

2017-18 Academic Year CLICC Accessories

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Refine Raw Data

```
library(readr)
library(stringr)
library(knitr)
library(dplyr)

##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##   filter, lag
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
library(ggplot2)
library(tidyr)
library(lubridate)

##
## Attaching package: 'lubridate'
## The following object is masked from 'package:base':
##
##   date
library(reshape2)

##
## Attaching package: 'reshape2'
## The following object is masked from 'package:tidyr':
##
##   smiths
Accessories <- read_csv("~/Downloads/1718 AY Accessories RAW.csv")

## Warning: Duplicated column names deduplicated: 'PATRON_GROUP_DISPLAY' =>
## 'PATRON_GROUP_DISPLAY_1' [3]
## Parsed with column specification:
## cols(
##   INSTITUTION_ID = col_character(),
##   PATRON_GROUP_DISPLAY = col_character(),
##   PATRON_GROUP_DISPLAY_1 = col_character(),
##   PATRON_STAT_CODE = col_character(),
##   ITEM_ENUM = col_character(),
##   CHARGE_DATE = col_character(),
```

```
## CHARGE_PLACE = col_character(),
## DISCHARGE_DATE = col_character(),
## DISCHARGE_PLACE = col_character()
## )

#Convert times into POSIX time
Accessories$CHARGE_DATE <- strptime(Accessories$CHARGE_DATE, format = "%m/%d/%Y %I:%M %p")
Accessories$DISCHARGE_DATE <- strptime(Accessories$DISCHARGE_DATE, format = "%m/%d/%Y %I:%M %p")

#Only include charges made during the 3 quarters
Accessories <- subset(Accessories,
  (Accessories$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  Accessories$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00")) |
  (Accessories$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  Accessories$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00")) |
  (Accessories$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  Accessories$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00")))

#Make all barcodes into uppercase
Accessories$ITEM_ENUM <- Accessories$ITEM_ENUM %>% str_to_upper()

#Create new variables for day of the week and hour in the day
Accessories$DAY_OF_WEEK <- Accessories$CHARGE_DATE %>% weekdays()
Accessories$HOUR <- Accessories$CHARGE_DATE %>% hour()
```

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Part 1) IPHONE CHARGERS

A) Item Usage

i.) Number of iPhone Charger checkouts by quarter

```
iphone <- Accessories[str_detect(Accessories$ITEM_ENUM, "IPHONE"),]  
  
#subset iphone chargers by quarter  
iphoneF17 <- subset(iphone, iphone$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &  
  iphone$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))  
iphoneW18 <- subset(iphone, iphone$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &  
  iphone$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))  
iphoneS18 <- subset(iphone, iphone$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &  
  iphone$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))  
  
data.frame(c(nrow(iphoneF17),nrow(iphoneW18),nrow(iphoneS18),nrow(iphone)),  
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%  
  setNames("Frequency") %>% kable(caption="Number of iPhone Charger Checkouts by Quarter")
```

Table 1: Number of iPhone Charger Checkouts by Quarter

	Frequency
Fall 2017	1820
Winter 2018	2376
Spring 2018	3538
'17-18 Academic Year	7734

ii.) Number of iPhone charger checkouts by location

```
iphone$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%  
  kable(caption="Number of iPhone Charger Checkouts by Location")
```

Table 2: Number of iPhone Charger Checkouts by Location

.	Freq
CLICC Lab	4300
CLICC YRL	2558
CLICC Powell	643
CLICC SEL Boelter	101
CLICC Biomed	84
CLICC SEL Geology	48

iii.) Number of iPhone charger checkouts by individual barcodes (from most to least used)

```
iphone$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%  
  kable(caption = "iPhone Charger Checkouts by Individual Barcodes (from most to least used)")
```

Table 3: iPhone Charger Checkouts by Individual Barcodes (from most to least used)

.	Freq
LAB-IPHONE-01	648
LAB-IPHONE-05	615
POW-IPHONE-02	600
LAB-IPHONE-02	543
LAB-IPHONE-04	373
YRL-IPHONE-06	364
YRL-IPHONE-05	325
YRL-IPHONE-03	317
LAB-IPHONE-14	297
LAB-IPHONE-06	288
LAB-IPHONE-13	279
YRL-IPHONE-01	276
LAB-IPHONE-07	274
LAB-IPHONE-03	256
LAB-IPHONE-12	241
LAB-IPHONE-08	188
YRL-IPHONE-02	185
YRL-IPHONE-14	138
YRL-IPHONE-10	132
YRL-IPHONE-08	127
LAB-IPHONE-15	124
YRL-IPHONE-12	122
YRL-IPHONE-15	114
YRL-IPHONE-11	108
YRL-IPHONE-07	105
YRL-IPHONE-09	94
LAB-IPHONE-10	80
YRL-IPHONE-04	80
YRL-IPHONE-13	71
LAB-IPHONE-11	62
POW-IPHONE-01	43
BOE-IPHONE-04	35
LAB-IPHONE-09	32
GEO-IPHONE-02	24
BOE-IPHONE-03	19
BIO-IPHONE-05	18
BIO-IPHONE-07	15
BOE-IPHONE-01	13
GEO-IPHONE-03	13
BIO-IPHONE-01	11
GEO-IPHONE-01	11
BOE-IPHONE-07	10
BIO-IPHONE-02	9
BOE-IPHONE-09	9
BOE-IPHONE-10	9
BIO-IPHONE-12	8
BIO-IPHONE-15	6
BOE-IPHONE-08	6
BIO-IPHONE-03	5

.	Freq
BIO-IPHONE-14	4
BIO-IPHONE-06	3
BIO-IPHONE-10	3
BIO-IPHONE-09	2

*Note: iPhone Chargers with barcodes “BIO-IPHONE-04”, “BIO-IPHONE-08”, “BIO-IPHONE-11”, “BIO-IPHONE-13”, “BOE-IPHONE-02”, “BOE-IPHONE-05”, and “BOE-IPHONE-06” were not used at all in the academic year.

iv.) Number of iPhone charger checkouts by location AND quarter

```
f <- iphoneF17$CHARGE_PLACE %>% table %>% data.frame()
w <- iphoneW18$CHARGE_PLACE %>% table %>% data.frame()
s <- iphoneS18$CHARGE_PLACE %>% table %>% data.frame()
iphonedf <- merge(f, w, by=".") %>% merge(., s, by = ".", all.y=T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
iphonedf1 <- iphonedf
iphonedf1$`'17-18 Academic Year` <- apply(iphonedf1[2:4], 1, sum)
iphonedf1 %>% kable(caption="Number of iPhone Charger Checkouts by Location and Quarter")
```

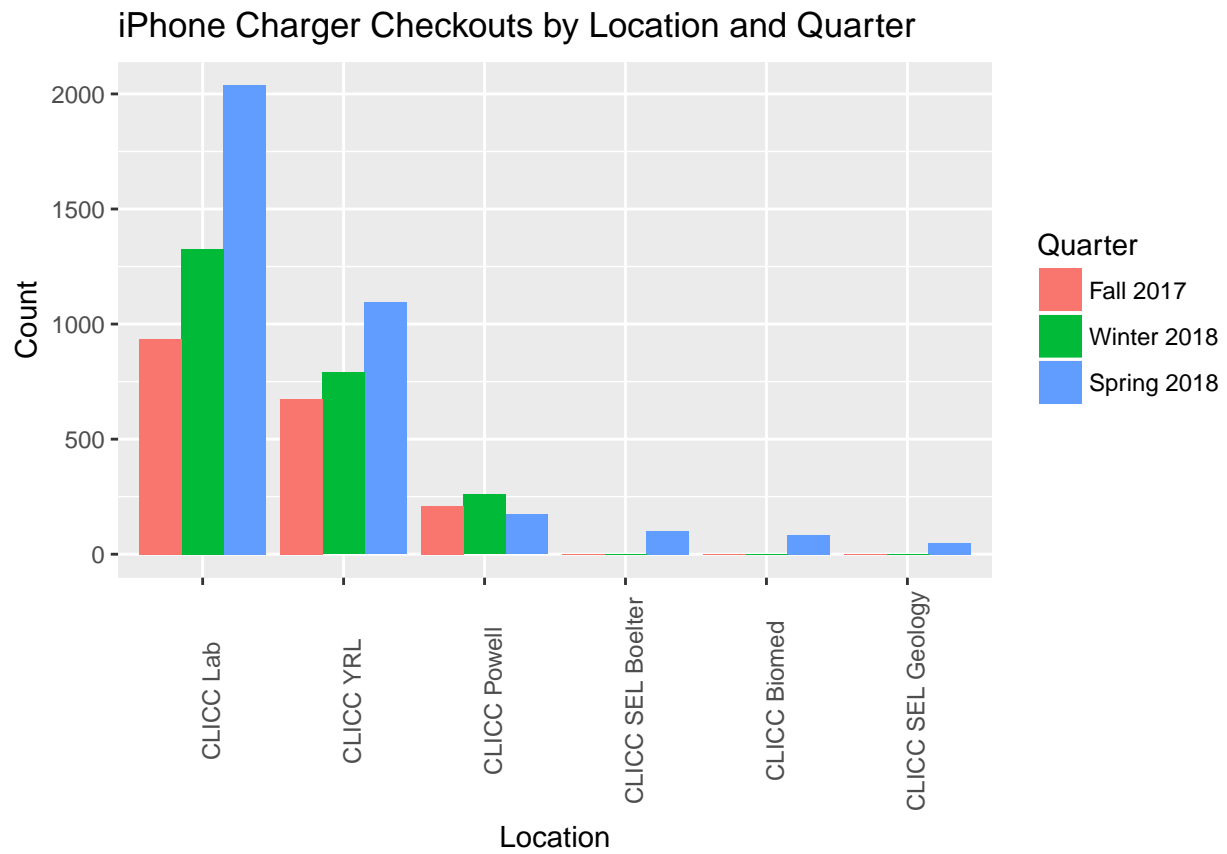
Table 4: Number of iPhone Charger Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Lab	936	1326	2038	4300
CLICC Powell	210	260	173	643
CLICC YRL	674	790	1094	2558
CLICC Biomed	0	0	84	84
CLICC SEL Boelter	0	0	101	101
CLICC SEL Geology	0	0	48	48

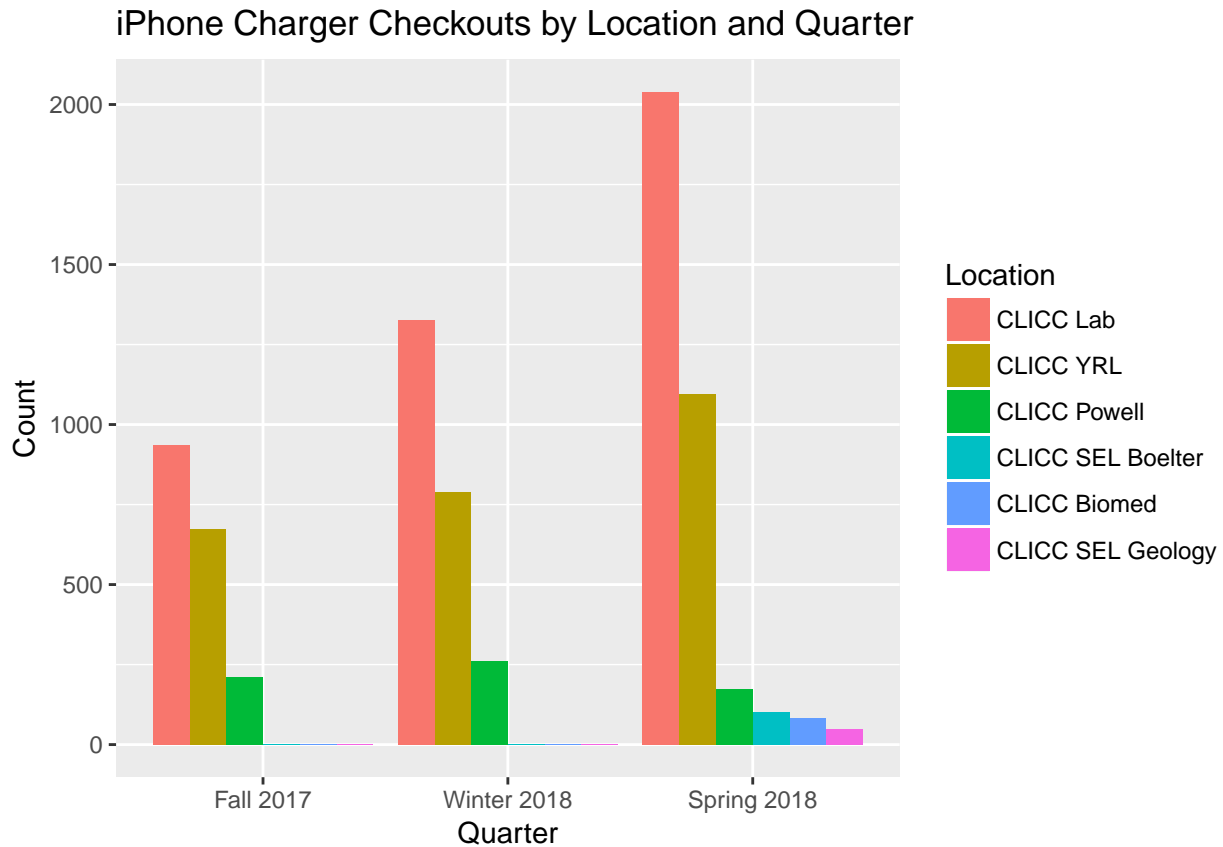
v.) iPhone Charger Graphs

```
iphonedf2 <- melt(iphonedf, id.vars=c("Location"))
#Reorder the factor levels
iphonedf2$Location <- reorder(iphonedf2$Location, X=desc(iphonedf2$value))

ggplot(iphonedf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("iPhone Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(iphonedf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("iPhone Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_fill_discrete(name = "Location")
```



