Seasonality Analysis and Pattern Matching in R

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Outline

Seasonality Analysis – recurring TIME patterns

- Month of the Year Seasonality
- Option Expiration Week Seasonality

Pattern Matching - recurring PRICE patterns

- Find historically similar matches to the last 90 days
- Find classical Technical Patterns: Head and Shoulders
- Define you own patterns

For complete source code, please see Appendix or my blog

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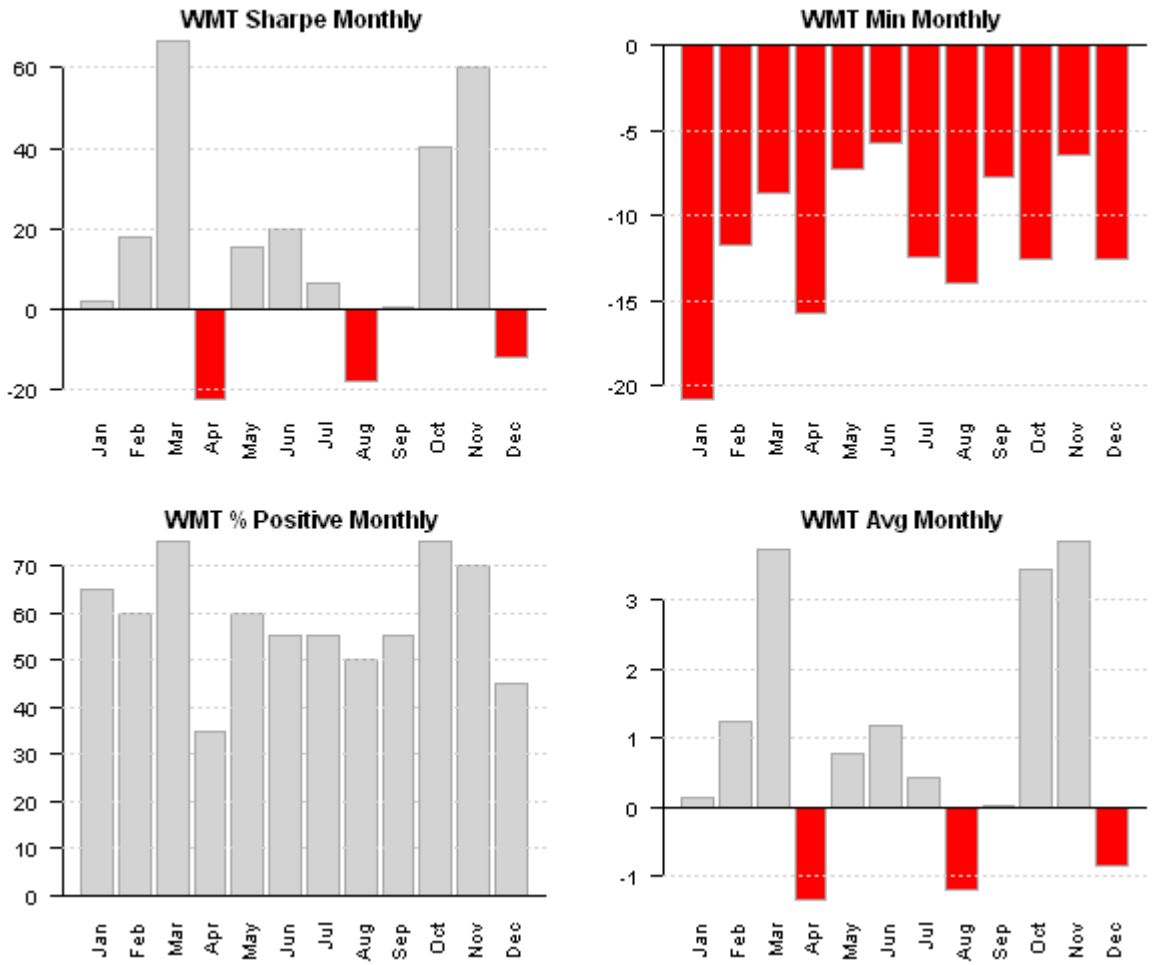
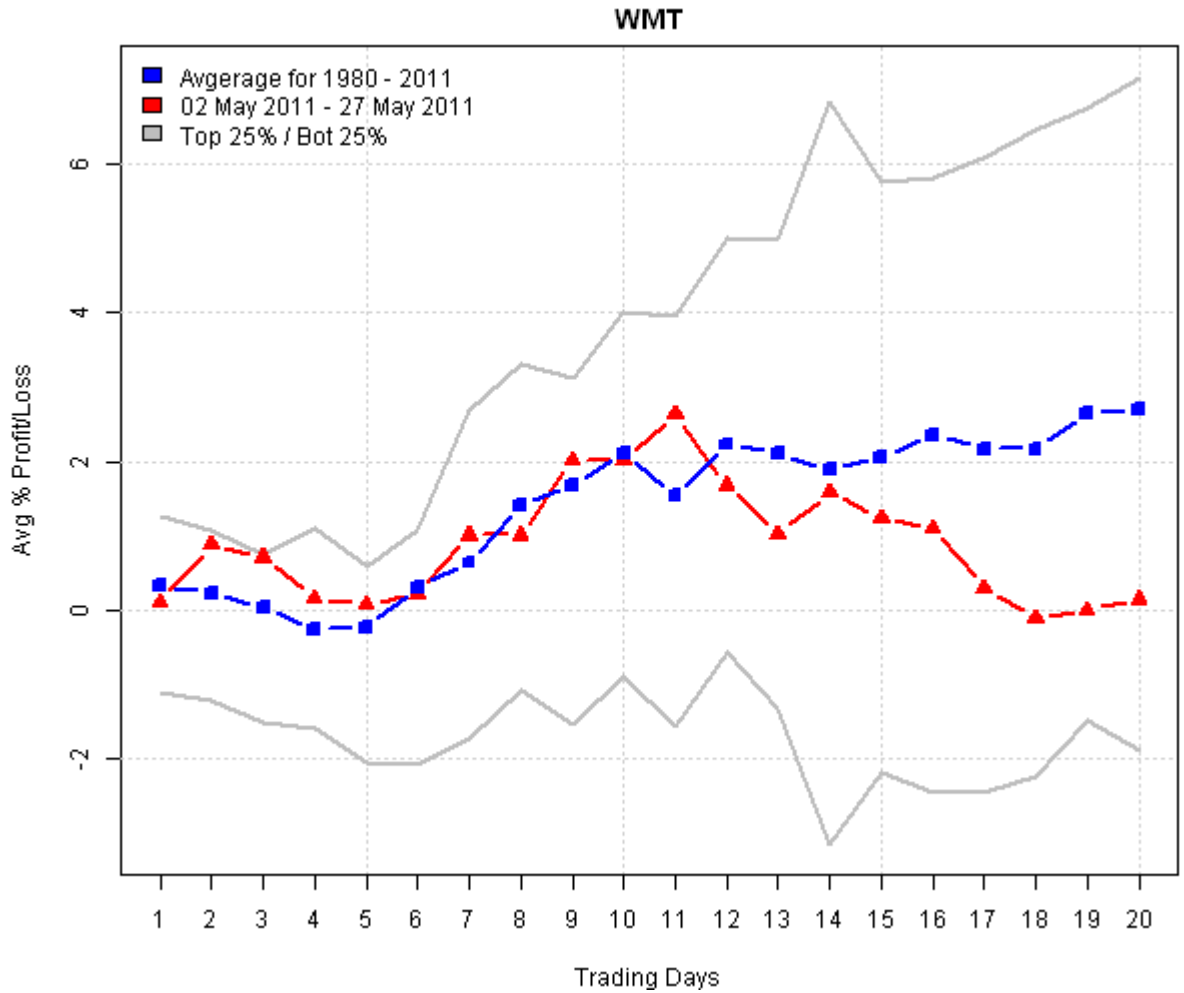
Month of the Year Seasonality: Wal-Mart

