

Blackbox.R

```

#=====
# Blackbox Project
#=====
# Description
# Simple pattern matching code.
# This code is not written with efficiency in mind.
# But instead focused on a beginning programmer to
# learn for and if statements
#-----
#-----
# Import library
#-----
library(xlsx)      # add excel helper library to read excel data into R

#-----

#=====
# Project Coding
#=====

#-----
# Mac users code
#-----
# get working directory
getwd()

#set working directory
setwd("/Users/richard/Desktop/FIU_R/Code/BlackBox")

# import the data from an excel file
data <- read.xlsx("Data/Fed_Data.xlsx", sheetName = "Import_Data")

#-----
# Windows users code
#-----

data$SP500DIFF <- NA
data$SP500DIFF[2:166] <- diff(data$SP500, lag =1)
data <- data[95:166, ]
names(data)

plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF')

```

```
plot(data$DATE, data$GDP , type = 'l' , col = "red")
par(new = TRUE)
plot(data$DATE, data$SP500DIFF ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)
```

```
#=====
```

```
#-----
```

```
# Student Code
```

```
#-----
```

```
# run a regression depend var GDP independent SP500DIFF
# and output the regression info
```

```
# Hint Code
```

```
# fit <- lm()
```

```
summary(fit)
```

```
#=====
```

```
# Project Coding
```

```
#=====
```

```
# create correlation plot of GDP and SP500Diff with regressing line
```

```
plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF',)
```

```
abline(fit)
```

```
#=====
```

```
#-----
```

```
#-----
```

```
# creating a data frame to hold the blackbox trades
```

```
signals <- NULL
```

```
# get the length of the data so we can loop the right amount of times
```

```
len <- nrow(data)
```

```
# for loop that sets the signals
```

```
for(i in 2:len){
```

```
  # temp signal holders
```

```
  gpd.signal <- NULL
```

```
  sp500diff.signal <- NULL
```

```
#-----
```

```

# Student Code
#-----

# enter if expression test for gdp

# handling GDP Signal
# if( "PUT SOME CODE HERE"){
  gpd.signal <- 'UP'
# } else if( "PUT SOME CODE HERE") {
  gpd.signal <- 'DOWN'
# } else {
  gpd.signal <- 'FLAT'
# }# end if else

#=====

# Project Coding
#=====

# handling SP500DIFF Signal
if( data$SP500DIFF[i] < data$SP500DIFF[i-1]){
  sp500diff.signal <- 'UP'
} else if( data$SP500DIFF[i] > data$SP500DIFF[i-1]) {
  sp500diff.signal <- 'DOWN'
} else {
  sp500diff.signal <- 'FLAT'
}# end if else

# store the current iteration of signals in the signals data frame
signals <- rbind(signals, data.frame( DATE = data$DATE[i],
                                     GDP = gpd.signal,
                                     SP500DIFF = sp500diff.signal))
}# end for

#-----

# create a column for the signal matches
# and set all entries in the column to NA
signals$MATCH <- NA

tricker.pattern <- c('UP', 'UP')

for(i in 1:nrow(signals)){
  if(signals$GDP[i] == tricker.pattern[1] & signals$SP500DIFF[i] ==
tricker.pattern[2] ){
    signals$MATCH[i] <- 'YES'
  } else {
    signals$MATCH[i] <- 'NO'
  }
}
}# end for

#-----

# search the signals data frame that equal 'YES'

```

```

# and creates a data frame named matches
matches <- subset(signals, signals$MATCH == 'YES')

#-----

# save the matches to and excel file in the data folder

#-----
# Student Code
#-----
# save the matches to and excel file in the data folder Project/Matches.xlsx
# hint code

### -----
# MAC USERS
### -----
write.xlsx("PUT SOME CODE HERE")

### -----
# WINDOWS USERS
### -----
### username <- "cemka_000"
### -----
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
### -----
# username <- "PUT YOUR USERNAME HERE"
# users.folder <- "C:\\Users\\"
# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Project\\Matches.xlsx"
# filename<- paste (users.folder, username , sep = '')
# filename <- paste (filename, the.rest, sep = '')
# write.xlsx("PUT SOME CODE HERE")

#=====
# Project Coding
#=====
#-----
# plotting the data with the matchs

# set the matches to plot on the level of -2.5 on the vertical axis
matches$Y <- -2.5

# set the plot enviroment to 1 row 1 column
# because remember it is set to 2 row by 2 columns in the code above
par(mfrow=c(1, 1))
#=====
#-----