B) iPhone Charger Individual Users

```
a <- iphoneF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- iphoneW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- iphoneS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for iPhone Chargers in '17-18 Academic Year")
```

Table 5: Individual Patrons for iPhone Chargers in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	911
Winter 2018	1118
Spring 2018	1496
'17-18 Academic Year	3525

C) iPhone Charger Time Analysis

i.) CLICC Lab

```
labiphone <- iphone[which(iphone$CHARGE_PLACE=="CLICC Lab"),]

#Create data frame for a CLICC lab iphone chargers time analysis
labiphone_time <- table(labiphone$HOUR, labiphone$DAY_OF_WEEK) %>% data.frame
names(labiphone_time) <- c("Hour", "Day of Week", "iPhone Charger Checkouts")
labiphone_time$`Day of Week` <- factor(labiphone_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

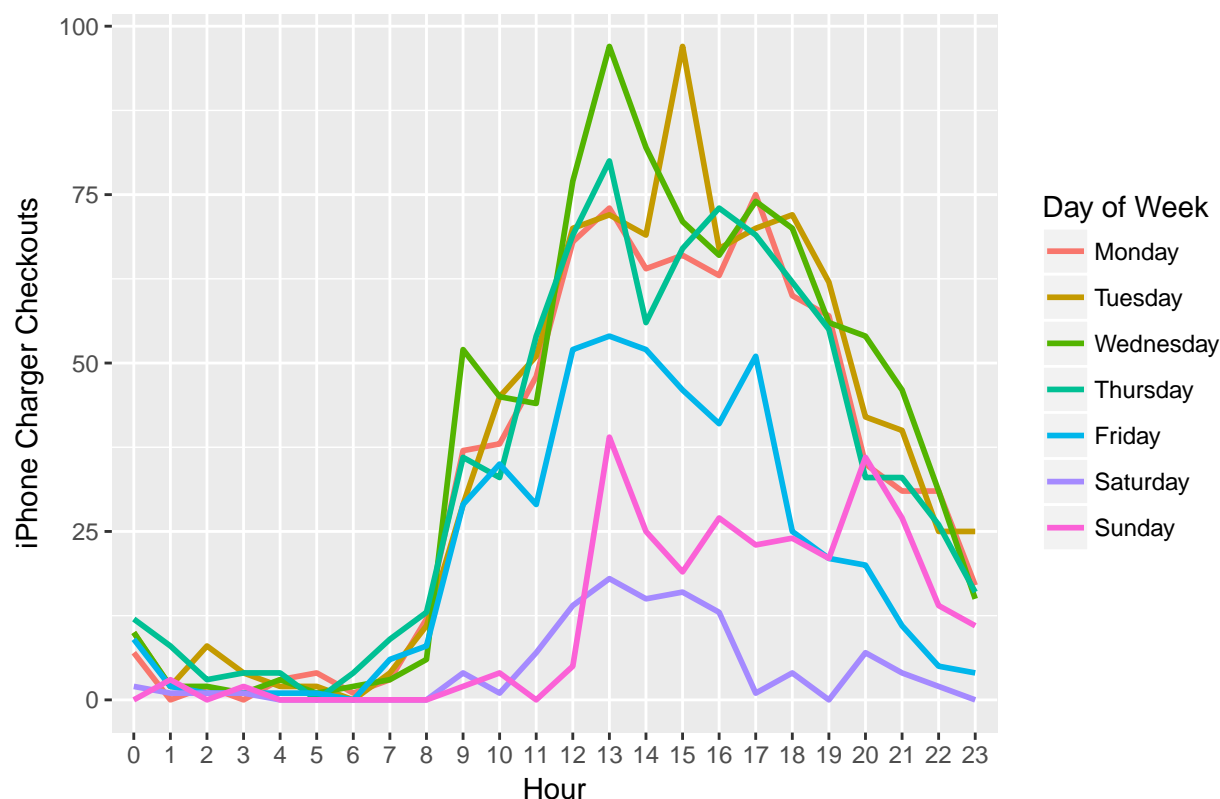
#Table Representation with Hour
labiphone$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "iPhone Charger Checkouts")) %>%
  kable(caption="Number of iPhone Charger Checkouts per Hour at CLICC Lab")
```

Table 6: Number of iPhone Charger Checkouts per Hour at CLICC Lab

Hour	iPhone Charger Checkouts
0	50
1	18
2	17
3	13
4	13
5	8
6	7
7	25
8	50
9	189
10	201
11	233
12	355
13	433
14	363
15	382
16	350
17	363
18	317
19	272
20	227
21	192
22	134
23	88

```
#Graphical representation
ggplot(labiphone_time,
  aes(x=Hour, y=`iPhone Charger Checkouts`, group=`Day of Week`, color=`Day of Week`)) +
  geom_line(size=1) +
  ggtitle("Time Analysis of CLICC Lab iPhone Chargers in '17-18 Academic Year")
```


Time Analysis of CLICC Lab iPhone Chargers in '17–18 Academic Year



**Note: On the x-axis, “0” indicates 12:00 AM, “1” indicates 1:00 AM, ... , “23” indicates 11:00 PM.

ii.) CLICC YRL

```
yrliPhone <- iPhone[which(iPhone$CHARGE_PLACE=="CLICC YRL"),]

#Create data frame for a CLICC lab iPhone chargers time analysis
yrliPhone_time <- table(yrliPhone$HOUR, yrliPhone$DAY_OF_WEEK) %>% data.frame
names(yrliPhone_time) <- c("Hour","Day of Week","iPhone Charger Checkouts")
yrliPhone_time$`Day of Week` <- factor(yrliPhone_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

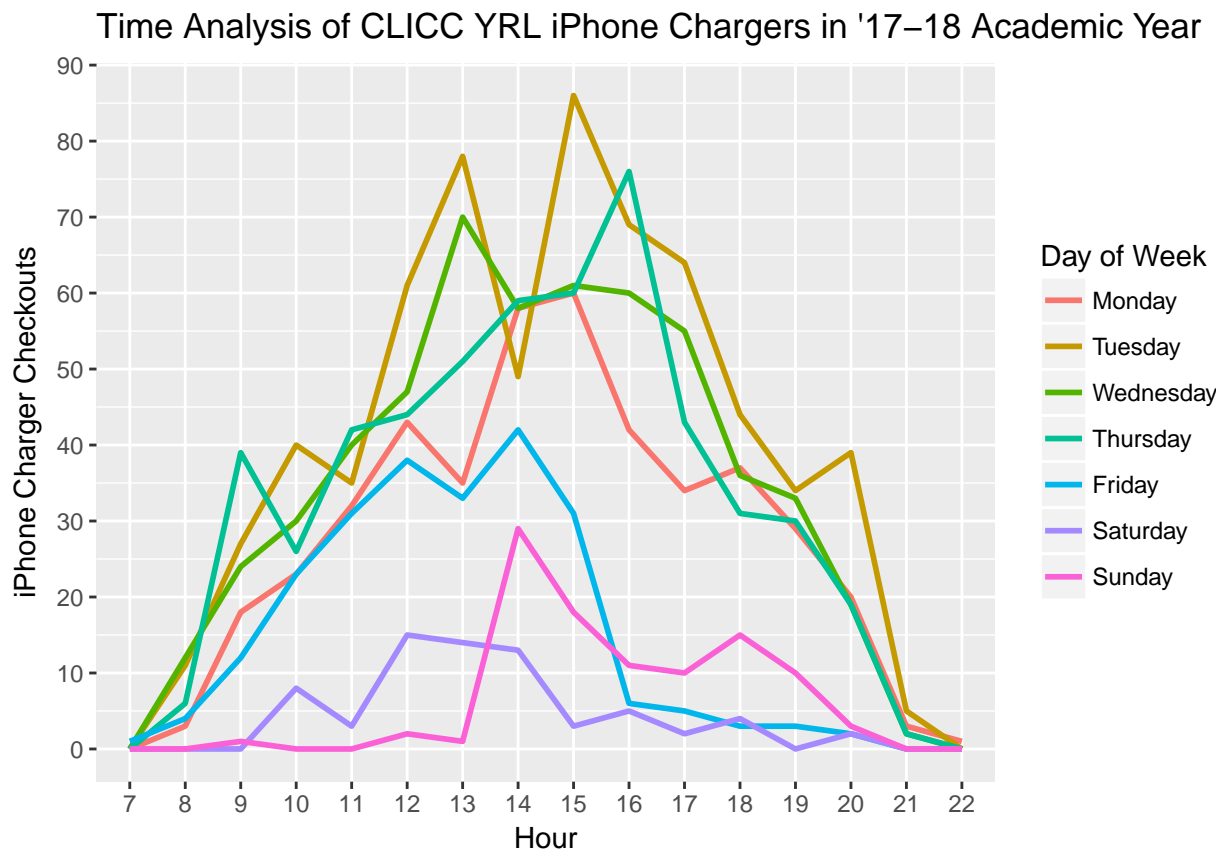
#Table Representation with Hour
yrliPhone$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "iPhone Charger Checkouts")) %>%
  kable(caption="Number of iPhone Charger Checkouts per Hour at CLICC YRL")
```

Table 7: Number of iPhone Charger Checkouts per Hour at CLICC YRL

Hour	iPhone Charger Checkouts
7	1
8	36
9	121
10	150
11	183
12	250
13	282
14	308

Hour	iPhone Charger Checkouts
15	319
16	269
17	213
18	170
19	139
20	104
21	12
22	1

```
#Graphical representation
ggplot(yrliptime,
  aes(x=Hour,y=`iPhone Charger Checkouts`, group=`Day of Week`,color=`Day of Week`)) +
  geom_line(size=1) +
  scale_y_continuous(breaks=seq(0,90,10)) +
  ggtitle("Time Analysis of CLICC YRL iPhone Chargers in '17-18 Academic Year")
```



Part 2) ANDROID CHARGERS

A) Item Usage

i.) Number of Android charger checkouts by quarter

```
android <- Accessories[str_detect(Accessories$ITEM_ENUM, "ANDROID"),]

#subset android chargers by quarter
androidF17 <- subset(android, android$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  android$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
androidW18 <- subset(android, android$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  android$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
androidS18 <- subset(android, android$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  android$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(androidF17),nrow(androidW18),nrow(androidS18),nrow(android)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Android Charger Checkouts by Quarter")
```

Table 8: Number of Android Charger Checkouts by Quarter

	Frequency
Fall 2017	497
Winter 2018	440
Spring 2018	432
'17-18 Academic Year	1369

ii.) Number of android charger checkouts by location

```
android$CHARGE_PLACE %>% table %>% sort(decreasing = T) %>%
  kable(caption="Number of Android Charger Checkouts by Location")
```

Table 9: Number of Android Charger Checkouts by Location

.	Freq
CLICC Lab	648
CLICC YRL	361
CLICC Powell	338
CLICC SEL Boelter	10
CLICC Biomed	7
CLICC SEL Geology	5

iii.) Number of android charger checkouts by individual barcodes (from most to least used)

```
android$ITEM_ENUM %>% table %>% sort(decreasing = T) %>%
  kable(caption="Android Charger Checkouts by Individual Barcodes (from most to least used)")
```

Table 10: Android Charger Checkouts by Individual Barcodes (from most to least used)

