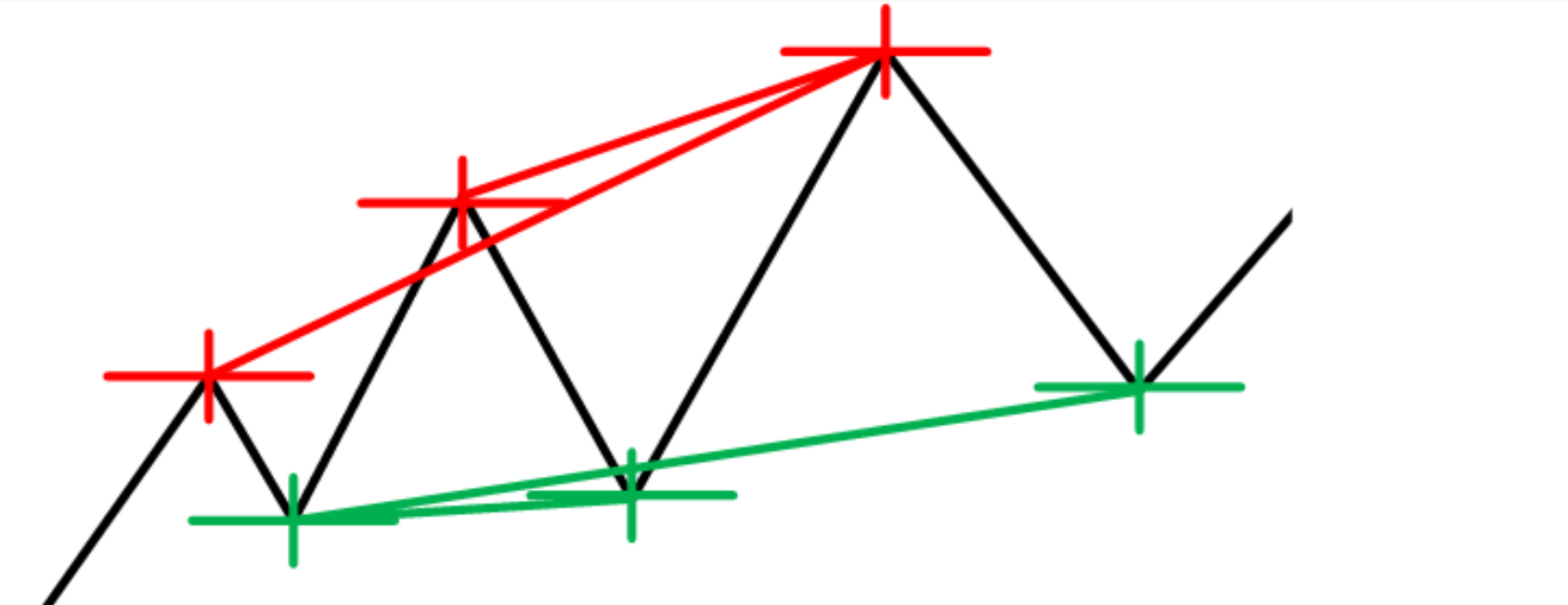
Our task is to see:

1. Develop a software which will detect the support and resistance lines automatically.
2. Decide the large number of stock holdings (the number was more than 150 in Q1 2011)truly reduce the unsystematic risk or not.
3. If the large stock holdings don't help improve the diversification, we will further our work to eliminate unnecessary stocks for Jabre Capital.

Algorithm Applied

My approach for task 1 is as follows:

- Find points where the derivative is about to change signal,
- Find the maximum and minimum point among these points,
- Among all the green points, draw a line which conects minimum point and another point with the smallest absolute value of slope rate,
- Among all the red points, draw a line which conects minimum point and another point with the smallest absolute value of slope rate.