```

```
# Student Code
```

```
#-----
```

```
# enter plot parameter correctly
```

```
# plot data with data, matches and legend
```

```
plot("PUT SOME CODE HERE",  
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',  
      lwd =2, col = "red", type = 'l', ylim=c(-3,8))
```

```
points(matches$DATE, matches$Y, pch = 19)
```

```
par(new = TRUE)
```

```
plot("PUT SOME CODE HERE" ,  
      xaxt = "n", yaxt = "n",  
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')  
axis(side = 4)
```

```
legend('topleft',  
       legend=c('GPD', 'SP500DIFF'),  
       lty = 1, col=c('red', 'darkgreen'), cex=0.8)
```

```
#-----
```

```
# Student Code
```

```
#-----
```

```
# save the plot to disk in pdf format in location
```

```
"Project/Graphics/Blackbox_Project.pdf"
```

```
# with width=10 and height=6
```

```
### -----
```

```
# MAC USERS
```

```
### -----
```

```
pdf("PUT SOME CODE HERE")
```

```
### -----
```

```
# WINDOWS USERS
```

```
### -----
```

```
### username <- "cemka_000"
```

```
### -----
```

```
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
```

```
### -----
```

```
# username <- "PUT YOUR USERNAME HERE"
```

```
# users.folder <- "C:\\Users\\"
```

```
# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Graphics\\Blackbox_Project.pdf"
```

```
# filename<- paste (users.folder, username , sep = '')
```

```
# filename <- paste (filename, the.rest, sep = '')
```

```
# pdf("PUT SOME CODE HERE")
```

```
# set the plot enviroment to 1 row 1 column
```

```

# because remember it is set to 2 row by 2 columns in the code above
par(mfrow=c(1, 1))

# plot data with data, matches and legend
plot(data$DATE, data$GDP,
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',
      lwd = 2, col = "red", type = 'l', ylim=c(-3, 8))

points(matches$DATE, matches$Y, pch = 19)

par(new = TRUE)
plot(data$DATE, data$SP500DIFF,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen", lwd = 2, type = 'l')
axis(side = 4)

legend('topleft',
      legend=c('GPD', 'SP500DIFF'),
      lty = 1, col=c('red', 'darkgreen'), cex=0.8)

```

```

#-----
# Student Code
#-----
# turn off device
# "PUT SOME CODE HERE"

```

Project Code


```

#=====
# Blackbox Project
#=====
# Description
# Simple pattern matching code.
# This code is not written with efficiency in mind.
# But instead focused on a beginning programmer to
# learn for and if statements
#-----
#-----
# Import library
#-----
library(xlsx)      # add excel helper library to read excel data into R

#-----

#=====
# Project Coding
#=====

#-----
# Mac users code
#-----
# get working directory
getwd()

#set working directory
setwd("/Users/richard/Desktop/FIU_R/Code/BlackBox")

# import the data from an excel file
data <- read.xlsx("Data/Fed_Data.xlsx", sheetName = "Import_Data")

#-----
# Windows users code
#-----

data$SP500DIFF <- NA
data$SP500DIFF[2:166] <- diff(data$SP500, lag =1)
data <- data[95:166, ]
names(data)

plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF')

```

```

plot(data$DATE, data$GDP , type = 'l' , col = "red")
par(new = TRUE)
plot(data$DATE, data$SP500DIFF ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)

