**HMM MODEL TO FORECAST THE TREND OF**

**STOCK PRICES**

**EXPLANATION:**

myHMM.m is my code to implement HMM

Graph.xlsx has the time series graph for the predicted prices and states.

Matlab.mat is my workspace which has all the values stored.

Finance.xlsx is my training dataset.

1. Take initial guess transition and emission matrices with probability values (GuessTR, GuessEM).
2. We calculate the moving average for the closing price using the formula:

MovAvge(i,1)=(Close(i,1)+Close(i-1,1)+Close(i-2,1)+Close(i-3,1)+Close(i-4,1))/5;

1. Now, Calculate the observables based on the formula:

if 0.999\*MovAvge(i,1)<Close(i,1) && Close(i,1)<1.001\*MovAvge(i,1)

OBS(i,1)=1;

elseif Close(i,1)<0.999\*MovAvge(i,1);

OBS(i,1)=2;

else

OBS(i,1)=3;

We name S – 1

L – 2

H – 3

States as F – 1

U – 2

D – 3

1. After training GuessTR and GuessEM with observation sequence hmmtrain gives estimated transition and emission matrices (estTR, estEM)
2. hmmdecode then gives the posterior probability of the states.
3. We model a HMM which is clear in my code myHMM.m with comments for every line.
4. Once the model has been executed, we will get the FuturePrice of the stocks i.e., FuturePrice(6:15,1)
5. The index2 stores the emitted observables for the 10 day-period as ‘I’ in the second row. Past state in ‘j’ and transitioned state in ‘k’.
6. The emission sequence for the 10 days are :

3 2 2 2 2 2 2 2 2 2

14. The Future closing prices for 10 days are:

2136.29617381180

2131.45167490220

2131.23221975746

2130.88301726100

2131.75874410974

2130.19204160247

2128.97243598705

2128.47708405180

2127.92660793781

2127.33591735504

**HOW TO RUN:**

1. Download the S&P 500 training data from

<https://finance.yahoo.com/quote/%5EGSPC/history?p=%5EGSPC>

1. The downloaded data have the dates in descending order i.e, recent dates in the starting. Reverse all the columns so that recent date is at the bottom using sort function in Excel.
2. Place the dataset in the existing folder path in Matlab.
3. Import Closing price column into Matlab workspace.
4. Run myHMM.m

**FORECASTING CAPABILITY:**

In the training data I have the closing prices till October, 18, 2016.

**Date**  **Predicted Price** **Actual Price from the website**

19 October, 2016 2136.2961738118 2,144.29

20 October, 2016 2131.4516749022 2,143.36