.	Freq
LAB-ANDROID-03	170
LAB-ANDROID-04	170
LAB-ANDROID-01	157
LAB-ANDROID-02	151
YRL-ANDROID-04	135
POW-ANDROID-02	116
POW-ANDROID-01	108
YRL-ANDROID-01	107
YRL-ANDROID-02	84
POW-ANDROID-03	76
POW-ANDROID-04	38
YRL-ANDROID-03	35
BOE-ANDROID-02	6
GEO-ANDROID-01	5
BOE-ANDROID-03	3
BIO-ANDROID-04	2
BIO-ANDROID-06	2
BIO-ANDROID-10	2
BIO-ANDROID-09	1
BOE-ANDROID-01	1

*Note: Android Chargers with barcodes “BIO-ANDROID-01”, “BIO-ANDROID-02”, “BIO-ANDROID-03”, “BIO-ANDROID-05”, “BIO-ANDROID-07”, and “BIO-ANDROID-08” were not used at all in the academic year.

iv.) Number of android charger checkouts by location AND quarter

```
f <- androidF17$CHARGE_PLACE %>% table %>% data.frame()
w <- androidW18$CHARGE_PLACE %>% table %>% data.frame()
s <- androidS18$CHARGE_PLACE %>% table %>% data.frame()
androiddf <- merge(f, w, by=".") %>% merge(., s, by = ".", all.y=T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
androiddf1 <- androiddf
androiddf1$`'17-18 Academic Year` <- apply(androiddf1[2:4], 1, sum)
androiddf1 %>% kable(caption="Number of Android Charger Checkouts by Location and Quarter")
```

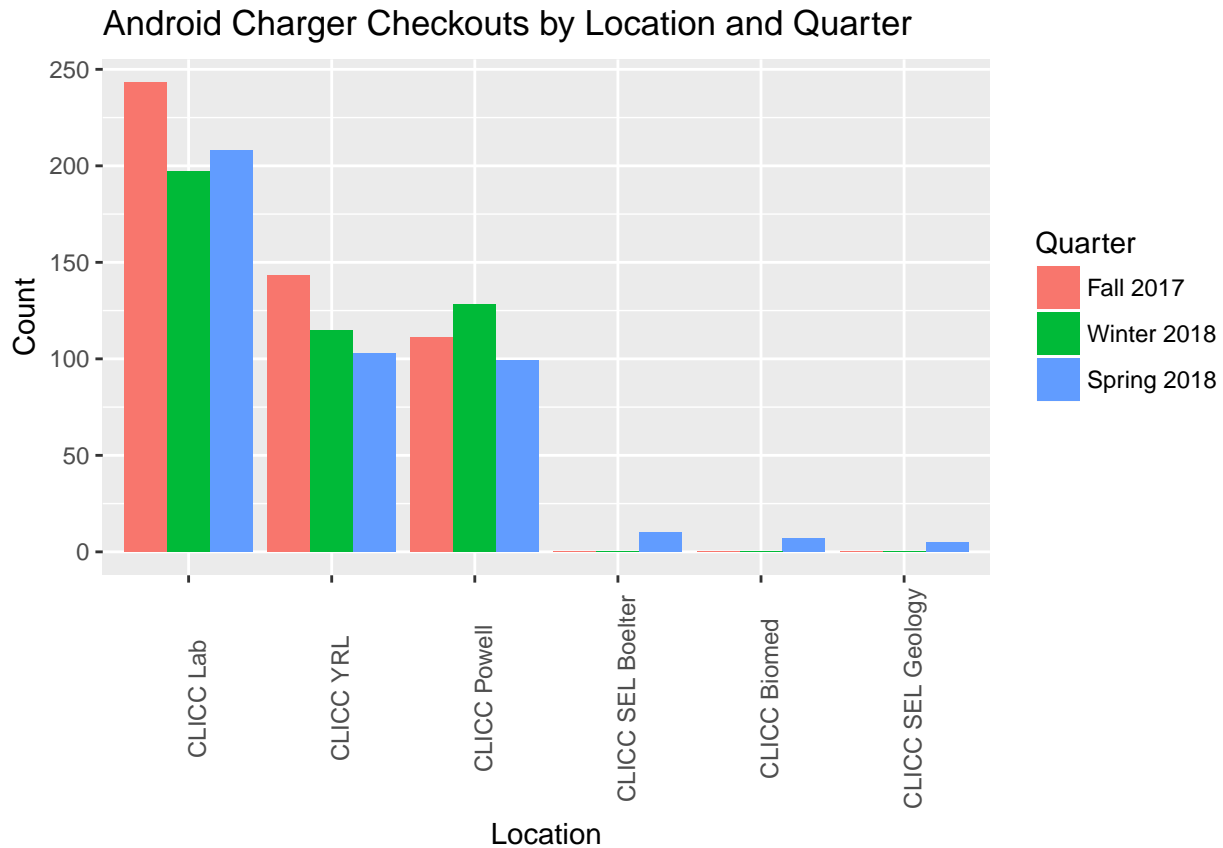
Table 11: Number of Android Charger Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Lab	243	197	208	648
CLICC Powell	111	128	99	338
CLICC YRL	143	115	103	361
CLICC Biomed	0	0	7	7
CLICC SEL Boelter	0	0	10	10
CLICC SEL Geology	0	0	5	5

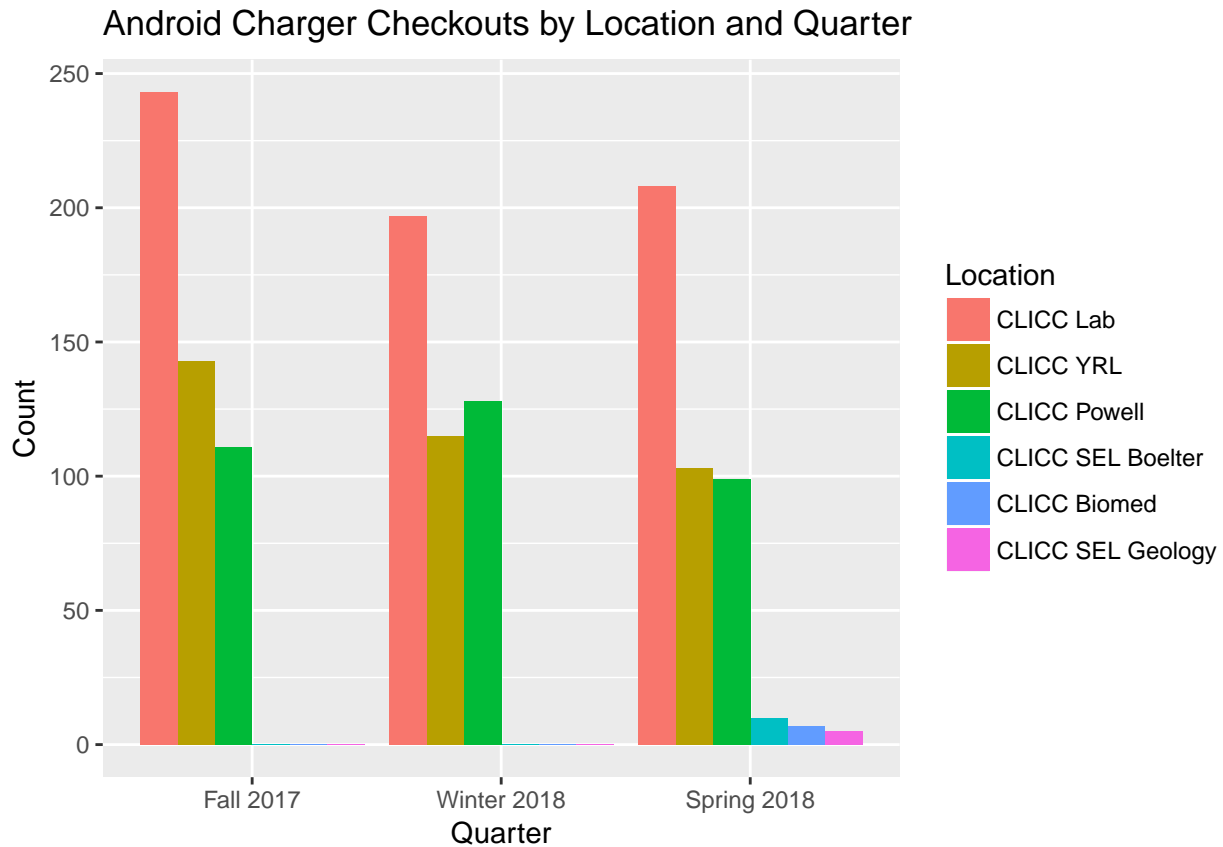
v.) Android Charger Graphs

```
androiddf2 <- melt(androiddf, id.vars=c("Location"))
#Reorder the factor levels
androiddf2$Location <- reorder(androiddf2$Location, X=desc(androiddf2$value))

ggplot(androiddf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("Android Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(androiddf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("Android Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_fill_discrete(name = "Location")
```



B) Android Charger Individual Users

```

a <- androidF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- androidW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- androidS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Android Chargers in '17-18 Academic Year")

```

Table 12: Individual Patrons for Android Chargers in '17-18 Academic Year

Number of Individual Patrons	
Fall 2017	199
Winter 2018	186
Spring 2018	218
'17-18 Academic Year	603

C) Android Charger Time Analysis

i.) CLICC Lab

```
labandroid <- android[which(android$CHARGE_PLACE=="CLICC Lab"),]

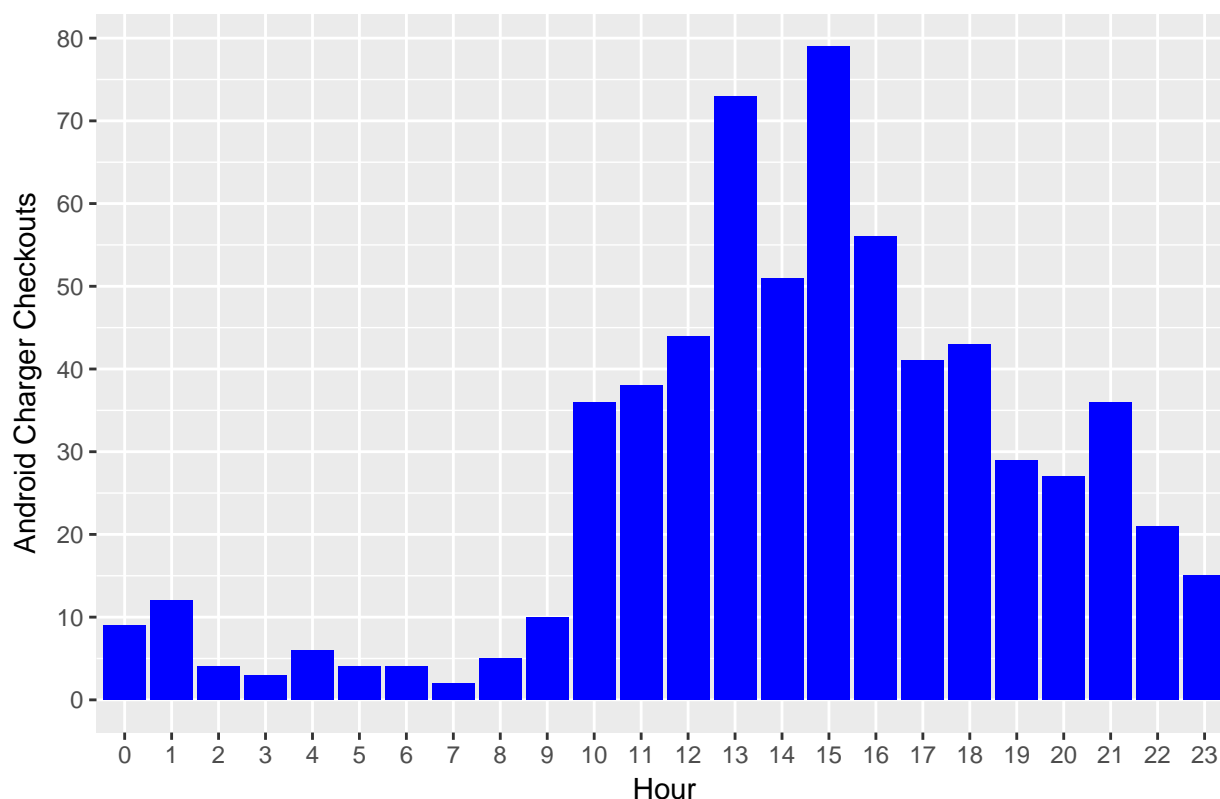
#Table Representation with Hour
labandroid_time <- table(labandroid$HOUR) %>% data.frame
names(labandroid_time) <- c("Hour", "Android Charger Checkouts")
labandroid_time %>% kable(caption="Number of Android Charger Checkouts per Hour at CLICC Lab")
```