Function: month.year.seasonality (data, 'WMT')



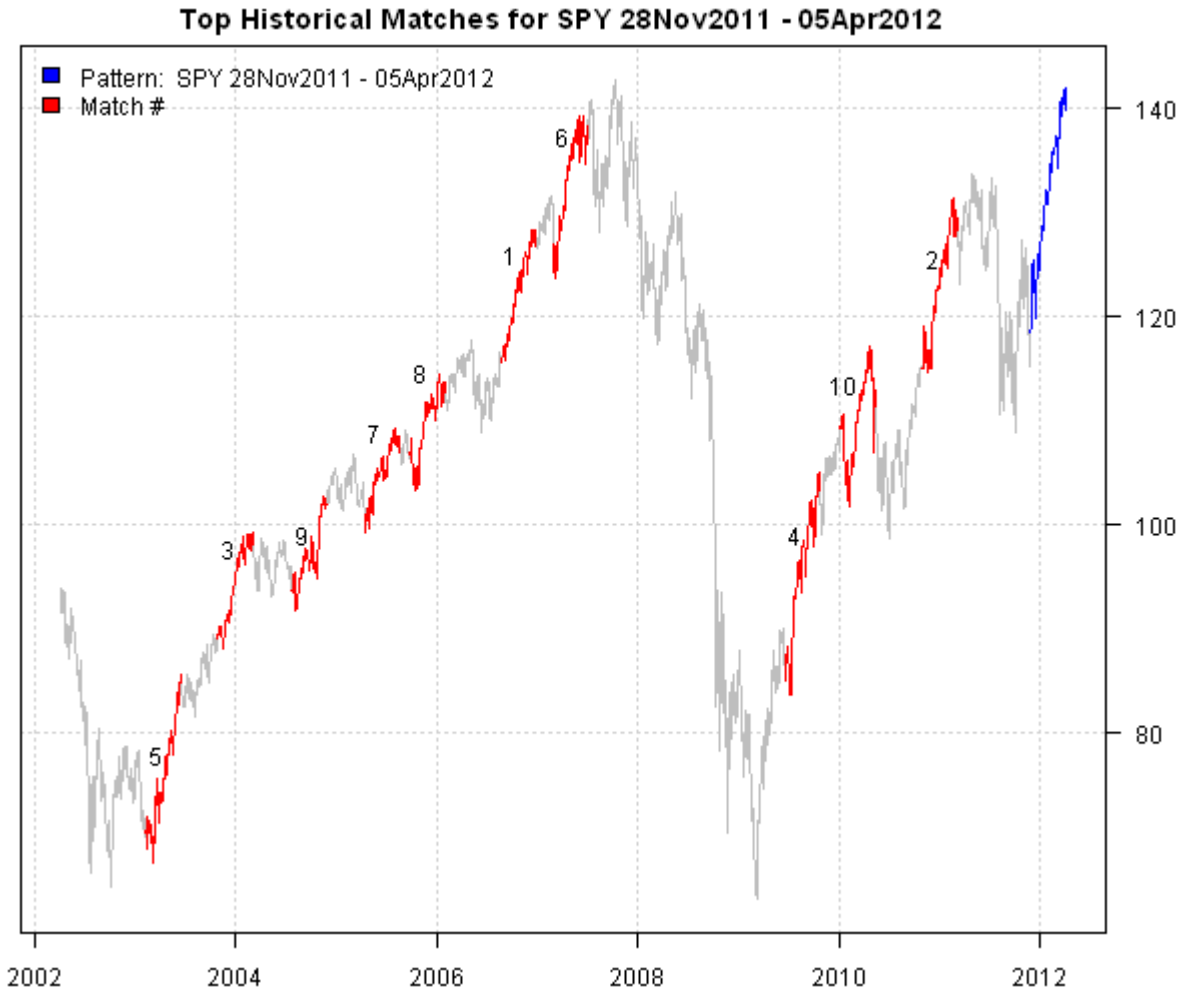
Wal-Mart's Seasonality in May

Function: time.seasonality(data, period.starts, 20, 'WMT')



