tar2

Part 1:

```
data <- read.xlsx("data_and_headers_processed.xlsx", 1, stringsAsFactors=T)
```

2. Possible problems:

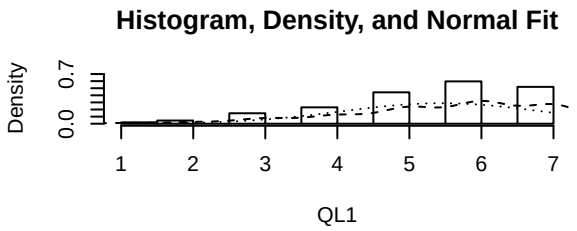
- Hebrew mixed with English - we took this problem and fixed the input file to include only english letters
- The sex feature have 2 missing values. You can see it here:

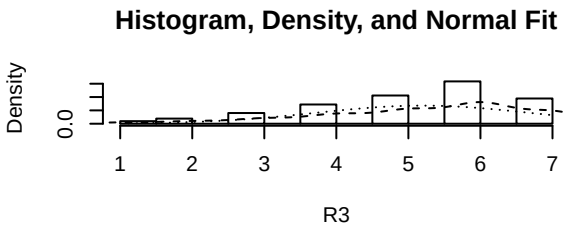
```
summary(data$Sex)
```

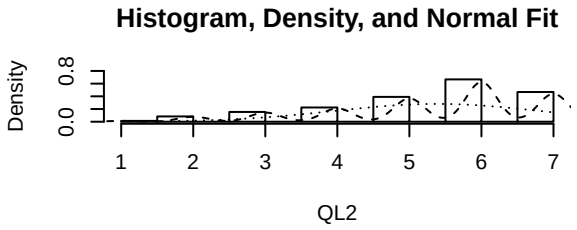
```
##   C1   C2 NA's
##  190  120    2
```

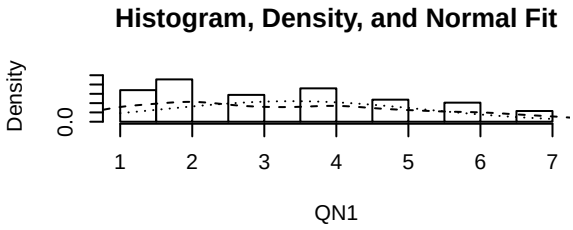
- The features don't really distribute noramly (i.e according to normal distribution) - it's not a problem by unless we assume it should distribute normaly. Here are few exmaples

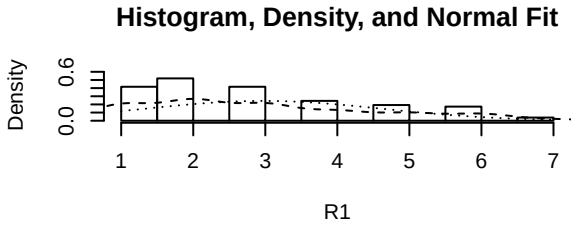
```
numeric.feature.names <- names(data)[c(which(names(data)=='QL1'):which(names(data)=='DI1'), which(na

multi.hist(x = data[,numeric.feature.names[1:6]])
```

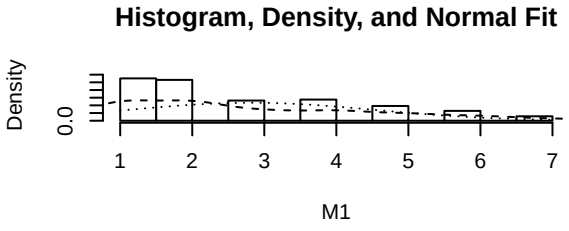












Create clarity, politeness, satisfaction variables

```
data$Age <- as.numeric(as.character(data$Age))

data.for.clarity <- cbind(data[,c("C1", "C2", "C3", "C5")], 8-data$C4, 8-data$C6)
clarity <- apply(data.for.clarity, MARGIN = 1, FUN = mean)

data.for.politeness <- cbind(data[,c("P1", "P2", "P4", "P5", "P6")], 8-data$P3)
politeness <- apply(data.for.politeness, MARGIN = 1, FUN = mean)

data.for.satisfaction <- cbind(data[,c("S1", "S2", "S3", "S5", "S6")], 8-data$S4)
satisfaction <- apply(data.for.satisfaction, MARGIN = 1, FUN = mean)

#now adding them to the data frame
data <- cbind(data, clarity = clarity, politeness = politeness, satisfaction = satisfaction)
```

