Assignment 2

Shubhang Periwal 19201104

11/7/2019

```r
# Question 1
dataset <- read.csv("mly532.csv",skip=19)
```

```r
#q2
DublinAirport <- read.csv("mly532.csv",skip=19,header=TRUE)
str(DublinAirport)
```

```
## 'data.frame':    931 obs. of  12 variables:
##  $ year : int  1941 1941 1942 1942 1942 1942 1942 1942 1942 1942 ...
##  $ month: int  11 12 1 2 3 4 5 6 7 8 ...
##  $ meant: num  6.9 6.5 4.3 2.9 6.3 8.4 10.4 13.1 14.6 14.9 ...
##  $ maxtp: num  14 12.7 11.9 11.6 16.2 16.2 20.9 24.1 22.2 22.3 ...
##  $ mintp: num  -3.1 -3.6 -3.1 -4.3 -6.1 0.8 1.8 1.4 7.2 6.7 ...
##  $ mnmax: num  9.9 9.1 6.9 5.8 9.4 11.9 14.4 18 18.9 18.4 ...
##  $ mnmin: num  3.9 3.9 1.7 0 3.2 4.9 6.3 8.2 10.4 11.4 ...
##  $ rain : num  67.2 41.7 91.9 25.8 76.4 ...
##  $ gmin : num  -5.7 -7.6 -9.5 -10.7 -8.3 -0.4 -0.7 -0.9 2.4 4.6 ...
##  $ wdsp : num  12 12.5 13.1 9 10.7 15.1 12 9.4 13.4 10.8 ...
##  $ maxgt: int  NA NA NA NA NA NA NA NA NA NA ...
##  $ sun  : num  56.1 46.1 72.8 51.4 73.9 ...
```

```r
#q3
DublinAirport$month <- factor(DublinAirport$month,labels=month.name)
```

```r
#q4
temp_list <- aggregate(DublinAirport$rain,list(DublinAirport$month),mean)
temp_list[[1]][which(temp_list[2]==max(temp_list[2]))]
```

```
## [1] December
## 12 Levels: January February March April May June July August ... December
```

```r
temp_list[[1]][which(temp_list[2]==min(temp_list[2]))]
```

```
## [1] February
## 12 Levels: January February March April May June July August ... December
```

```r
#Maximum is in December
#Minimum is in February
```

```r
#q5
DublinAirport$season <- factor(DublinAirport$month,labels=
                              c("Winter","Winter","Spring","Spring","Spring",
                                            "Winter"),levels=month.name)
```

```
#q6
class(DublinAirport) <- c("WeatherData","data.frame")
```

```
#q7
summary.WeatherData <- function(wd){
  cat('RAIN\n')
  cat('Mean by seasons:\n')
  print(aggregate(wd$rain,list(wd$season),mean,na.rm=TRUE))
  cat('Standard Deviation by seasons:\n')
  print(aggregate(wd$rain,list(wd$season),sd,na.rm=TRUE))
  cat('Minimum rain by seasons:\n')
  print(aggregate(wd$rain,list(wd$season),min,na.rm=TRUE))
  cat('Maximum rain by seasons:\n')
  print(aggregate(wd$rain,list(wd$season),max,na.rm=TRUE))

  cat('\nMAXTP\n')
  cat('Mean by seasons:\n')
  print(aggregate(wd$maxtp,list(wd$season),mean,na.rm=TRUE))
  cat('Standard Deviation by seasons:\n')
  print(aggregate(wd$maxtp,list(wd$season),sd,na.rm=TRUE))
  cat('Minimum maxtp by seasons:\n')
  print(aggregate(wd$maxtp,list(wd$season),min,na.rm=TRUE))
  cat('Maximum maxtp by seasons:\n')
  print(aggregate(wd$maxtp,list(wd$season),max,na.rm=TRUE))

  cat('\nMINTP\n')
  cat('Mean by seasons:\n')
  print(aggregate(wd$mintp,list(wd$season),mean,na.rm=TRUE))
  cat('Standard Deviation by seasons:\n')
  print(aggregate(wd$mintp,list(wd$season),sd,na.rm=TRUE))
  cat('Minimum mintp by seasons:\n')
  print(aggregate(wd$mintp,list(wd$season),min,na.rm=TRUE))
  cat('Maximum mintp by seasons:\n')
  print(aggregate(wd$mintp,list(wd$season),max,na.rm=TRUE))

  cat('\nMAXGT\n')

  cat('Mean by seasons:\n')
  print(aggregate(wd$maxgt,list(wd$season),mean,na.rm=TRUE))
  cat('Standard Deviation by seasons:\n')
  print(aggregate(wd$maxgt,list(wd$season),sd,na.rm=TRUE))
  cat('Minimum maxgt by seasons:\n')
  print(aggregate(wd$maxgt,list(wd$season),min,na.rm=TRUE))
  cat('Maximum maxgt by seasons:\n')
  print(aggregate(wd$maxgt,list(wd$season),max,na.rm=TRUE))


}
summary(DublinAirport)
```

```
## RAIN
## Mean by seasons:
##    Group.1        x
```
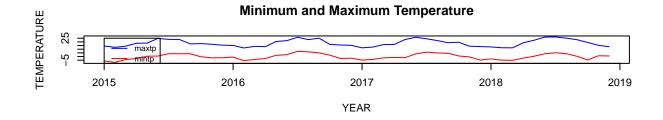
```