```

```

#=====

```

```

#-----

```

```

# Student Code

```

```

#-----

```

```

# run a regression depend var GDP independent SP500DIFF
# and output the regression info

```

```

# Hint Code

```

```

# fit <- lm()

```

```

summary(fit)

```

```

#=====

```

```

# Project Coding

```

```

#=====

```

```

# create correlation plot of GDP and SP500Diff with regressing line

```

```

plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF',)

```

```

abline(fit)

```

```

#=====

```

```

#-----

```

```

#-----

```

```

# creating a data frame to hold the blackbox trades

```

```

signals <- NULL

```

```

# get the length of the data so we can loop the right amount of times

```

```

len <- nrow(data)

```

```

# for loop that sets the signals

```

```

for(i in 2:len){

```

```

  # temp signal holders

```

```

  gpd.signal <- NULL

```

```

  sp500diff.signal <- NULL

```

```

#-----

```

```

# Student Code
#-----

# enter if expression test for gdp

# handling GDP Signal
# if( "PUT SOME CODE HERE"){
  gpd.signal <- 'UP'
# } else if( "PUT SOME CODE HERE") {
  gpd.signal <- 'DOWN'
# } else {
  gpd.signal <- 'FLAT'
# }# end if else

#=====

# Project Coding
#=====

# handling SP500DIFF Signal
if( data$SP500DIFF[i] < data$SP500DIFF[i-1]){
  sp500diff.signal <- 'UP'
} else if( data$SP500DIFF[i] > data$SP500DIFF[i-1]) {
  sp500diff.signal <- 'DOWN'
} else {
  sp500diff.signal <- 'FLAT'
}# end if else

# store the current iteration of signals in the signals data frame
signals <- rbind(signals, data.frame( DATE = data$DATE[i],
                                     GDP = gpd.signal,
                                     SP500DIFF = sp500diff.signal))
}# end for

#-----

# create a column for the signal matches
# and set all entries in the column to NA
signals$MATCH <- NA

tricker.pattern <- c('UP', 'UP')

for(i in 1:nrow(signals)){
  if(signals$GDP[i] == tricker.pattern[1] & signals$SP500DIFF[i] ==
tricker.pattern[2] ){
    signals$MATCH[i] <- 'YES'
  } else {
    signals$MATCH[i] <- 'NO'
  }
}
}# end for

#-----

# search the signals data frame that equal 'YES'

```

```

# and creates a data frame named matches
matches <- subset(signals, signals$MATCH == 'YES')

#-----

# save the matches to and excel file in the data folder

#-----
# Student Code
#-----
# save the matches to and excel file in the data folder Project/Matches.xlsx
# hint code

### -----
# MAC USERS
### -----
write.xlsx("PUT SOME CODE HERE")

### -----
# WINDOWS USERS
### -----
### username <- "cemka_000"
### -----
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
### -----
# username <- "PUT YOUR USERNAME HERE"
# users.folder <- "C:\\Users\\"
# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Project\\Matches.xlsx"
# filename<- paste (users.folder, username , sep = '')
# filename <- paste (filename, the.rest, sep = '')
# write.xlsx("PUT SOME CODE HERE")

#=====
# Project Coding
#=====
#-----

# plotting the data with the matchs

# set the matches to plot on the level of -2.5 on the vertical axis
matches$Y <- -2.5

# set the plot enviroment to 1 row 1 column
# because remember it is set to 2 row by 2 columns in the code above
par(mfrow=c(1, 1))
#=====
#-----