Part 2

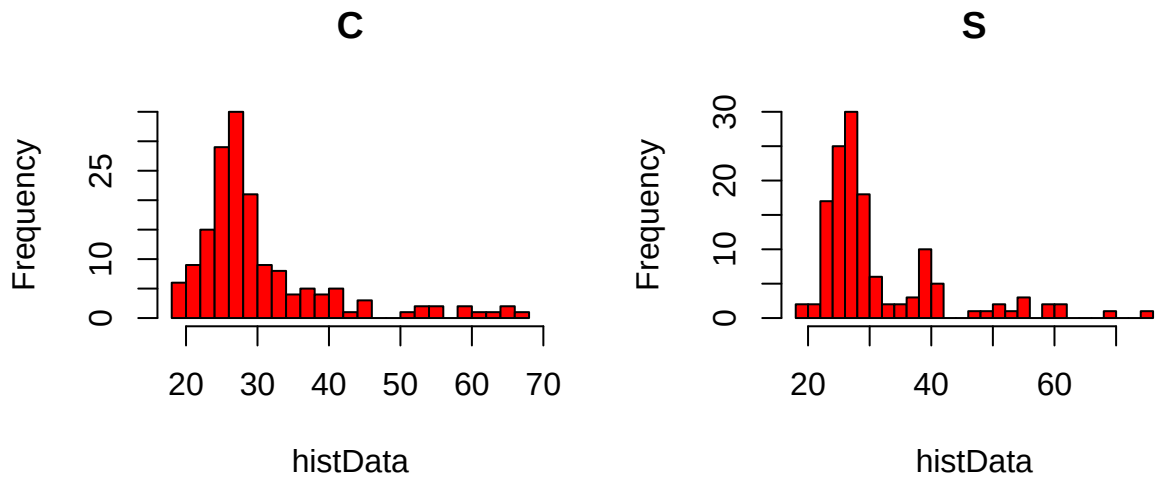
Descriptive statistics (2.1)

data$Age

```
par(mfrow=c(1,2))
combineSummaryFrame(data[data$System=='C',]$Age, data[data$System=='S',]$Age, rowNames = c('C', 'S'))
```

```
##   Min. 1st Qu. Median  Mean 3rd Qu. Max. NA's
## C   18      25     28 30.85   32.75   67    7
## S   19      26     28 31.82   34.25   75    3
```

```
invisible(drawHist(data[data$System=='C',]$Age, br=20, main='C')) #suppress ## NULL
invisible(drawHist(data[data$System=='S',]$Age, br=20, main='S'))
```



data$Sex

```r
par(mfrow=c(1,2))
colnames <- c("men", "women")
combineSummaryFrame(data[data$System=='C',]$Sex, data[data$System=='S',]$Sex, colnames = colnames, rowNa
```

```
##   men women NA's
## C 104    67    2
## S  86    53   NA
```

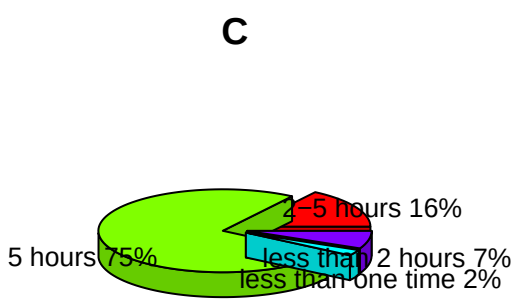
```r
invisible(drawPieChart(table(data[data$System=='C',]$Sex), colnames, main='C'))
invisible(drawPieChart(table(data[data$System=='S',]$Sex), colnames, main='S'))
```

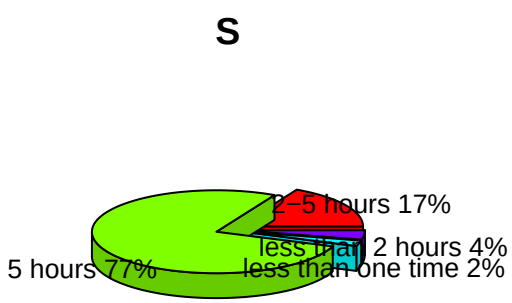
data$Comp_Use_Freq

```r
par(mfrow=c(1,2))
colnames <- c("2-5 hours", "5 hours", "less than one time", "less than 2 hours")
combineSummaryFrame(data[data$System=='C',]$Comp_Use_Freq, data[data$System=='S',]$Comp_Use_Freq, colnar
```

```
##   2-5 hours 5 hours less than one time less than 2 hours
## C        27     130                  4                12
## S        24     107                  3                 5
```

```r
invisible(drawPieChart(table(data[data$System=='C',]$Comp_Use_Freq), colnames, main='C'))
invisible(drawPieChart(table(data[data$System=='S',]$Comp_Use_Freq), colnames, main='S'))
```