## 1  Winter 63.89017
## 2  Spring 53.54915
## 3  Summer 63.92165
## 4  Autumn 70.20948
## Standard Deviation by seasons:
##    Group.1       x
## 1  Winter 32.87200
## 2  Spring 27.30880
## 3  Summer 35.43135
## 4  Autumn 38.11011
## Minimum rain by seasons:
##    Group.1   x
## 1  Winter 4.7
## 2  Spring 3.6
## 3  Summer 4.0
## 4  Autumn 3.6
## Maximum rain by seasons:
##    Group.1     x
## 1  Winter 217.0
## 2  Spring 151.8
## 3  Summer 189.9
## 4  Autumn 185.8
##
## MAXTP
## Mean by seasons:
##    Group.1        x
## 1  Winter 12.73761
## 2  Spring 17.16239
## 3  Summer 23.02511
## 4  Autumn 18.02198
## Standard Deviation by seasons:
##    Group.1        x
## 1  Winter 1.638288
## 2  Spring 2.798734
## 3  Summer 1.787048
## 4  Autumn 3.038054
## Minimum maxtp by seasons:
##    Group.1    x
## 1  Winter  4.8
## 2  Spring  9.9
## 3  Summer 18.4
## 4  Autumn 12.1
## Maximum maxtp by seasons:
##    Group.1    x
## 1  Winter 17.1
## 2  Spring 23.5
## 3  Summer 28.7
## 4  Autumn 25.1
##
## MINTP
## Mean by seasons:
##    Group.1         x
## 1  Winter -3.1931624
## 2  Spring -0.5871795
```
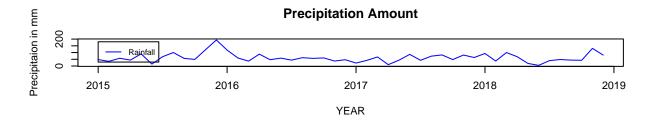
```
## 3  Summer  5.9303030
## 4  Autumn  1.2551724
## Standard Deviation by seasons:
##    Group.1        x
## 1  Winter 2.369322
## 2  Spring 2.401950
## 3  Summer 1.735196
## 4  Autumn 2.799624
## Minimum mintp by seasons:
##    Group.1     x
## 1  Winter -12.2
## 2  Spring  -7.9
## 3  Summer   0.7
## 4  Autumn  -8.4
## Maximum mintp by seasons:
##    Group.1     x
## 1  Winter   1.8
## 2  Spring   6.9
## 3  Summer 10.0
## 4  Autumn   7.5
##
## MAXGT
## Mean by seasons:
##    Group.1        x
## 1  Winter 53.04933
## 2  Spring 45.57333
## 3  Summer 39.49333
## 4  Autumn 47.23661
## Standard Deviation by seasons:
##    Group.1        x
## 1  Winter 8.767892
## 2  Spring 7.426136
## 3  Summer 6.263642
## 4  Autumn 7.875278
## Minimum maxgt by seasons:
##    Group.1  x
## 1  Winter 35
## 2  Spring 28
## 3  Summer 27
## 4  Autumn 27
## Maximum maxgt by seasons:
##    Group.1  x
## 1  Winter 80
## 2  Spring 66
## 3  Summer 56
## 4  Autumn 73
```

```
#Findings
#The minimum rain is during the spring where the mean is lowest of all
#The value in spring is less in each and every statistical measure
#Even though autumn has the highest mean, but it has low amount of variance
#when compared to winter.  Autumn has more amount of rain as
#compared to other seasons, so it is advisable to take your umbrella along side
#Even though the maximum value in winter is higher, but rains in autumn are more
```

```
#than other seasons due to its high mean. The variation of rain is also highest
#as can be seen by its standard deviation.

# We can see from maxgt that winter is the windiest month of all,
# followed by autumn and spring. There is a relation between temperature and
# windspeeds. Winter having the minimum temperature also has the maximum wind
# speeds. Which might be the effect of low temperatures. This is also true for
# summers and other seaons. Gust speed and temperature are inversely related.
# we should work on a relationship between temperature and wind speeds, if one
# can be used to predict the other.
```

```
#q8
plot.WeatherData <- function(wd,st_year=2015,ed_year=2018,g1=TRUE,g2=TRUE,g3=TRUE){
  par(mfrow=c(3,1))
  if(g1){myts1 <- wd[wd$year>=st_year&wd$year<=ed_year,c("maxtp","mintp")]
  myts <- ts(myts1,frequency = 12,start=c(st_year,1))
  plot.ts(myts,plot.type = 'single',xlab="YEAR",ylab="TEMPERATURE",col=c("blue","red")
          , main="Minimum and Maximum Temperature")
  legend(st_year, 25, legend=c("maxtp", "mintp"),
         col=c("blue","red"), lty=1:1,cex=0.8)
  }
  if(g2){myts1 <- wd[wd$year>=st_year&wd$year<=ed_year,"rain"]
  myts <- ts(myts1,frequency = 12,start=c(st_year,1))
  plot.ts(myts,plot.type = 'single',xlab="YEAR",ylab="Precipitaion in mm",col="blue",
          main="Precipitation Amount")
  legend(st_year, 180, legend=c("Rainfall"),
         col=c("blue"), lty=1:1,cex=0.8)
  }
  if(g3){myts1 <- wd[wd$year>=st_year&wd$year<=ed_year,"maxgt"]
  myts <- ts(myts1,frequency = 12,start=c(st_year,1))
  plot.ts(myts,plot.type = 'single',xlab="YEAR",ylab="Gust",col="red",
          main="Maximum Gust Speed")
  legend(st_year, 50, legend=c("maxgt"),
         col=c("red"), lty=1:1,cex=0.8)
  }
}

plot(DublinAirport,st_year=2015,ed_year=2018,g1=TRUE,g2=TRUE,g3=TRUE)
```

Minimum and Maximum Temperature

Precipitation Amount

Maximum Gust Speed