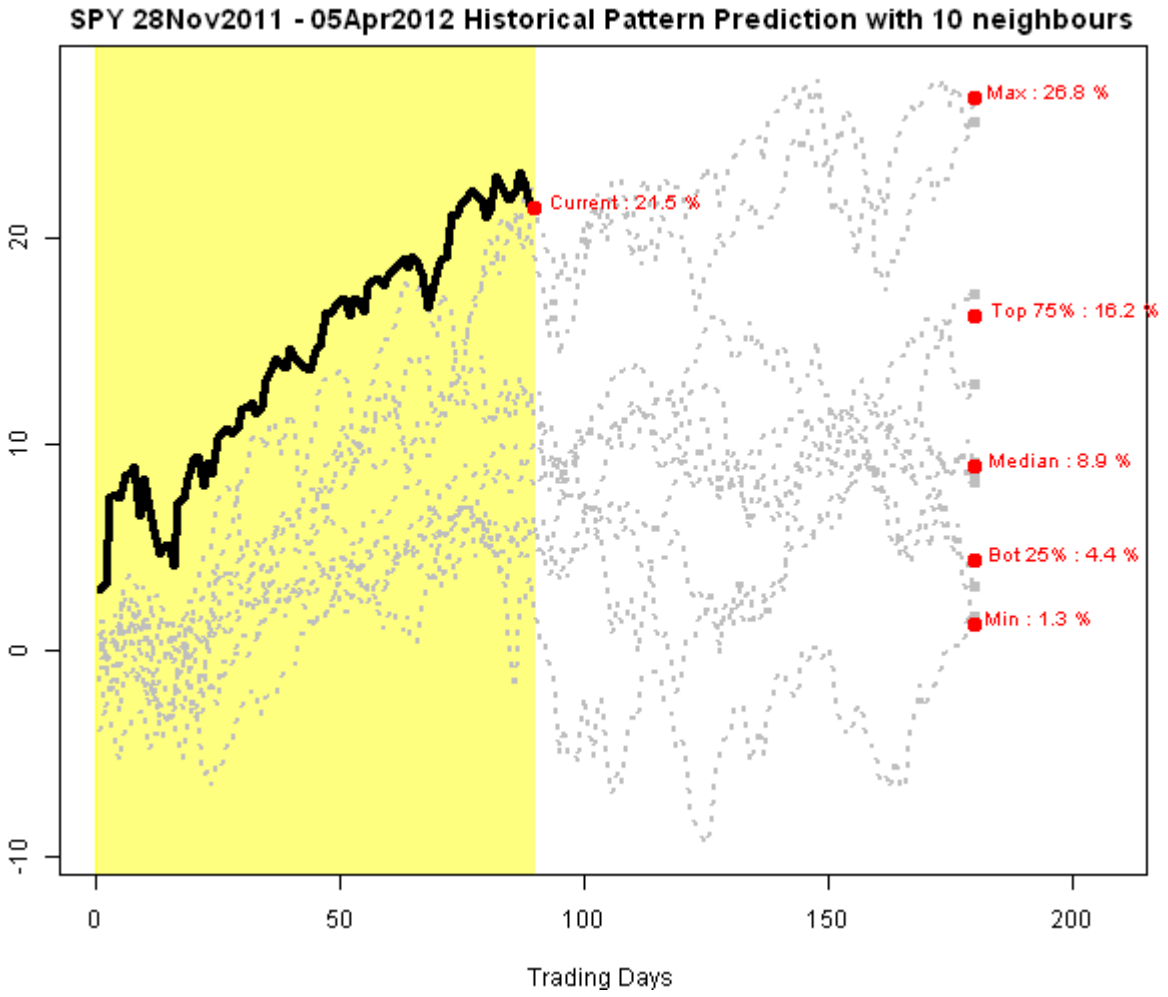
Pattern Matching – last 90 days of SPY

Function: matches = bt.matching.find (data, plot = T)



Overlay best historically similar matches

Function: bt.matching.overlay (matches, plot = T)