```

```

# Student Code
#-----
# enter plot parameter correctly
# plot data with data, matches and legend
plot("PUT SOME CODE HERE",
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',
      lwd =2, col = "red", type = 'l', ylim=c(-3,8))

points(matches$DATE, matches$Y, pch = 19)

par(new = TRUE)
plot("PUT SOME CODE HERE" ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)

legend('topleft',
      legend=c('GPD', 'SP500DIFF'),
      lty = 1, col=c('red', 'darkgreen'), cex=0.8)

#-----
# Student Code
#-----
# save the plot to disk in pdf format in location
"Project/Graphics/Blackbox_Project.pdf"
# with width=10 and height=6

### -----
# MAC USERS
### -----
pdf("PUT SOME CODE HERE")

### -----
# WINDOWS USERS
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### -----
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
### -----
# username <- "PUT YOUR USERNAME HERE"
# users.folder <- "C:\\Users\\"
# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Graphics\\Blackbox_Project.pdf"
# filename<- paste (users.folder, username , sep = '')
# filename <- paste (filename, the.rest, sep = '')
# pdf("PUT SOME CODE HERE")

# set the plot enviroment to 1 row 1 column

```

```
# because remember it is set to 2 row by 2 columns in the code above
```

```
par(mfrow=c(1, 1))
```

```
# plot data with data, matches and legend
```

```
plot(data$DATE, data$GDP,  
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',  
      lwd = 2, col = "red", type = 'l', ylim=c(-3, 8))
```

```
points(matches$DATE, matches$Y, pch = 19)
```

```
par(new = TRUE)
```

```
plot(data$DATE, data$SP500DIFF ,  
      xaxt = "n", yaxt = "n",  
      ylab = "", xlab = "" , col = "darkgreen" , lwd = 2, type = 'l')  
axis(side = 4)
```

```
legend('topleft',  
       legend=c('GPD', 'SP500DIFF'),  
       lty = 1, col=c('red', 'darkgreen'), cex=0.8)
```

```
#-----
```

```
# Student Code
```

```
#-----
```

```
# turn off device
```

```
# "PUT SOME CODE HERE"
```

Project Code Solution

```

#=====
# Blackbox Project Solution
#=====
# Description
# Simple pattern matching code.
# This code is not written with efficiency in mind.
# But instead focused on a beginning programmer to
# learn for and if statements
#-----
#-----
# Import library
#-----
library(xlsx)      # add excel helper library to read excel data into R

#-----

#-----
# Mac Users Code
#-----
# get working directory
getwd()

#set working directory
setwd("/Users/richard/Desktop/FIU_R/Code/BlackBox")

# import the data from an excel file
data <- read.xlsx("Data/Fed_Data.xlsx", sheetName = "Import_Data")

### -----
# WINDOWS USERS
### -----
### username <- "cemka_000"
### -----
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
### -----
# username <- "PUT YOUR USERNAME HERE"
# users.folder <- "C:\\Users\\"
# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Data\\Fed_Data.xlsx"
# filename<- paste (users.folder, username , sep = '')
# filename <- paste (filename, the.rest, sep = '')
# data <- read.xlsx(filename, sheetName = "Import_Data")

data$SP500DIFF <- NA
data$SP500DIFF[2:166] <- diff(data$SP500, lag =1)
data <- data[95:166, ]
names(data)

```



```

plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF')

plot(data$DATE, data$GDP , type = 'l' , col = "red")
par(new = TRUE)
plot(data$DATE, data$SP500DIFF ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)
#-----
# run a regression depend var GDP independent SP500DIFF
# and output the regression info

# run a regression depend var GDP independent SP500DIFF
# and output the regression info

fit <- lm(data$SP500DIFF ~ data$GDP)
summary(fit)

# create correlation plot of GDP and SP500Diff with regressing line

plot(data$GDP, data$SP500DIFF,
      main = 'Correlation GDP SP500DIFF',
      xlab = 'GDP', ylab = 'SP500DIFF',)

abline(fit)

#-----
#-----
# creating a data frame to hold the blackbox trades
signals <- NULL

# get the length of the data so we can loop the right amount of times
len <- nrow(data)

# for loop that sets the signals
for(i in 2:len){

  # temp signal holders
  gpd.signal <- NULL
  sp500diff.signal <- NULL

  # handling GDP Signal
  if( data$GDP[i] < data$GDP[i-1]){
    gpd.signal <- 'UP'
  } else if( data$GDP[i] > data$GDP[i-1]) {
    gpd.signal <- 'DOWN'
  }
}