Table 13: Number of Android Charger Checkouts per Hour at CLICC Lab

Hour	Android Charger Checkouts
0	9
1	12
2	4
3	3
4	6
5	4
6	4
7	2
8	5
9	10
10	36
11	38
12	44
13	73
14	51
15	79
16	56
17	41
18	43
19	29
20	27
21	36
22	21
23	15

```
#Graphical representation
ggplot(labandroid_time, aes(x=Hour,y=`Android Charger Checkouts`)) +
  geom_col(fill="blue") +
  scale_y_continuous(breaks=seq(0,80,10)) +
  ggtitle("Time Analysis of CLICC Lab Android Chargers in '17-18 Academic Year")
```

Time Analysis of CLICC Lab Android Chargers in '17–18 Academic Year



**Note: Graph does not breakdown by Day of Week because there are very few checkouts to begin with.

ii.) CLICC YRL

```
yrlandroid <- android[which(android$CHARGE_PLACE=="CLICC YRL"),]

#Table Representation with Hour
yrlandroid_time <- table(yrlandroid$HOUR) %>% data.frame
names(yrlandroid_time) <- c("Hour","Android Charger Checkouts")
yrlandroid_time %>% kable(caption="Number of Android Charger Checkouts per Hour at CLICC YRL")
```

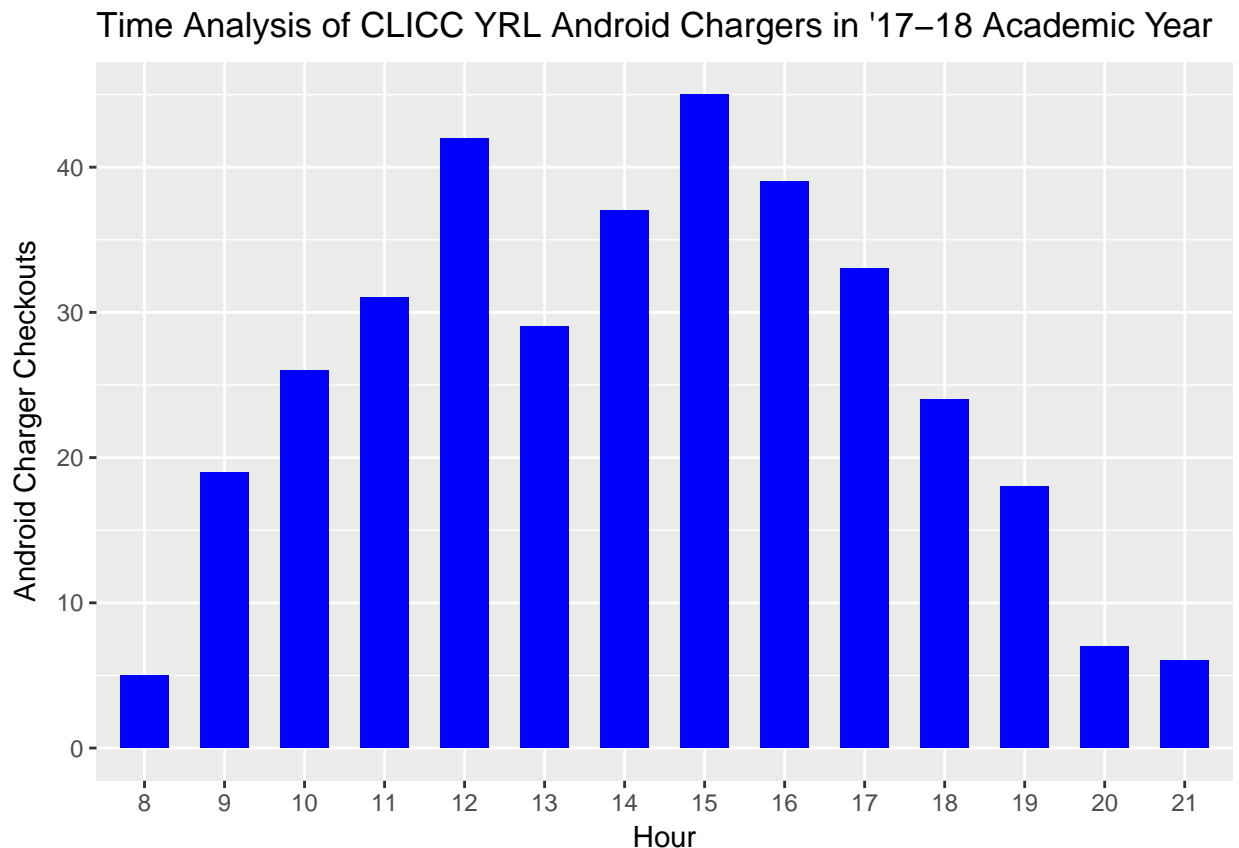
Table 14: Number of Android Charger Checkouts per Hour at CLICC YRL

Hour	Android Charger Checkouts
8	5
9	19
10	26
11	31
12	42
13	29
14	37
15	45
16	39
17	33
18	24
19	18
20	7

Hour	Android Charger Checkouts
21	6

#Graphical representation

```
ggplot(yrlandroid_time, aes(x=Hour,y=`Android Charger Checkouts`)) +
  geom_col(fill="blue", width = 0.6) +
  ggtitle("Time Analysis of CLICC YRL Android Chargers in '17-18 Academic Year")
```



.....

Part 3) MBP 2016 CHARGERS

A) Item Usage

i.) Number of MBP 2016 Charger checkouts by quarter

```
newMBPcharger <- Accessories[str_detect(Accessories$ITEM_ENUM, "CNEW"),]

#subset MBP 2016 chargers by quarter
newMBPchargerF17 <- subset(newMBPcharger,
  newMBPcharger$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  newMBPcharger$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
newMBPchargerW18 <- subset(newMBPcharger,
```

```

newMBPcharger$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
newMBPcharger$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
newMBPchargerS18 <- subset(newMBPcharger,
newMBPcharger$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
newMBPcharger$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(newMBPchargerF17),nrow(newMBPchargerW18),nrow(newMBPchargerS18),nrow(newMBPcharger)),
row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
setNames("Frequency") %>% kable(caption="Number of MBP 2016 Charger Checkouts by Quarter")

```

Table 15: Number of MBP 2016 Charger Checkouts by Quarter

	Frequency
Fall 2017	2860
Winter 2018	2765
Spring 2018	2508
'17-18 Academic Year	8133

ii.) Number of MBP 2016 Charger checkouts by location

```

newMBPcharger$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
kable(caption="Number of MBP 2016 Charger Checkouts by Location")

```

Table 16: Number of MBP 2016 Charger Checkouts by Location

.	Freq
CLICC YRL	2222
CLICC Powell	2149
CLICC Lab	1724
CLICC Biomed	1491
CLICC Arts	342
CLICC SEL Geology	163
CLICC Music	42

iii.) Number of MBP 2016 Charger checkouts by individual barcodes (from most to least used)

```

newMBPcharger$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
kable(caption = "MBP 2016 Charger Checkouts by Individual Barcodes (from most to least used)")

```

Table 17: MBP 2016 Charger Checkouts by Individual Barcodes
(from most to least used)

.	Freq
POW-AE-CNEW	712
POW-AC-CNEW	647
POW-AA-CNEW	625
LAB-AA-CNEW	611
LAB-AE-CNEW	587
YRL-AB-CNEW	515
YRL-AC-CNEW	488
YRL-AD-CNEW	474

.	Freq
YRL-AA-CNEW	384
YRL-AE-CNEW	361
BIO-AA-CNEW	337
LAB-AC-CNEW	306
BIO-AE-CNEW	305
BIO-AC-CNEW	302
BIO-AD-CNEW	274
LAB-AD-CNEW	220
BIO-AB-CNEW	137
ART-AB-CNEW	106
ART-AC-CNEW	99
GEO-AB-CNEW	91
ART-AA-CNEW	80
GEO-AA-CNEW	72
ART-AD-CNEW	57
BOE-AC-CNEW	45
BIO-AJ-CNEW	35
BOE-AD-CNEW	35
BIO-AG-CNEW	34
BIO-AI-CNEW	34
BOE-AB-CNEW	32
BOE-AA-CNEW	27
BOE-AE-CNEW	26
MUS-AB-CNEW	22
MUS-AA-CNEW	20
BIO-AH-CNEW	18
BIO-AF-CNEW	15

*Note: MBP 2016 Chargers with barcodes “LAB-AB-CNEW”, “POW-AB-CNEW”, and “POW-AD-CNEW” were not used at all in the academic year.

iv.) Number of MBP 2016 Charger checkouts by location AND quarter

```
f <- newMBPchargerF17$CHARGE_PLACE %>% table %>% data.frame()
w <- newMBPchargerW18$CHARGE_PLACE %>% table %>% data.frame()
s <- newMBPchargerS18$CHARGE_PLACE %>% table %>% data.frame()
newMBPchargerdf <- merge(f, w, by=".", all.y = T) %>% merge(., s, by = ".") %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
newMBPchargerdf1 <- newMBPchargerdf
newMBPchargerdf1$`'17-18 Academic Year` <- apply(newMBPchargerdf1[2:4], 1, sum)
newMBPchargerdf1 %>% kable(caption="Number of MBP 2016 Charger Checkouts by Location and Quarter")
```

Table 18: Number of MBP 2016 Charger Checkouts by Location and Quarter

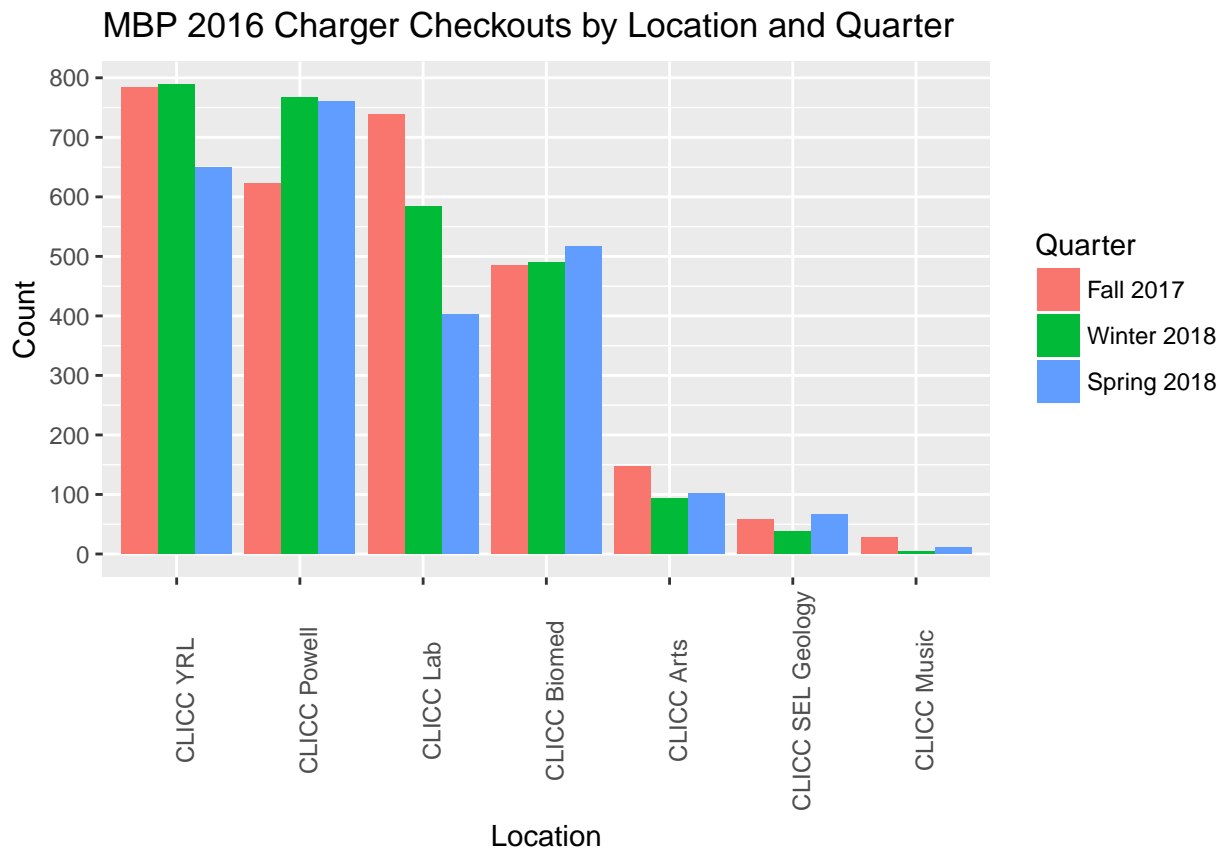
Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	147	94	101	342
CLICC Biomed	484	490	517	1491
CLICC Lab	738	584	402	1724
CLICC Music	27	4	11	42

