Programming for Data Science

DS-GA 1007

Financial Analysis for Disney Using Python

Final Report

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Introduction:

In order to conduct financial analysis to the Walt Disney Company, we divided Disney's business into four major sectors,

1) Studio Entertainment
2) Park and Resorts
3) Consumer Product and Interactive Media
4) Media Networks

We used Python's Pandas, Matplotlib, Numpy, Scikit-learn, Statsmodels libraries for the basic financial analysis, advanced time series analysis, regression analysis and Moving Average Crossover Strategy Analysis respectively, to analyze the stock price performance for Disney and the correlations among other peer companies. Furthermore, we selected several companies for each sector to perform risk, correlation and regression analysis in order to figure out Disney's position.

Problem Statement:

Challenged with the chance to evaluate and understand the business environment and opportunities Disney is facing. The issue is to identify where Disney can facilitate the future growth based on the analysis of the historical stock price**.**

1) Basic Fundamental Analysis for Disney:

In this section of the report we used Python's Pandas, Matplotlib and numpy libraries for the basic financial analysis and advanced time series analysis.

 Procedures:

- Select time frame for all companies to eliminate the missing stock prices (Timeframe: 1/1/2010 to 10/24/2017)
- Data Cleaning such as dealing with missing values, symbols and creating structure in to the data.
- Loading time-serAies data, data cleaning and data alignment
- Common financial computations: Moving average and Rate of Returns
- Risk analysis: Standard deviation of the daily
- Correlation analysis
- Seaborn: statistical data visualization

Results:

1) Basic stock performance for Disney
2) The daily rate of return histogram for Disney
3) Correlations for Disney and Companies in the Field of Studio Entertainment:

2) Regression Analysis:

Based on the correlation analysis in the previous procedure we decided to take this analysis one step forward to figure out in-depth relationship between Disney's and peer companies' stock price for that we did Regression Analysis. Same as in the previous analysis we stick to the four-major business section of Disney.

Procedures:

- Select time frame for all companies to eliminate the missing stock prices (Timeframe: 1/1/2010 to 10/24/2017)
- Co-relate the values of Stock prices for all the companies in every sector according to the dates.
- Creating Regression Model
- Eliminating companies which do not/ have very little relation with Disney based on P-value (P >0.05)

Results:

Sector-wise Models:

1) **Studio:**
   = 151.6437 + 0.1542 AMCX - 3.8416 CMCSA + 0.7569 FOXA – 0.685 SNE – 0.1221 TWX

   R-Square Value: 0.978

2) **Park:**
   = 53.990 + 0.4724 AAL + 0.6922 FUN - 0.3044 MCD – 0.5686 SEAS + 0.6420 SIX

   R-Square value: 0.8330

3) **Media:**
   = 15.8563 + 1.2551 BT + 0.8169 CBS – 0.4113 DISCA + 0.1571 GLOB + 0.1070 NFLX

   R-Square: 0.996

4) **Interactive Media:**
   = -18.2753 – 0.0343 AMZN + 1.0024 KO + 0.3409 EA + 0.5853FL + 0.2581 HSY – 0.4213 K + 0.4175 NKE + 0.7404 PHG

   R=Square: 0.997

Improvement:

There is still complacency of improvement in this model. This analysis is only done based on sector-wise best fit companies' stock price.

3) Moving Average Crossover Analysis for Disney's Stock Price:

Problem:

> When to enter or exit the stock market (trading strategy) can maximize the investment for Disney

Methodology:

<Momentum Strategy>

- Select time frame for all companies to eliminate the missing stock prices (Timeframe: 1/1/2010 to 10/24/2017)
- If the short moving average exceed the long moving average then it's a signal to go long. If the long moving average exceeds the short moving average, then it's a signal to go short or exit the market.

<Back-testing>

- A simulation to test the performance and risk of trading strategy on historical data

Procedure:

- Plotted Disney's historical stock price (2010.1.1-2017.10.24) from Yahoo Finance
- Defined two lookback periods: a 50-day short window and a 100-day long window
- Created two moving average filters using Simple Moving Average (SMA) and Exponential Moving Average (EMA). Compare those two methodologies, and select EMA filters as two lookback periods to calculate the mean stock price on the Disney's "Ajusted Closing Price". Plotted the moving average trend lines

Result:

- The moving average crossover strategy improves trading profit by 5.5% than buy-and-hold strategy but contains a relatively high risk in terms of returns
- The risk-free rate is excluded in the Sharpe Ratio calculation

Improvements:

- Use complex algorithms, like KMeans, Classification to improve trading model
- Multi-symbol portfolios, by adding more columns to a pandas DataFrame
- Add risk management framework to help mitigate the lookahead bias