```

```

} else {
  gpd.signal <- 'FLAT'
}# end if else

# handling SP500DIFF Signal
if( data$SP500DIFF[i] < data$SP500DIFF[i-1]){
  sp500diff.signal <- 'UP'
} else if( data$SP500DIFF[i] > data$SP500DIFF[i-1]) {
  sp500diff.signal <- 'DOWN'
} else {
  sp500diff.signal <- 'FLAT'
}# end if else

# store the current iteration of signals in the signals data frame
signals <- rbind(signals, data.frame( DATE = data$DATE[i],
                                     GDP = gpd.signal,
                                     SP500DIFF = sp500diff.signal))
}# end for

```

```

#-----
# create a column for the signal matches
# and set all entries in the column to NA
signals$MATCH <- NA

```

```

tricker.pattern <- c('UP', 'UP')

for(i in 1:nrow(signals)){
  if(signals$GDP[i] == tricker.pattern[1] & signals$SP500DIFF[i] ==
tricker.pattern[2] ){
    signals$MATCH[i] <- 'YES'
  } else {
    signals$MATCH[i] <- 'NO'
  }
}# end for

```

```

#-----
# search the signals data frame that equal 'YES'
# and creates a data frame named matches
matches <- subset(signals, signals$MATCH == 'YES')

```

```

#-----
# save the matches to and excel file in the data folder
write.xlsx(matches, "Project/Matches.xlsx")

```

```

#-----
# plotting the data with the matches

```

```
# set the matches to plot on the level of -2.5 on the vertical axis
matches$Y <- -2.5
```

```
# set the plot enviroment to 1 row 1 column
# because remember it is set to 2 row by 2 columns in the code above
par(mfrow=c(1, 1))
```

```
# plot data with data, matches and legend
plot(data$DATE, data$GDP,
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',
      lwd = 2, col = "red", type = 'l', ylim=c(-3,8))
```

```
points(matches$DATE, matches$Y, pch = 19)
```

```
par(new = TRUE)
plot(data$DATE, data$SP500DIFF ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)
mtext("SP500DIFF", side = 4, line = 3)
```

```
legend('topleft',
       legend=c('GPD', 'SP500DIFF'),
       lty = 1, col=c('red', 'darkgreen'), cex=0.8)
```

```
#-----
# save the plot to disk in pdf format in location "Project/Blackbox.pdf"
```

```
### -----
# MAC USERS
### -----
pdf("Project/Graphics/Blackbox_Project.pdf", width=10, height=6)
```

```
### -----
# WINDOWS USERS
### -----
### username <- "cemka_000"
### -----
### UNCOMMENT BELOW AND COMMENT MAC SECTION ABOVE
### -----
# username <- "PUT YOUR USERNAME HERE"
# users.folder <- "C:\\Users\\"
```

```

# the.rest <- "\\Desktop\\FIU_R\\Code\\List\\BlackBox\\Graphics\\Blackbox_Project.pdf"
# filename<- paste (users.folder, username , sep='')
# filename <- paste (filename, the.rest, sep = '')
# pdf(filename, width=10, height=6)

# set the plot enviroment to 1 row 1 column
# because remember it is set to 2 row by 2 columns in the code above
par(mfrow=c(1, 1))

# plot data with data, matches and legend
plot(data$DATE, data$GDP,
      main = 'Blackbox', xlab = 'Year', ylab = 'Data - GDP',
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points(matches$DATE, matches$Y, pch = 19)

par(new = TRUE)
plot(data$DATE, data$SP500DIFF ,
      xaxt = "n", yaxt = "n",
      ylab = "", xlab = "" , col = "darkgreen" ,lwd = 2, type= 'l')
axis(side = 4)
mtext("SP500DIFF", side = 4, line = 3)

legend('topleft',
      legend=c('GPD', 'SP500DIFF'),
      lty = 1, col=c('red', 'darkgreen'), cex=0.8)

dev.off()

```