Introduction of Principal Component Analysis(PCA)

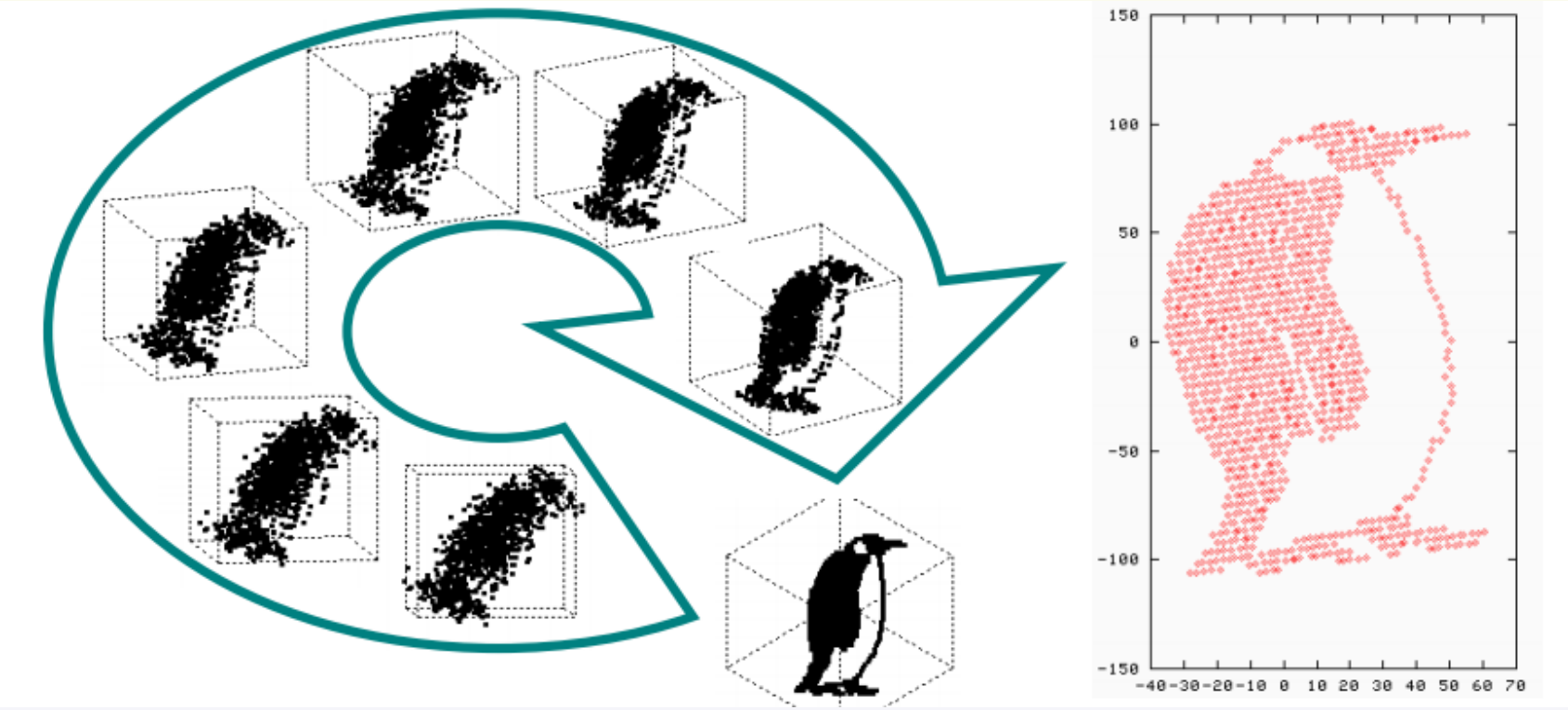
Principal component analysis (PCA) is:
A mathematical procedure that converts a set of observations of possibly correlated variables into a set of values of linearly uncorrelated eigenvectors.
PCA steps are as follows:

1. Get some data and subtract the mean
2. Calculate the covariance matrix
3. Calculate the eigenvectors and eignevalues of the covariance matrix
4. Choose components and form a feature vector to explain as much of the volatility of the data set as possible

PCA is a powerful method to find patterns in data of high dimension, and compress data to low dimension without losing much information.