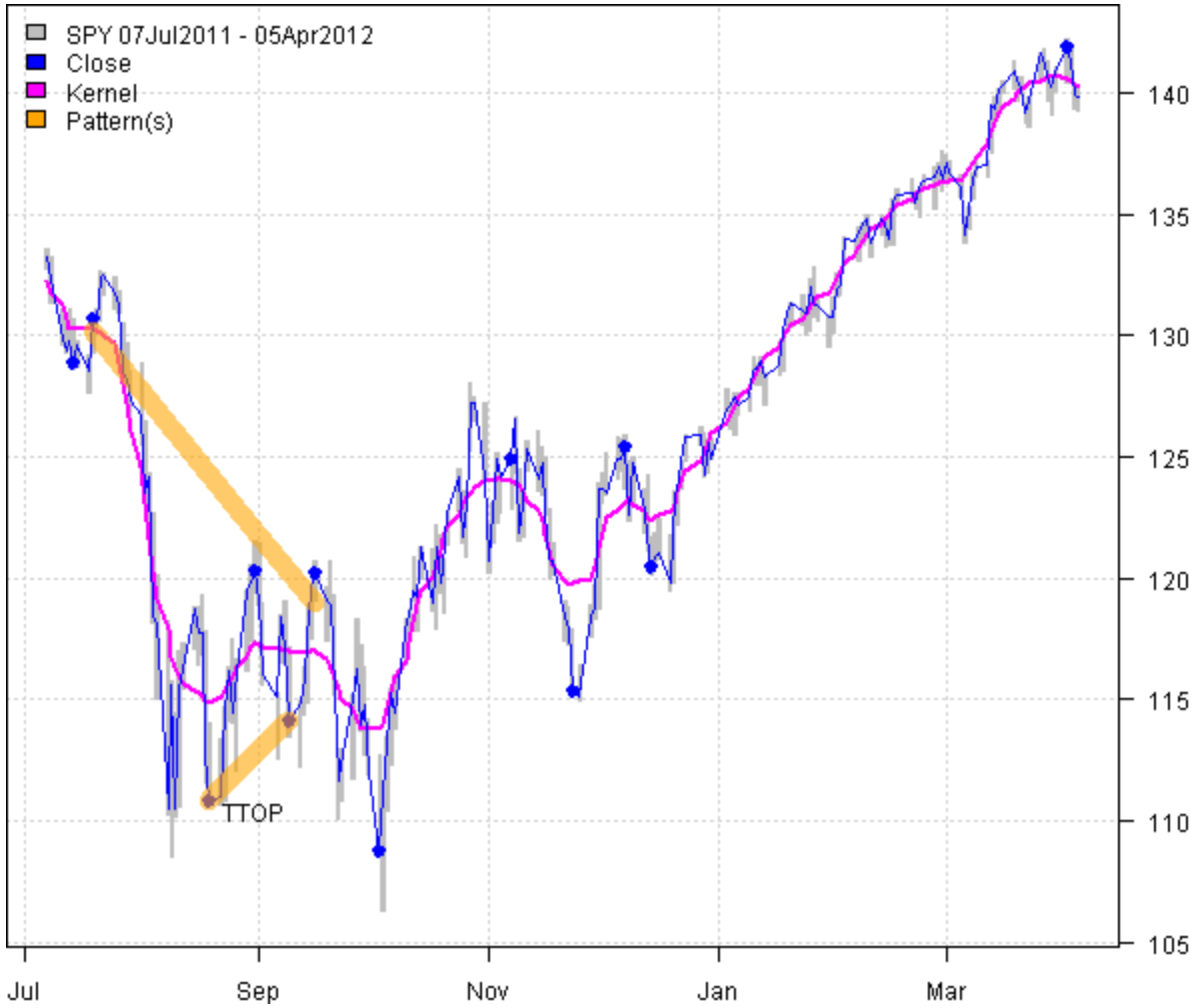
Pattern Matching – Technical Patterns

- Foundations of Technical Analysis by A. Lo, H. Mamaysky, J. Wang
- Computational Algorithm to define and find Technical Patterns
- The Technical Patterns definitions are easy to translate into R
  For example, Triangle Tops definition:

Foundations of Technical Analysis	R Code
$$\text{TTOP} \equiv \begin{cases} E_1 \text{ is a maximum} \\ E_1 > E_3 > E_5 \\ E_2 < E_4 \end{cases}$$	pattern = list() pattern$len = 5 pattern$start = 'min' pattern$formula = expression(E1 > E3 & E3 > E5 & E2 < E4) patterns$TTOP = pattern

Classical Technical Pattern(s) for SPY

Function: plot.patterns (data, 190, 'SPY')



The End

Please visit my blog at

www.systematicinvestor.wordpress.com

for more examples and ideas.

Appendix: R Code

Download R Code at www.systematicportfolio/RFinance2012

```
###########################################################################
# Load Systematic Investor Toolbox (SIT)
###########################################################################
con = gzcon(url('http://www.systematicportfolio.com/sit.gz', 'rb'))
    source(con)
close(con)

# Load supporting R code for R/Finance 2012
con=url('http://www.systematicportfolio.com/rfinance2012.r')
    source(con)
close(con)
```

```
#***************************************************************
# Seasonality Analysis - TIME patterns
#***************************************************************
load.packages('quantmod')
ticker = 'WMT'

data = getSymbols(ticker, src = 'yahoo', from = '1970-01-01', auto.assign = F)
    data = adjustOHLC(data, use.Adjusted=T)
data = data['1980::2012:04:07']
#***************************************************************
# Look at the Month of the Year Seasonality
#***************************************************************
month.year.seasonality(data, ticker)

#***************************************************************
# Look at What seasonally happens in the first 20 days of May
#***************************************************************
# Find first day of May: it is one day after the last day of April
month.ends = endpoints(data, 'months')
    month.ends = month.ends[month.ends > 0 & month.ends < nrow(data)]
    index = which(format(index(data), '%b')[month.ends] == 'Apr')

layout(1)
time.seasonality(data, 1 + month.ends[index], 20, ticker)
```

```
#****************************************************************
# Pattern Matching - PRICE patterns
#****************************************************************
# Load historical data
#****************************************************************
load.packages('quantmod')
ticker = 'SPY'

data = getSymbols(ticker, src = 'yahoo', from = '1970-01-01', auto.assign = F)
    data = adjustOHLC(data, use.Adjusted=T)
data = data['::2012:04:07']
#****************************************************************
# Find historical Matches similar to the last 90 days of price history
#****************************************************************
matches = bt.matching.find(Cl(data), main = ticker,    n.query=90, plot=TRUE)

out = bt.matching.overlay(matches, plot=TRUE)

#****************************************************************
# Find Classical Techical Patterns, based on
# Pattern Matching. Based on Foundations of Technical Analysis
# by A.W. LO, H. MAMAYSKY, J. WANG
#****************************************************************
plot.patterns(data, 190, ticker)
```