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Powell	622	767	760	2149
CLICC SEL Geology	58	38	67	163
CLICC YRL	784	788	650	2222

v.) MBP 2016 Charger Graphs

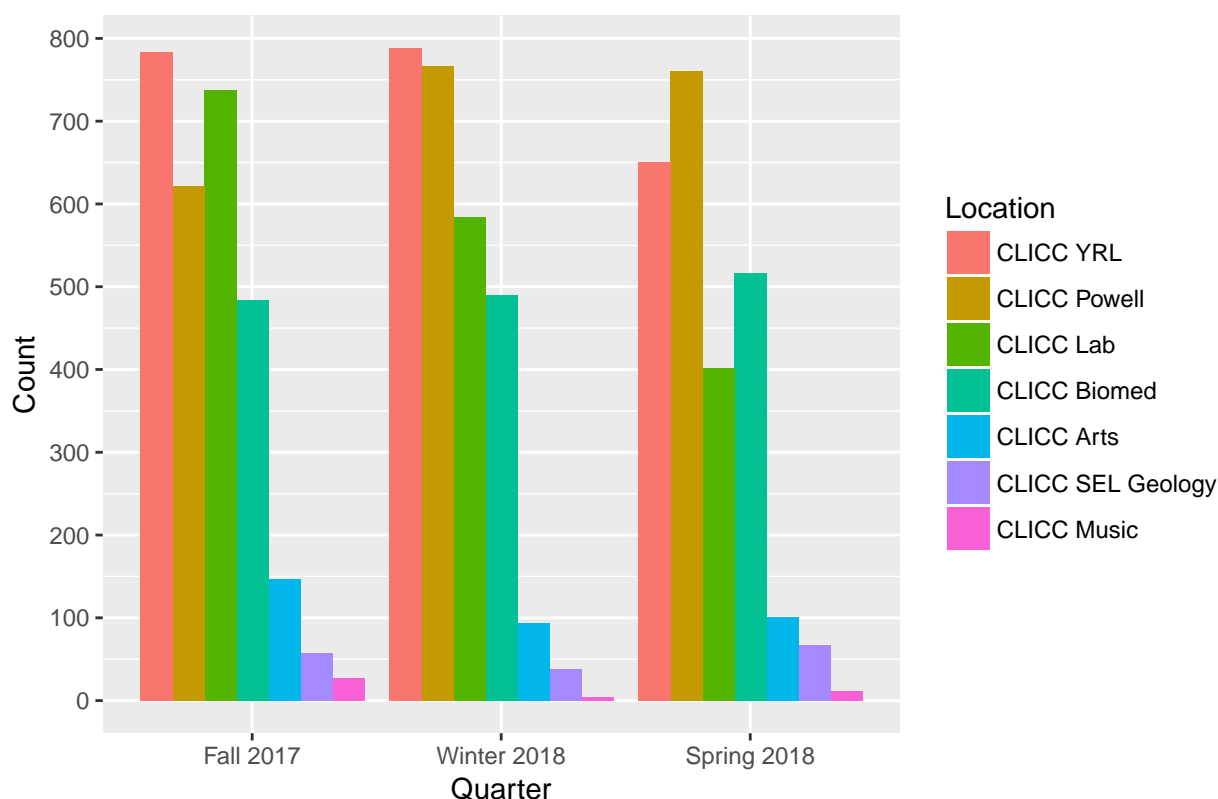
```
newMBPchargerdf2 <- melt(newMBPchargerdf, id.vars=c("Location"))
#Reorder the factor levels
newMBPchargerdf2$Location <- reorder(newMBPchargerdf2$Location, X=desc(newMBPchargerdf2$value))

ggplot(newMBPchargerdf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("MBP 2016 Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_y_continuous(breaks=seq(0,800,100)) +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(newMBPchargerdf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("MBP 2016 Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_y_continuous(breaks=seq(0,800,100)) +
  scale_fill_discrete(name = "Location")
```

MBP 2016 Charger Checkouts by Location and Quarter



B) MBP 2016 Charger Individual Users

```
a <- newMBPchargerF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- newMBPchargerW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- newMBPchargerS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for MBP 2016 Chargers in '17-18 Academic Year")
```

Table 19: Individual Patrons for MBP 2016 Chargers in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	1288
Winter 2018	1272
Spring 2018	1197
'17-18 Academic Year	3757

C) MBP 2016 Charger Time Analysis

i.) CLICC YRL

```

yrlnewMBPcharger <- newMBPcharger[which(newMBPcharger$CHARGE_PLACE=="CLICC YRL"),]

#Create data frame for a CLICC YRL iphone chargers time analysis
yrlnewMBPcharger_time <- table(yrlnewMBPcharger$HOUR, yrlnewMBPcharger$DAY_OF_WEEK) %>% data.frame
names(yrlnewMBPcharger_time) <- c("Hour","Day of Week","MBP 2016 Charger Checkouts")
yrlnewMBPcharger_time$`Day of Week` <- factor(yrlnewMBPcharger_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

#Table Representation with Hour
yrlnewMBPcharger$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "MBP 2016 Charger Checkouts")) %>%
  kable(caption="Number of MBP 2016 Charger Checkouts per Hour at CLICC YRL")

```

Table 20: Number of MBP 2016 Charger Checkouts per Hour at CLICC YRL

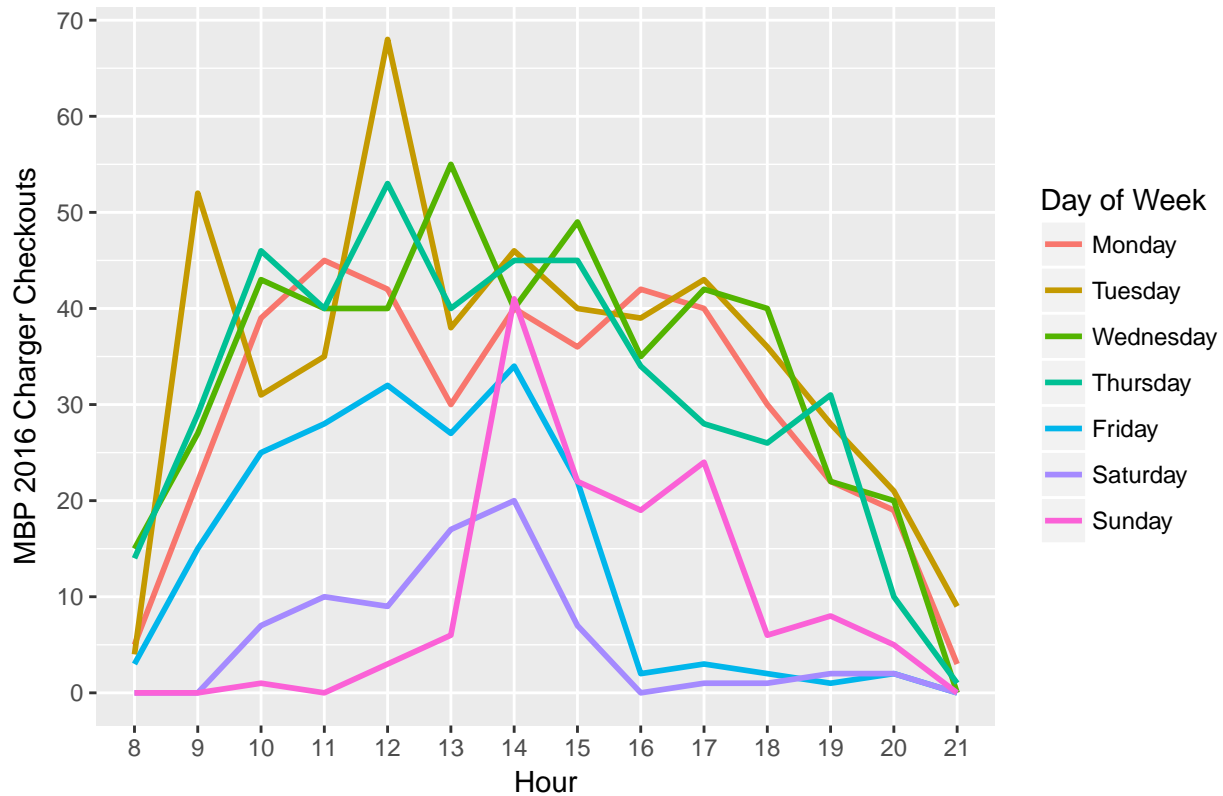
Hour	MBP 2016 Charger Checkouts
8	41
9	145
10	192
11	198
12	247
13	213
14	266
15	221
16	171
17	181
18	141
19	114
20	79
21	13

```

#Graphical representation
ggplot(yrlnewMBPcharger_time,
  aes(x=Hour,y=`MBP 2016 Charger Checkouts`, group=`Day of Week`,color=`Day of Week`)) +
  geom_line(size=1) +
  scale_y_continuous(breaks=seq(0,70,10)) +
  ggtitle("Time Analysis of CLICC YRL MBP 2016 Chargers in '17-18 Academic Year")

```

Time Analysis of CLICC YRL MBP 2016 Chargers in '17–18 Academic Year



ii.) CLICC Lab

```
labnewMBPcharger <- newMBPcharger[which(newMBPcharger$CHARGE_PLACE=="CLICC Lab"),]

#Create data frame for a CLICC lab iphone chargers time analysis
labnewMBPcharger_time <- table(labnewMBPcharger$HOUR, labnewMBPcharger$DAY_OF_WEEK) %>% data.frame
names(labnewMBPcharger_time) <- c("Hour","Day of Week","MBP 2016 Charger Checkouts")
labnewMBPcharger_time$`Day of Week` <- factor(labnewMBPcharger_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

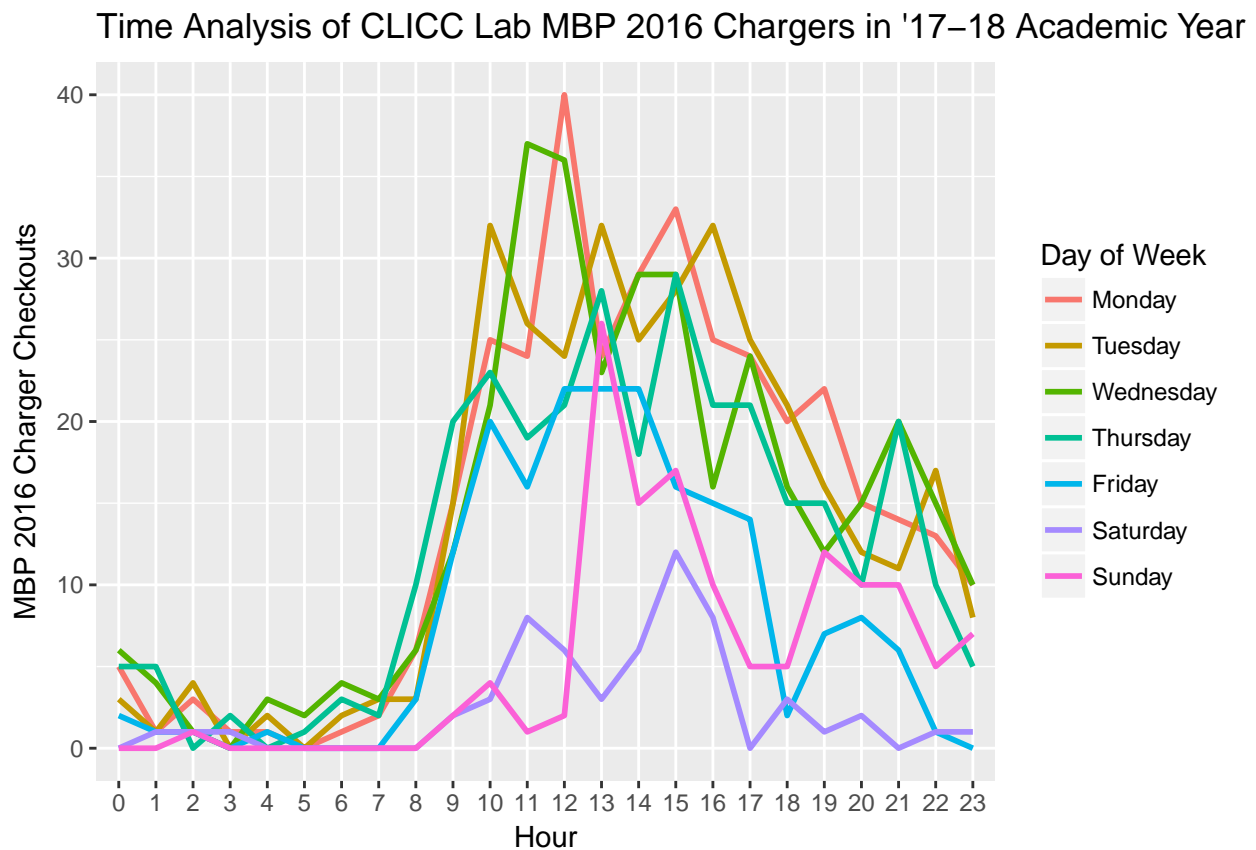
#Table Representation with Hour
labnewMBPcharger$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "MBP 2016 Charger Checkouts")) %>%
  kable(caption="Number of MBP 2016 Charger Checkouts per Hour at CLICC Lab")
```