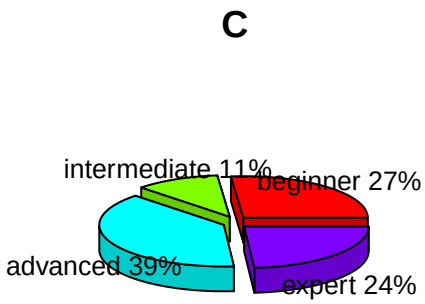


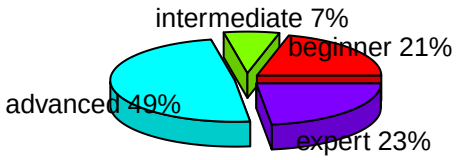
data$Comp_Use_Know

```
par(mfrow=c(1,2))
colnames <- c("beginner", "intermediate", "advanced",  "expert")
combineSummaryFrame(data[data$System=='C',]$Comp_Use_Know, data[data$System=='S',]$Comp_Use_Know, colnar
```

```
##   beginner intermediate advanced expert
## C       46           19       67     41
## S       29           10       68     32
```

```
invisible(drawPieChart(table(data[data$System=='C',]$Comp_Use_Know), colnames, main='C'))
invisible(drawPieChart(table(data[data$System=='S',]$Comp_Use_Know), colnames, main='S'))
```