Example of Principal Component Analysis(PCA)

Here's an example of PCA analysis. The dimension has been reduced to 2 from 3, and we can still tell it is a penguin.

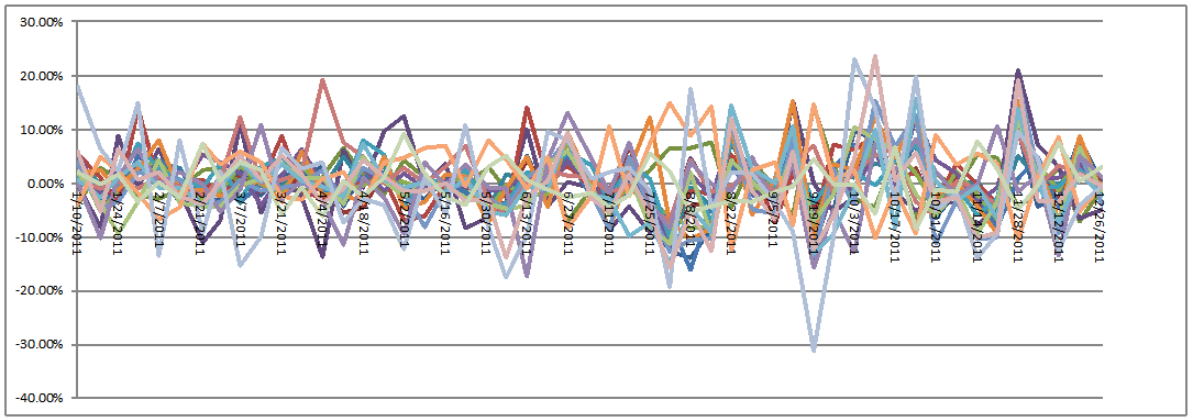


PCA analysis of a penguin image

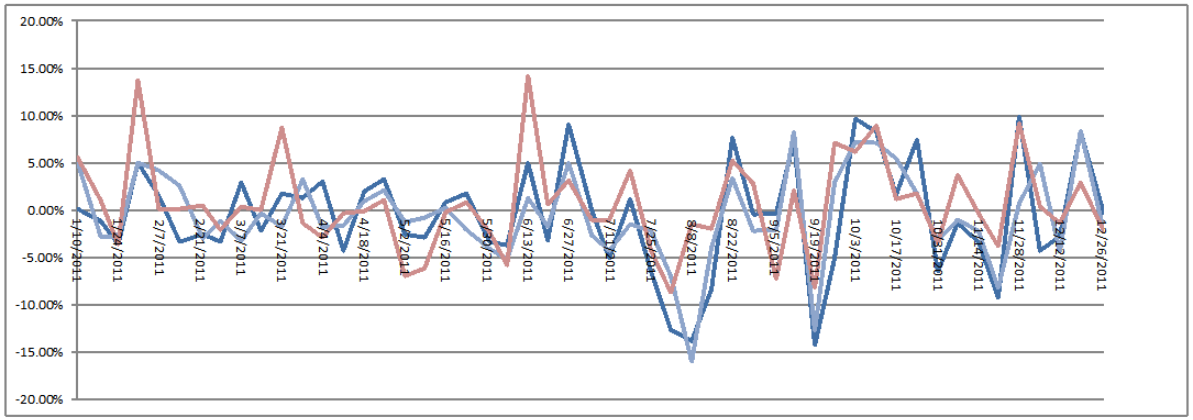
Expectation of Principal Component Analysis(PCA)

As to a portfolio of n stocks, if it is not well diversified, we expect that the first few components(feature vectors/eigenvectors) can explain the majority of the dispersion of the return.
For example, 3 components(feature vectors/eigenvectors) can explain more than 70% of the variation of a portfolio with 15 stock holdings.