Table 21: Number of MBP 2016 Charger Checkouts per Hour at CLICC Lab

Hour	MBP 2016 Charger Checkouts
0	21
1	13
2	11
3	4
4	7
5	3
6	10
7	10
8	28

Hour	MBP 2016 Charger Checkouts
9	78
10	128
11	131
12	151
13	158
14	144
15	164
16	127
17	113
18	82
19	85
20	72
21	81
22	62
23	41

```
#Graphical representation
ggplot(labnewMBPcharger_time,
  aes(x=Hour,y=`MBP 2016 Charger Checkouts`, group=`Day of Week`,color=`Day of Week`)) +
  geom_line(size=1) +
  ggtitle("Time Analysis of CLICC Lab MBP 2016 Chargers in '17-18 Academic Year")
```



Part 4) OLD MBP CHARGERS

A) Item Usage

i.) Number of Old MBP Charger checkouts by quarter

```
oldMBPcharger <- Accessories[str_detect(Accessories$ITEM_ENUM, "COLD") |
                             str_detect(Accessories$ITEM_ENUM, "CHRG"),]

#subset old MBP chargers by quarter
oldMBPchargerF17 <- subset(oldMBPcharger,
                           oldMBPcharger$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
                           oldMBPcharger$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
oldMBPchargerW18 <- subset(oldMBPcharger,
                           oldMBPcharger$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
                           oldMBPcharger$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
oldMBPchargerS18 <- subset(oldMBPcharger,
                           oldMBPcharger$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
                           oldMBPcharger$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(oldMBPchargerF17),nrow(oldMBPchargerW18),nrow(oldMBPchargerS18),nrow(oldMBPcharger)),
           row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Old MBP Charger Checkouts by Quarter")
```

Table 22: Number of Old MBP Charger Checkouts by Quarter

	Frequency
Fall 2017	648
Winter 2018	586
Spring 2018	628
'17-18 Academic Year	1862

ii.) Number of Old MBP Charger checkouts by location

```
oldMBPcharger$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
  kable(caption="Number of Old MBP Charger Checkouts by Location")
```

Table 23: Number of Old MBP Charger Checkouts by Location

.	Freq
CLICC Powell	616
CLICC YRL	496
CLICC Lab	331
CLICC Biomed	248
CLICC Arts	65
CLICC Music	58
CLICC SEL Geology	33
CLICC SEL Boelter	15

iii.) Number of Old MBP Charger checkouts by individual barcodes (from most to least used)

```
oldMBPcharger$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%  
  kable(caption = "Old MBP Charger Checkouts by Individual Barcodes (from most to least used)")
```

Table 24: Old MBP Charger Checkouts by Individual Barcodes
(from most to least used)

.	Freq
POW-AA-COLD	173
POW-AE-COLD	160
LAB-AB-COLD	147
YRL-AB-COLD	142
POW-AC-COLD	135
YRL-AA-COLD	134
POW-AD-COLD	133
BIO-AB-COLD	132
YRL-AC-COLD	118
BIO-AA-COLD	105
LAB-AA-COLD	104
YRL-AD-COLD	102
LAB-AC-COLD	80
ART-AA-COLD	65
MUS-AA-COLD	52
GEO-CHRG-01	18
GEO-CHRG-02	15
POW-AB-COLD	15
BIO-AC-COLD	7
BOE-AB-COLD	6
BOE-AC-COLD	6
MUS-AB-COLD	6
BIO-AD-COLD	4
BOE-AA-COLD	3

iv.) Number of Old MBP Charger checkouts by location AND quarter

```
f <- oldMBPchargerF17$CHARGE_PLACE %>% table %>% data.frame()  
w <- oldMBPchargerW18$CHARGE_PLACE %>% table %>% data.frame()  
s <- oldMBPchargerS18$CHARGE_PLACE %>% table %>% data.frame()  
oldMBPchargerdf <- merge(f, w, by=".", all.y = T) %>% merge(., s, by = ".") %>%  
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%  
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))  
#Make a new dataframe to include the entire academic year  
oldMBPchargerdf1 <- oldMBPchargerdf  
oldMBPchargerdf1$`'17-18 Academic Year` <- apply(oldMBPchargerdf1[2:4], 1, sum)  
oldMBPchargerdf1 %>% kable(caption="Number of Old MBP Charger Checkouts by Location and Quarter")
```

Table 25: Number of Old MBP Charger Checkouts by Location
and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	17	21	27	65
CLICC Biomed	98	101	49	248

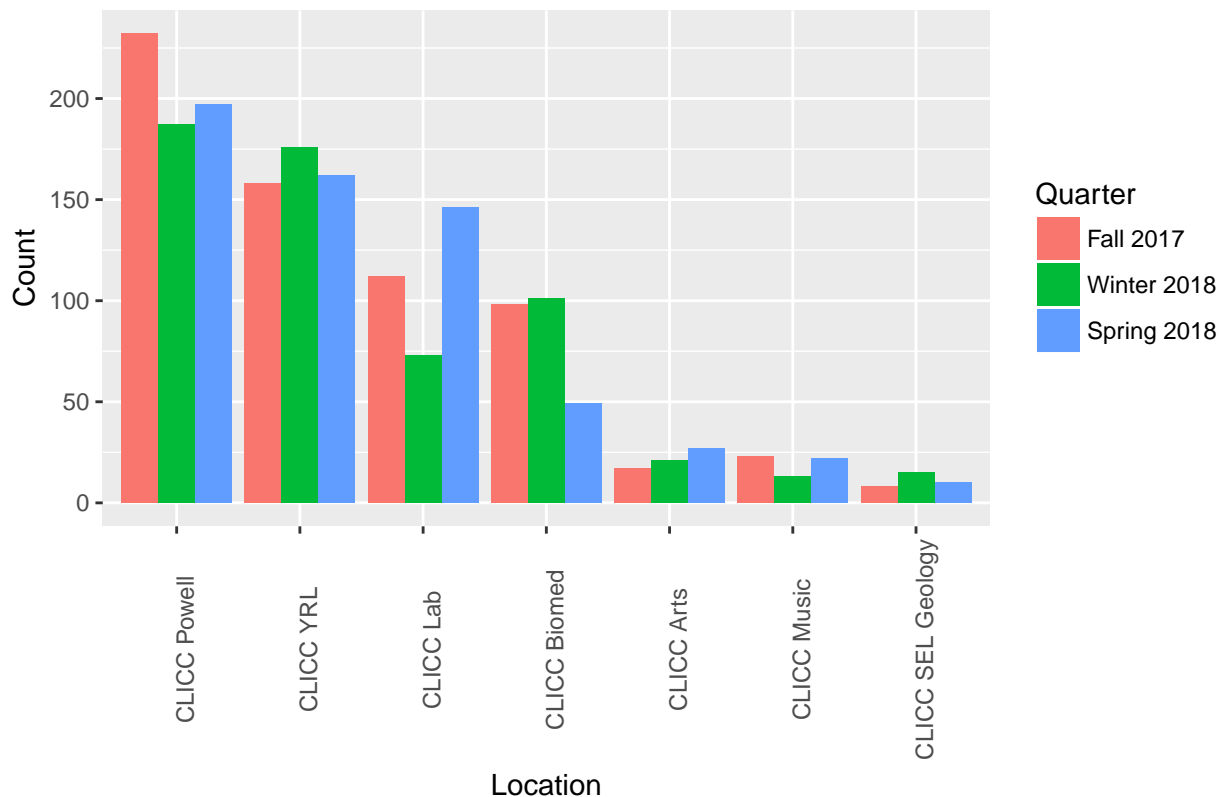
Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Lab	112	73	146	331
CLICC Music	23	13	22	58
CLICC Powell	232	187	197	616
CLICC SEL Geology	8	15	10	33
CLICC YRL	158	176	162	496

v.) Old MBP Charger Graphs

```
oldMBPchargerdf2 <- melt(oldMBPchargerdf, id.vars=c("Location"))
#Reorder the factor levels
oldMBPchargerdf2$Location <- reorder(oldMBPchargerdf2$Location, X=desc(oldMBPchargerdf2$value))

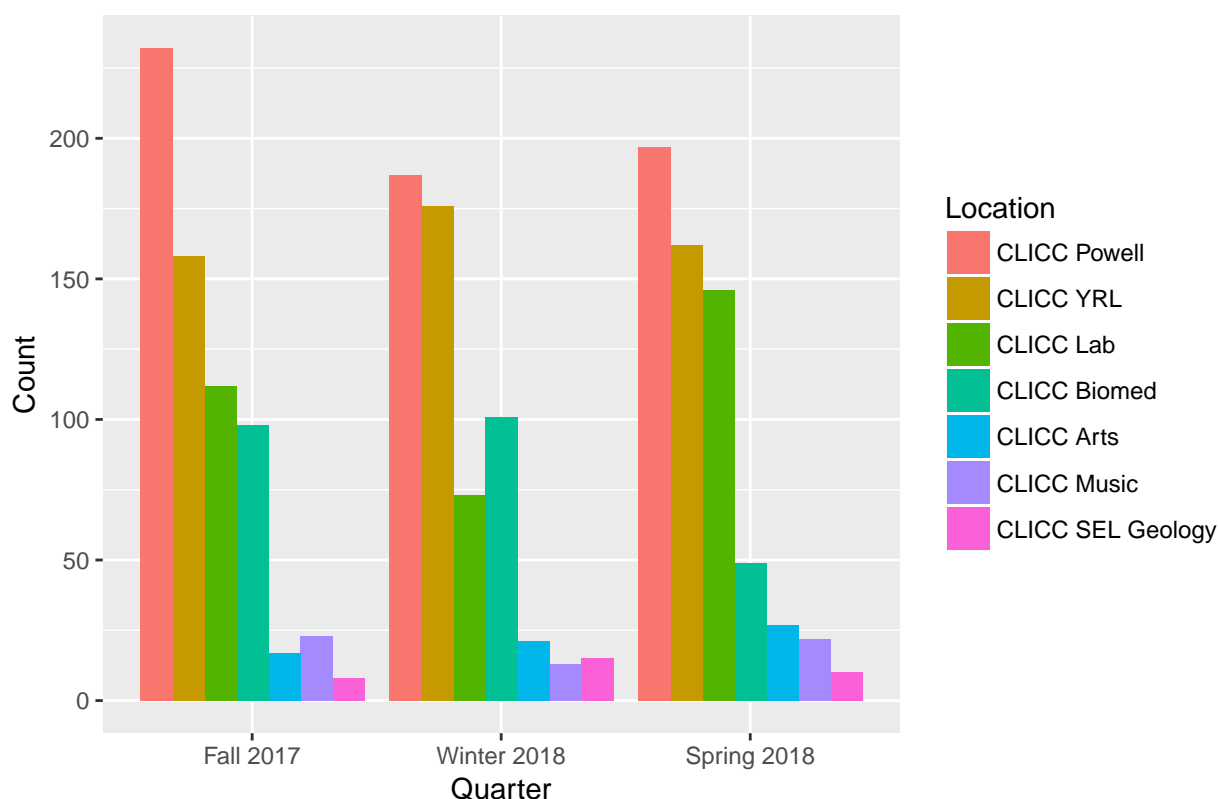
ggplot(oldMBPchargerdf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("Old MBP Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```

Old MBP Charger Checkouts by Location and Quarter



```
ggplot(oldMBPchargerdf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("Old MBP Charger Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_fill_discrete(name = "Location")
```

Old MBP Charger Checkouts by Location and Quarter



B) Old MBP Charger Individual Users

```
a <- oldMBPchargerF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- oldMBPchargerW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- oldMBPchargerS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Old MBP Chargers in '17-18 Academic Year")
```

Table 26: Individual Patrons for Old MBP Chargers in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	313
Winter 2018	278
Spring 2018	254
'17-18 Academic Year	845

C) Old MBP Charger Time Analysis

i.) CLICC Powell

