

Applied Time Series Analysis (CS575)

Mini Project

This mini project is mandatory work as an essential learning activity. You may choose either **Option 1** OR **Option 2** OR **Option 3**

Option 1: Analysis of financial time series

Consider a time series stock values of various companies for a given duration (download using the script below). Your task is to find an appropriate model for the stock prediction.

Estimate the parameters of the chosen time series model. Compare at least with three different models. Elaborate on difficulties and alternative approaches.

Option 2:

Choose time series data that you would like to analyse. Present the time series and explain your interest in the data. Analyse the time series using appropriate techniques (e.g., for prediction, anomaly detection, missing value prediction etc.), and any other techniques that seem relevant for the specific time series dataset. Present your analysis and describe your findings. Elaborate on difficulties and alternative approaches. Compare at least with three different models.

Option 3: Define your own project (discuss with faculty first)

You may use whatever software you like (e.g., Python, R, Mat lab, ...), use available functions for time series analysis, or write your own functions. Whatever you choose, you are required to state precisely what you are using and what the specific function does; it is not enough to only provide the name of a function and its output. First, explore the basic properties of the entries in the dataset in order to begin to refine your analysis. Once we understand how our data is formatted and what the data range is for each variable, then investigate. The relationship between stocks at a deeper level would be interesting analysis to investigate.

Submission:

- **Report should contain (maximum of 15 Pages, one column format, with font size of 11 for the text)**
 - Objectives
 - Methodology and Mathematical Background
 - Results and Analysis
 - [Most Important] Statistical analysis like ACF, PACF, ADF Test and others
 - Plots of data analysis design and comparison
 - Implementation files (python, MATLAB, R)
 - Conclusion

Content of **Project_CS575** folder (Yellow highlights are folders; others are files). The structure is already pushed to git. When you push to git, push as individual files as shown below. For Pcloud, zip the folder **Project_CS575**, rename it to “roll_number_Project_CS575.zip” and then upload to <https://u.pcloud.com/#page=puplink&code=EYo7Z3NKRKYkAUDko02zYGyKFH43Q1B8y>

```
+--- Project_CS575
| +--- Code
| | +--- all_codes_R_py_Matlab_here.py (Can be multiple files too)
| | +--- dataset
| | | +--- Apple_stock.csv
| | | +--- IBM_stock.csv
| | +--- roll_code.ipynb
| +--- PPT
| | +--- roll_ppt.pptx
| | +--- roll_ppt_source_pptx_latex
| +--- Report
| | +--- roll_report.pdf
| | +--- roll_report_source_docx_latex
```

This work is due 22nd April 23:59 PM. (Monday)

Check the page below for a sample code to download dataset.

Sample code to download dataset. You can try other stock datasets too.

```
#####
```

```
#download data from yahoo! finance
```

```
#####
```

```
##data source: http://finance.yahoo.com/
```

```
""""
```

```
from pandas_datareader import data as pdr
```

```
from datetime import datetime
```

```
#download data
```

```
ibm = pdr.DataReader('IBM', 'yahoo', start=datetime(2014, 8, 1), end=datetime(2016, 11, 30))
```

```
aapl = pdr.DataReader('AAPL', 'yahoo', start=datetime(2014, 8, 1), end=datetime(2016, 11, 30))
```

```
fb = pdr.DataReader('FB', 'yahoo', start=datetime(2014, 8, 1), end=datetime(2016, 11, 30))
```

```
googl = pdr.DataReader('GOOGL', 'yahoo', start=datetime(2014, 8, 1), end=datetime(2016, 11, 30))
```

```
#print first few lines of data
```

```
print(ibm.head())
```

```
print(aapl.head())
```

```
print(fb.head())
```

```
print(googl.head())
```

```
#export and save as csv files
```

```
ibm.to_csv('IBM_stock.csv', sep=',')
```

```
aapl.to_csv('Apple_stock.csv', sep=',')
```

```
fb.to_csv('Facebook_stock.csv', sep=',')
```

```
googl.to_csv('Google_stock.csv', sep=',')
```