Expectation of Principal Component Analysis(PCA)



(1)



(2)

Expected PCA result

Problem Solving based on PCA

In our approach, we will use the return performance of a stock rather than price peformance, as the thing we are interested in is changes in the stock price rather than absolute stock prices.
Thus, to help Jabre Capital with its challenges, our approach will be divided into following steps:

1. Get historical prices of stocks on Jabre Capital's list from quater to quarter in 2011, and develop historical return ratios accordingly,
2. Figure out which stocks Jabre Capital holds for an entire year, and conduct PCA analysis
3. Conduct PCA analysis from quarter to quarter, and see whether the additional stock holdings improve the diversification of the portfolio
4. If the divesification worsens, divide stocks by industry, eliminate similar stocks, and elect one that can explain the majority of the unsystematic risk of the industry based on PCA analysis of stocks in the same industry.

From Team to Sponsor

The following outputs are expected from this project:

- Software of finding support and resistance line,
- Return of Investment charts and data of stocks Jabre Capital invested in 2011,
- Principal component analysis of the stocks held for an entire year, stocks in the same quarter and stocks in the same industry,
- Suggestions about a diversified and narrowed portfolio list,
- R package with a complete set of documentations along with some test codes that can be used to reproduce simulation results,
- Technical report and presentations summarizing the work.

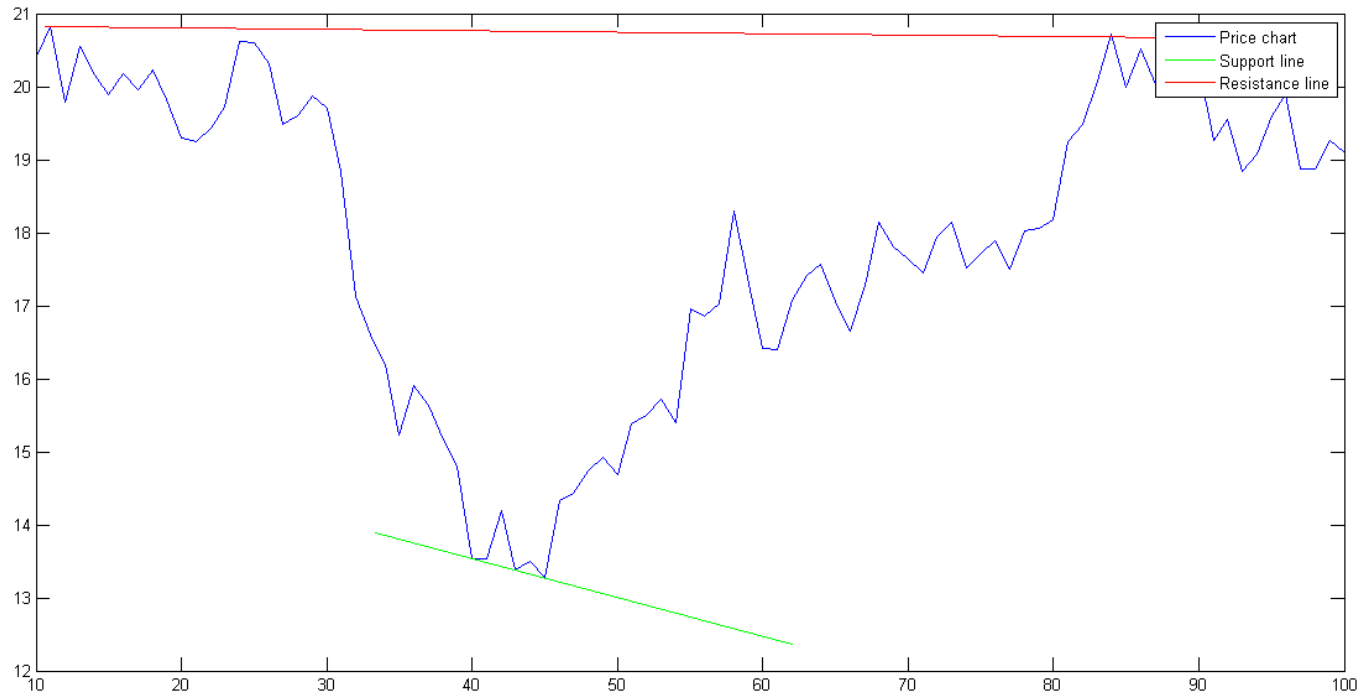
From Sponsor to Team

In order for our project to be of successful one, we will need:

- Provide lists of stocks Jabre Capital held in 2011, and access to all the price charts and data of these stocks before Oct 26,2012
- Timely responses to inquiries,

Evaluation of Task 1

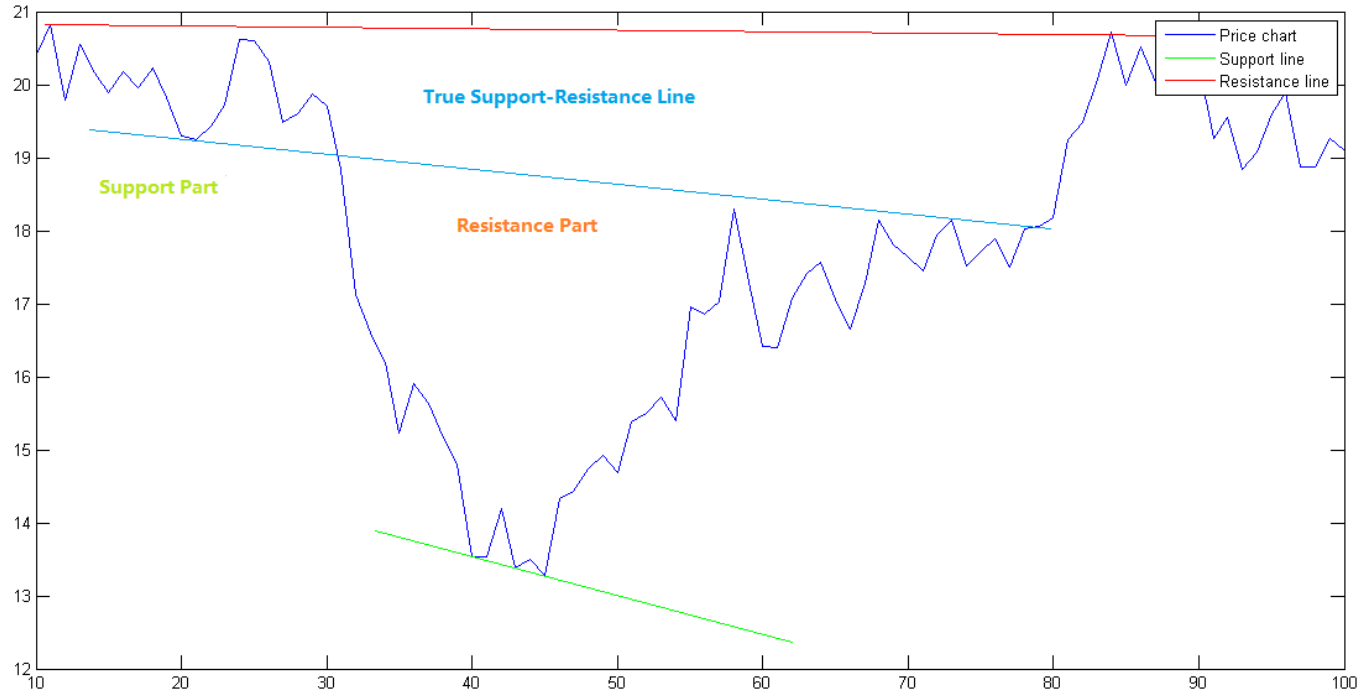
Based on algorithm mentioned, I have developed software for drawing support and resistance lines. Using a sample data, I get the pictures as follows:



Resistance and Support lines drawed by Matlab

Evaluation of Task 1

It fulfills the goal of the algorithm quite well.However, it is not good enough to draw real support and resistance lines:



Real Resistance and Support lines

Future Work

- Improve the algorithm of Task 1, making it possible to draw multiple resistance and support lines in a give period, and the lines can be crossed by the price chart
- Apply R to calculate covariance matrix, apply PCA analysis in Task 2&3,
- Optimize the stock selection.

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