```
powoldMBPcharger <- oldMBPcharger[which(oldMBPcharger$CHARGE_PLACE=="CLICC Powell"),]

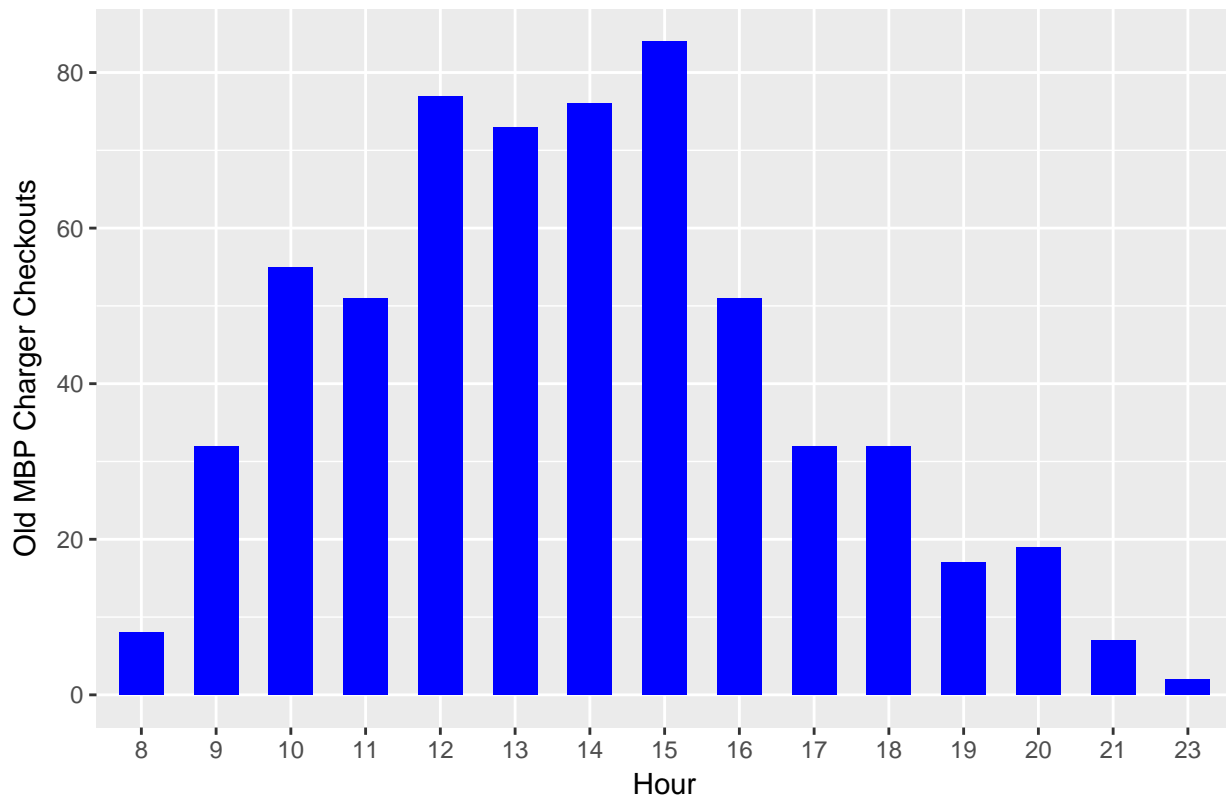
#Table Representation with Hour
powoldMBPcharger_time <- table(powoldMBPcharger$HOUR) %>% data.frame
names(powoldMBPcharger_time) <- c("Hour", "Old MBP Charger Checkouts")
powoldMBPcharger_time %>% kable(caption="Number of Old MBP Charger Checkouts per Hour at CLICC Powell")
```

Table 27: Number of Old MBP Charger Checkouts per Hour at CLICC Powell

Hour	Old MBP Charger Checkouts
8	8
9	32
10	55
11	51
12	77
13	73
14	76
15	84
16	51
17	32
18	32
19	17
20	19
21	7
23	2

```
#Graphical representation
ggplot(powoldMBPcharger_time, aes(x=Hour,y=`Old MBP Charger Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  ggtitle("Time Analysis of CLICC Pow Old MBP Chargers in '17-18 Academic Year")
```

Time Analysis of CLICC Pow Old MBP Chargers in '17–18 Academic Year



ii.) CLICC YRL

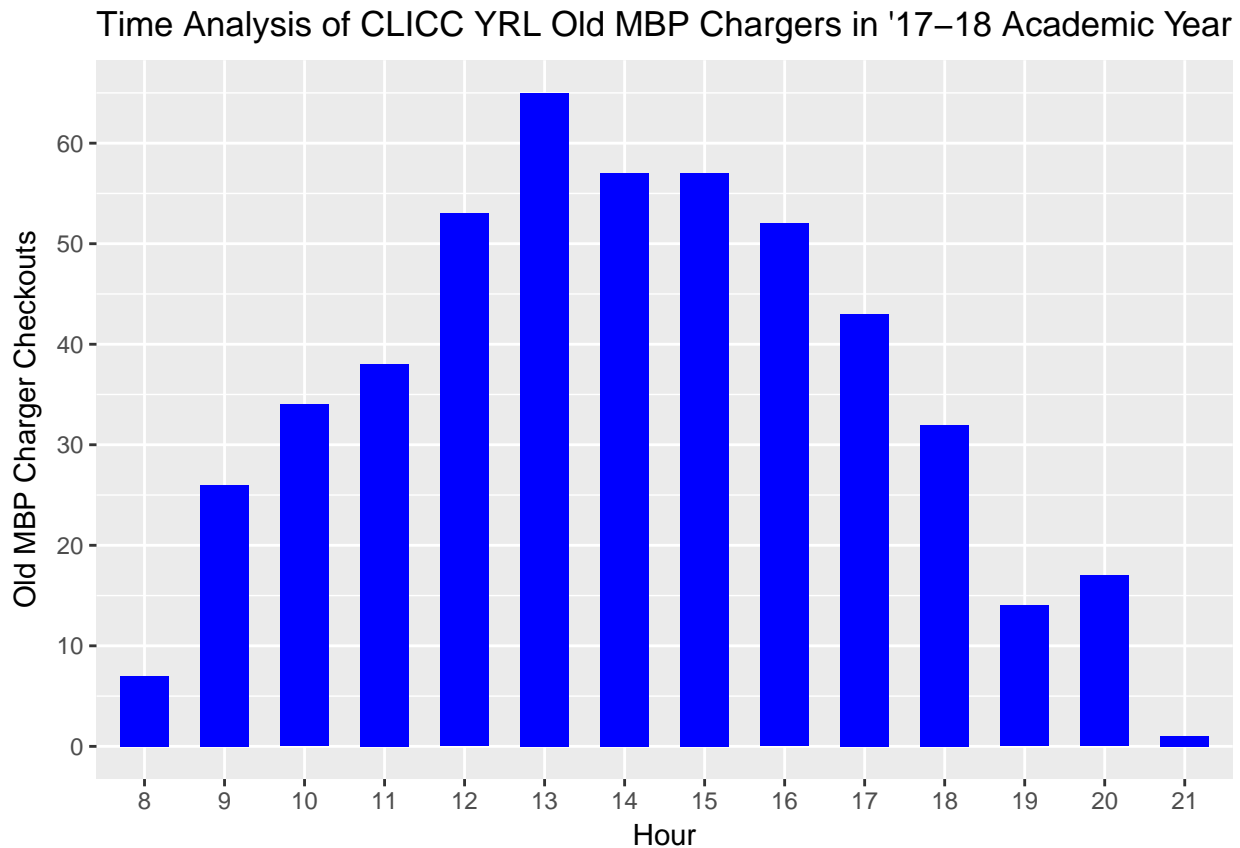
```
yrldMBPcharger <- oldMBPcharger[which(oldMBPcharger$CHARGE_PLACE=="CLICC YRL"),]

#Table Representation with Hour
yrldMBPcharger_time <- table(yrldMBPcharger$HOUR) %>% data.frame
names(yrldMBPcharger_time) <- c("Hour", "Old MBP Charger Checkouts")
yrldMBPcharger_time %>% kable(caption="Number of Old MBP Charger Checkouts per Hour at CLICC YRL")
```

Table 28: Number of Old MBP Charger Checkouts per Hour at CLICC YRL

Hour	Old MBP Charger Checkouts
8	7
9	26
10	34
11	38
12	53
13	65
14	57
15	57
16	52
17	43
18	32
19	14
20	17
21	1

```
#Graphical representation
ggplot(yr1oldMBPcharger_time, aes(x=Hour,y=`Old MBP Charger Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,70,10)) +
  ggtitle("Time Analysis of CLICC YRL Old MBP Chargers in '17-18 Academic Year")
```



.....

Part 5) HEADSETS

A) Item Usage

i.) Number of Headset checkouts by quarter

```
headset <- Accessories[str_detect(Accessories$ITEM_ENUM, "HDS")
  | str_detect(Accessories$ITEM_ENUM, "HEADSET"),]

#subset headset by quarter
headsetF17 <- subset(headset, headset$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  headset$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
headsetW18 <- subset(headset, headset$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  headset$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
headsetS18 <- subset(headset, headset$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  headset$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))
```

```
data.frame(c(nrow(headsetF17),nrow(headsetW18),nrow(headsetS18),nrow(headset)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Headset Checkouts by Quarter")
```

Table 29: Number of Headset Checkouts by Quarter

	Frequency
Fall 2017	1064
Winter 2018	1107
Spring 2018	1109
'17-18 Academic Year	3280

ii.) Number of Headset checkouts by location

```
headset$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
  kable(caption="Number of Headset Checkouts by Location")
```

Table 30: Number of Headset Checkouts by Location

.	Freq
CLICC Powell	1251
CLICC YRL	899
CLICC Lab	495
CLICC Biomed	353
CLICC Arts	193
CLICC Classrooms	33
CLICC SEL Geology	33
CLICC SEL Boelter	20
CLICC Music	3

iii.) Number of Headset checkouts by individual barcodes (from most to least used)

```
headset$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
  kable(caption = "Headset Checkouts by Individual Barcodes (from most to least used)")
```

Table 31: Headset Checkouts by Individual Barcodes (from most to least used)

.	Freq
YRL-HDST-06	224
YRL-HDST-01	183
COLLEGE-HDST-09	181
COLLEGE-HDST-06	177
COLLEGE-HDST-08	151
YRL-HDST-10	142
COLLEGE-HDST-04	136
COLLEGE-HDST-05	135
LAB-HDST-07	116
YRL-HDST-07	115
COLLEGE-HDST-01	113
COLLEGE-HDST-10	105

.	Freq
LAB-HDST-02	105
COLLEGE-HDST-02	103
COLLEGE-HDST-07	102
LAB-HDST-06	98
YRL-HDST-05	82
ART-HDST-03	75
ART-HDST-01	72
LAB-HDST-01	70
BIO-HDST-15	68
YRL-HDST-04	54
BIO-HDST-03	49
COLLEGE-HDST-03	48
ART-HDST-02	46
BIO-HDST-11	44
LAB-HDST-03	37
YRL-HDST-09	36
GEO-HDST-01	31
LAB-HDST-08	28
YRL-HDST-02	28
BIO-HDST-12	27
YRL-HDST-08	27
BIO-HDST-07	22
BIO-HDST-08	22
BIO-HDST-14	22
BIO-HDST-05	18
LAB-HDST-09	17
CLASS-HDST-04	16
BIO-HDST-25	15
BIO-HDST-02	13
LAB-HDST-10	11
BIO-HDST-13	10
BIO-HDST-18	10
LAB-HDST-04	10
BIO-HDST-04	9
BIO-HDST-23	9
BOE-HDST-01	8
CLASS-HEADSET-08	8
YRL-HDST-03	8
BIO-HDST-16	6
CLASS-HDST-01	5
BIO-HDST-01	4
BOE-HDST-03	4
BOE-HDST-05	4
BOE-HDST-04	3
LAB-HDST-05	3
BIO-HDST-19	2
BIO-HDST-24	2
CLASS-HDST-03	2
CLASS-HDST-05	2
GEO-HDST-02	2
MUS-HDST-01	2
BIO-HDST-22	1

	Freq
BOE-HDST-02	1
MUS-HDST-02	1

*Note: Headsets with barcodes “BIO-HDST-06”, “BIO-HDST-09”, “BIO-HDST-10”, “BIO-HDST-17”, “BIO-HDST-20”, “BIO-HDST-21”, and “CLASS-HDST-02” were not used at all in the academic year.

iv.) Number of Headset checkouts by location AND quarter