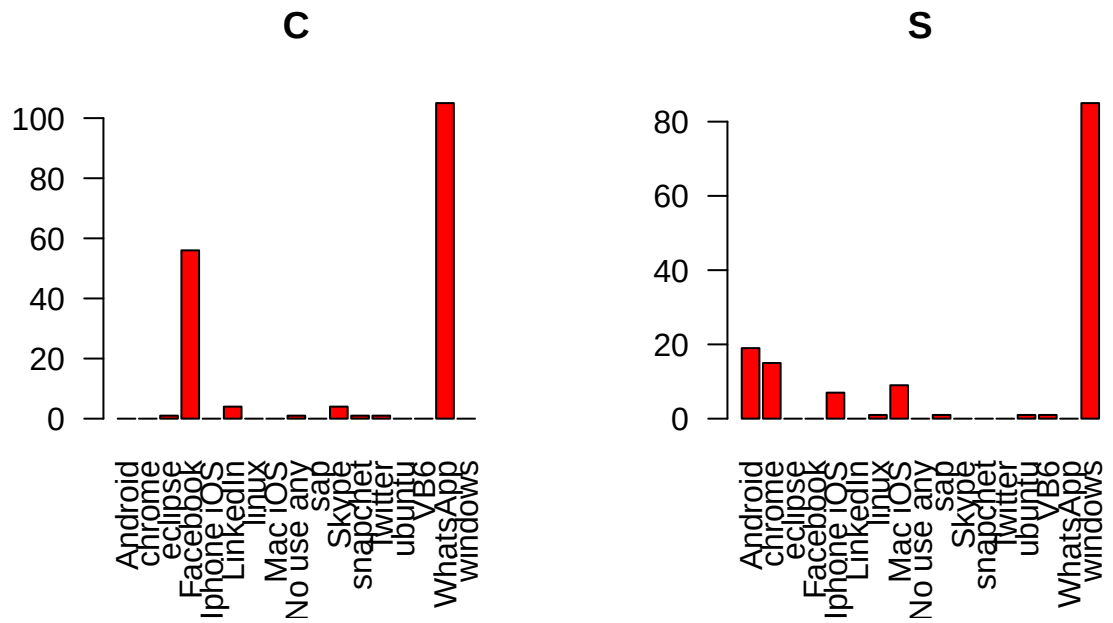


data$Selected_Software

```r
par(mfrow=c(1,2))
combineSummaryFrame(data[data$System=='C',]$Selected_Software, data[data$System=='S',]$Selected_Softwar
```

```
##   Android chrome eclipse Facebook Iphone iOS LinkedIn linux Mac iOS
## C       0      0       1       56          0        4     0       0
## S      19     15       0        0          7        0     1       9
##   No use any sap Skype snapchet Twitter ubuntu VB6 WhatsApp windows
## C          1   0     4        1       1      0   0      105       0
## S          0   1     0        0       0      1   1        0      85
```

```r
invisible(barplot(table(data[data$System=='C',]$Selected_Software), las=2, col = 'red', main='C'))
invisible(barplot(table(data[data$System=='S',]$Selected_Software), las=2, col = 'red', main='S'))
```



Part 2.2

```r
data_filtered <- data[data$System == 'C' & data$Age  >= 18 & data$Age<=49,]

stat_data <- data_filtered[ ,names(data_filtered) %in% c("clarity", "politeness", "satisfaction")]
stat_res <- data.frame(
  apply(stat_data, 2, length),
  apply(stat_data, 2, mean, na.rm=TRUE),
  apply(stat_data, 2, sd, na.rm=TRUE),
  apply(stat_data, 2, min, na.rm=TRUE),
  apply(stat_data, 2, max, na.rm=TRUE),
  apply(stat_data, 2, kurtosis, na.rm=TRUE),
  apply(stat_data, 2, skewness, na.rm=TRUE)
)
colnames(stat_res) <- c('count', 'mean', 'sd', 'min', 'max', 'kurtosis', 'skewness')
stat_res
```

```
##              count     mean        sd      min max kurtosis    skewness
```

```
## clarity        161 5.408009 0.9030816 3.000000   7 2.589470 -0.29878680
## politeness     161 4.656926 1.0948544 1.666667   7 2.747956 -0.06905606
## satisfaction   161 5.146104 0.9488226 3.000000   7 2.401156 -0.07127015
```

Part 2.3

```
stat_data_2.3 <- data_filtered[ ,names(data_filtered) %in% c("Age", "clarity", "politeness", "satisfacti
corstarsl(stat_data_2.3)
```

```
##                   Age  clarity politeness
## Age
## clarity       -0.15
## politeness    -0.05   0.51***
## satisfaction -0.19*   0.74***    0.64***
```

Part 2.4

```
lmodel1 = lm(satisfaction ~ Age+Sex, data = data_filtered)
summary(lmodel1)
```

```
##
## Call:
## lm(formula = satisfaction ~ Age + Sex, data = data_filtered)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.44683 -0.61155  0.01074  0.70608  2.07916
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.93795    0.38327  15.493   <2e-16 ***
## Age         -0.03178    0.01297  -2.450   0.0154 *
## SexC2        0.30350    0.15288   1.985   0.0489 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9252 on 151 degrees of freedom
##   (7 observations deleted due to missingness)
## Multiple R-squared:  0.06159,    Adjusted R-squared:  0.04916
## F-statistic: 4.956 on 2 and 151 DF,  p-value: 0.008232
```

```
lmodel2 = lm(satisfaction ~ Age+Sex+clarity+politeness, data = data_filtered)
summary(lmodel2)
```

```
##
## Call:
## lm(formula = satisfaction ~ Age + Sex + clarity + politeness,
```

```
##     data = data_filtered)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.39337 -0.28880 -0.00726  0.40600  1.66216
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.10289    0.39514   2.791  0.00594 **
## Age         -0.01590    0.00810  -1.964  0.05144 .
## SexC2        0.13132    0.09544   1.376  0.17088
## clarity      0.55307    0.06081   9.095 5.58e-16 ***
## politeness   0.31275    0.04922   6.354 2.41e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5712 on 149 degrees of freedom
##   (7 observations deleted due to missingness)
## Multiple R-squared:  0.6471, Adjusted R-squared:  0.6376
## F-statistic:  68.3 on 4 and 149 DF,  p-value: < 2.2e-16
```

```
anova(lmodel1, lmodel2)
```

```
## Analysis of Variance Table
##
## Model 1: satisfaction ~ Age + Sex
## Model 2: satisfaction ~ Age + Sex + clarity + politeness
##   Res.Df     RSS Df Sum of Sq      F    Pr(>F)
## 1    151 129.256
## 2    149  48.611  2    80.645 123.59 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```