```
f <- headsetF17$CHARGE_PLACE %>% table %>% data.frame()
w <- headsetW18$CHARGE_PLACE %>% table %>% data.frame()
s <- headsetS18$CHARGE_PLACE %>% table %>% data.frame()
headsetdf <- merge(f, w, by=".", all.y = T) %>% merge(., s, by = ".") %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
headsetdf1 <- headsetdf
headsetdf1$`'17-18 Academic Year` <- apply(headsetdf1[2:4], 1, sum)
headsetdf1 %>% kable(caption="Number of Headset Checkouts by Location and Quarter")
```

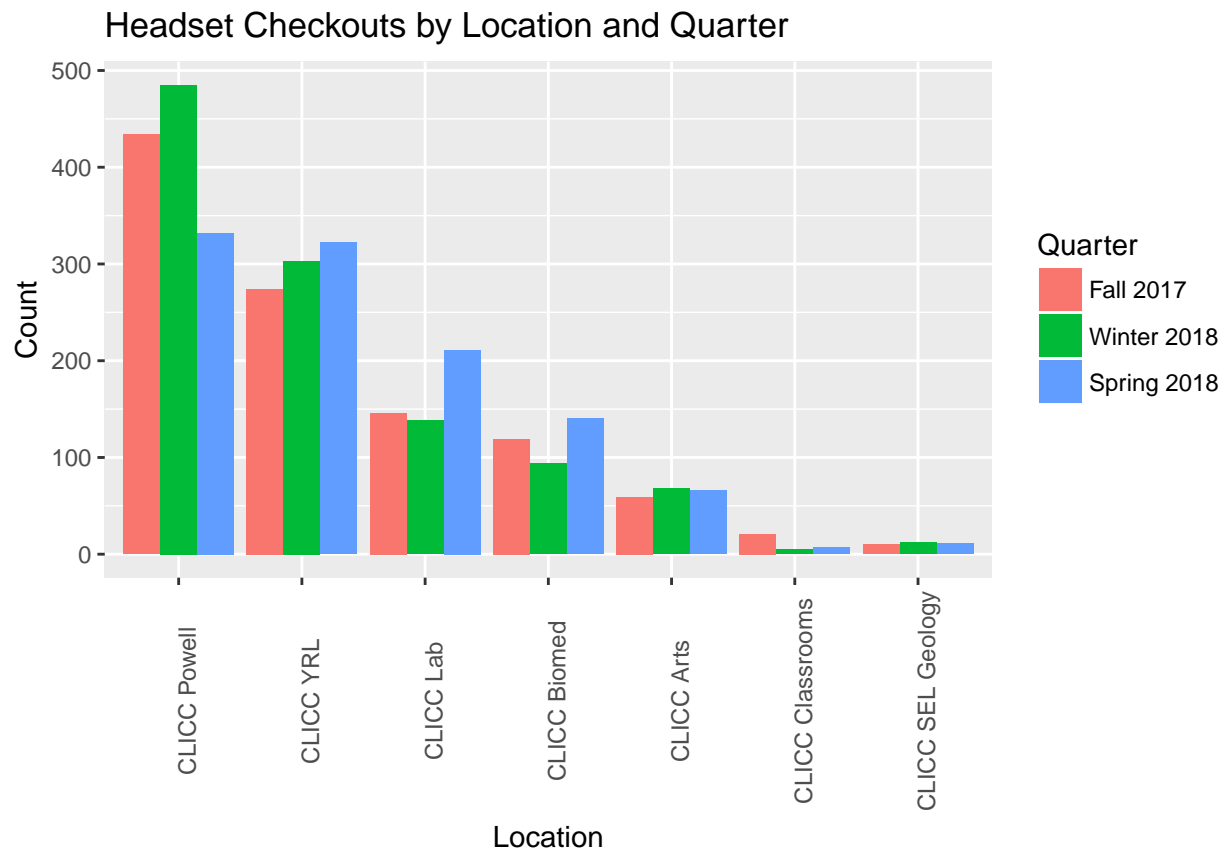
Table 32: Number of Headset Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	59	68	66	193
CLICC Biomed	119	94	140	353
CLICC Classrooms	21	5	7	33
CLICC Lab	146	138	211	495
CLICC Powell	434	485	332	1251
CLICC SEL Geology	10	12	11	33
CLICC YRL	274	303	322	899

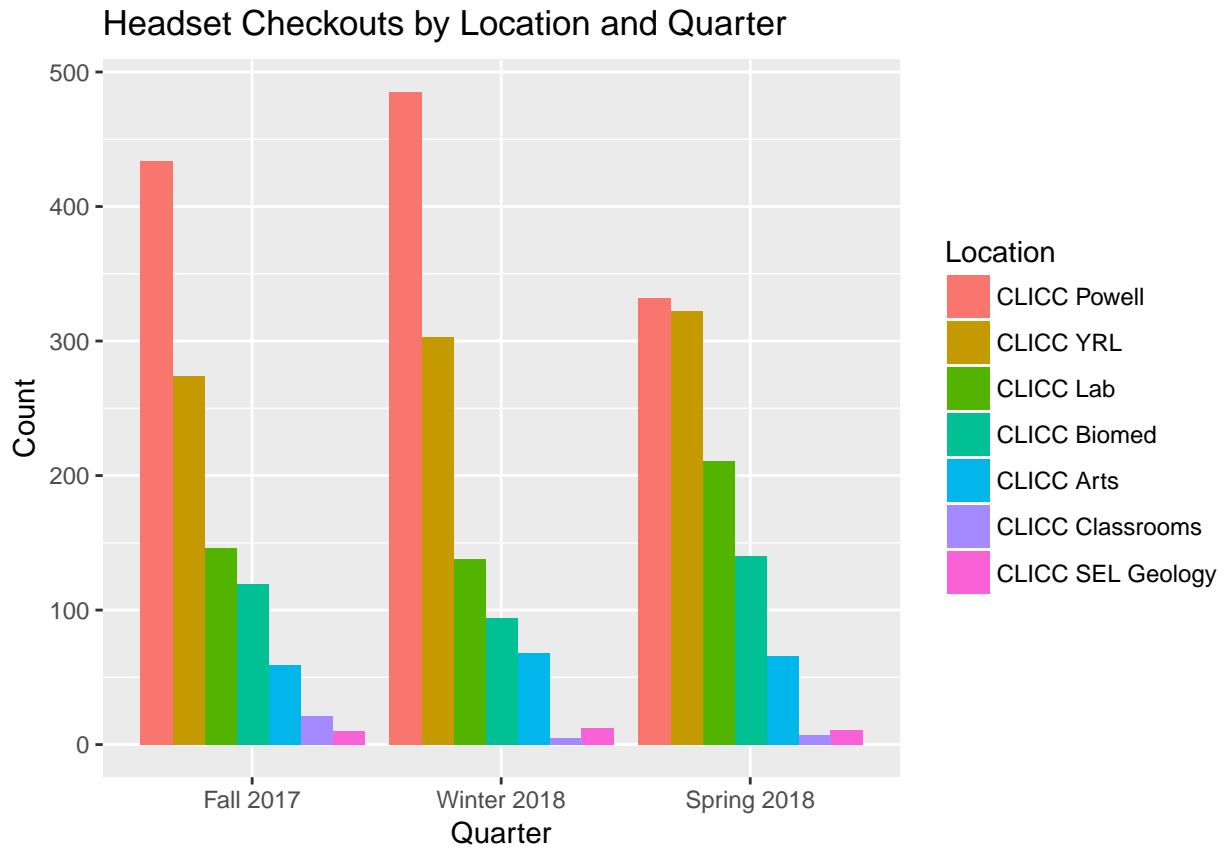
v.) Headset Graphs

```
headsetdf2 <- melt(headsetdf, id.vars=c("Location"))
#Reorder the factor levels
headsetdf2$Location <- reorder(headsetdf2$Location, X=desc(headsetdf2$value))

ggplot(headsetdf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("Headset Checkouts by Location and Quarter") +
  ylab("Count") +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(headsetdf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("Headset Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_fill_discrete(name = "Location")
```



B) Headset Individual Users

```
a <- headsetF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- headsetW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- headsetS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Headsets in '17-18 Academic Year")
```

Table 33: Individual Patrons for Headsets in '17-18 Academic Year

Number of Individual Patrons	
Fall 2017	474
Winter 2018	463
Spring 2018	483
'17-18 Academic Year	1420

C) Headset Time Analysis

i.) CLICC Powell

```

powheadset <- headset[which(headset$CHARGE_PLACE=="CLICC Powell"),]

#Create data frame for a CLICC Powell headset time analysis
powheadset_time <- table(powheadset$HOUR, powheadset$DAY_OF_WEEK) %>% data.frame
names(powheadset_time) <- c("Hour", "Day of Week", "Headset Checkouts")
powheadset_time$`Day of Week` <- factor(powheadset_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

#Table Representation with Hour
powheadset$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "Headset Checkouts")) %>%
  kable(caption="Number of Headset Checkouts per Hour at CLICC Powell")

```

Table 34: Number of Headset Checkouts per Hour at CLICC Powell

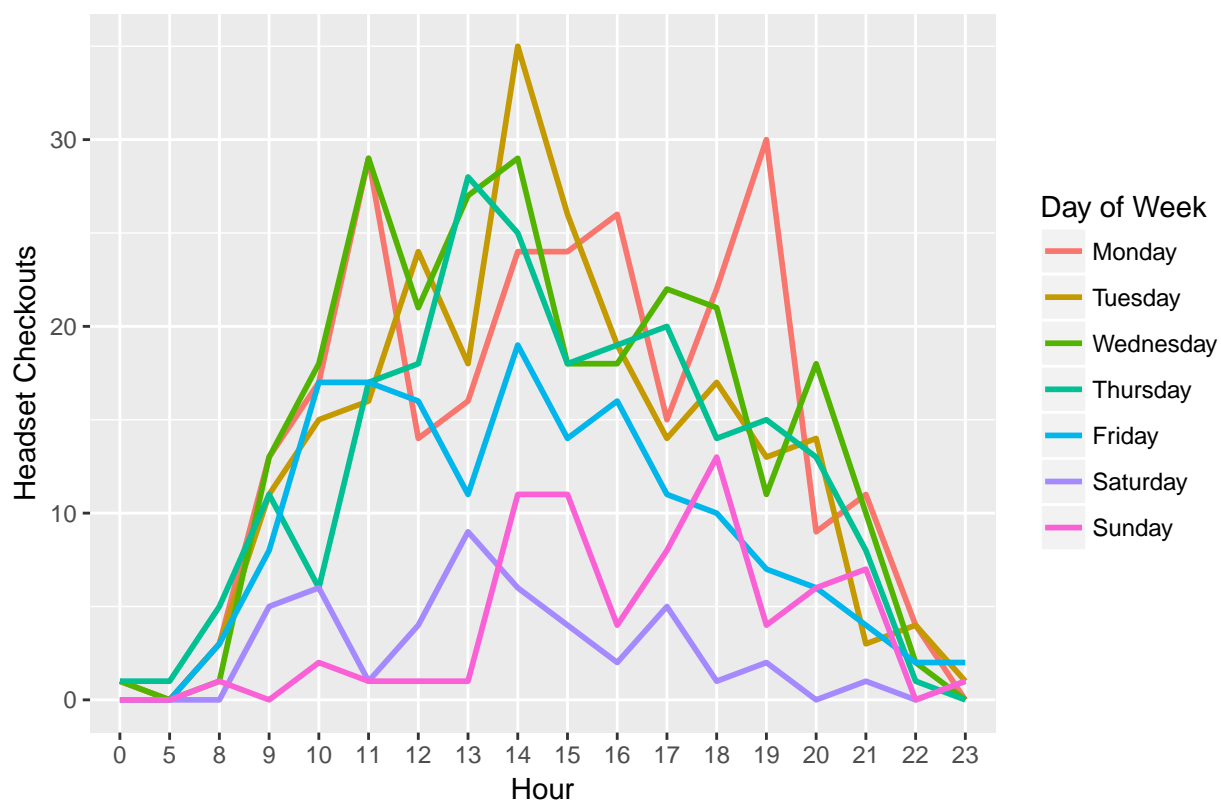
Hour	Headset Checkouts
0	3
5	1
8	16
9	61
10	81
11	110
12	98
13	110
14	149
15	115
16	104
17	95
18	98
19	82
20	66
21	44
22	13
23	5

```

#Graphical representation 1
ggplot(powheadset_time,
  aes(x=Hour,y=`Headset Checkouts`, group=`Day of Week`,color=`Day of Week`)) +
  geom_line(size=1) +
  ggtitle("Time Analysis of CLICC Powell Headsets in '17-18 Academic Year")

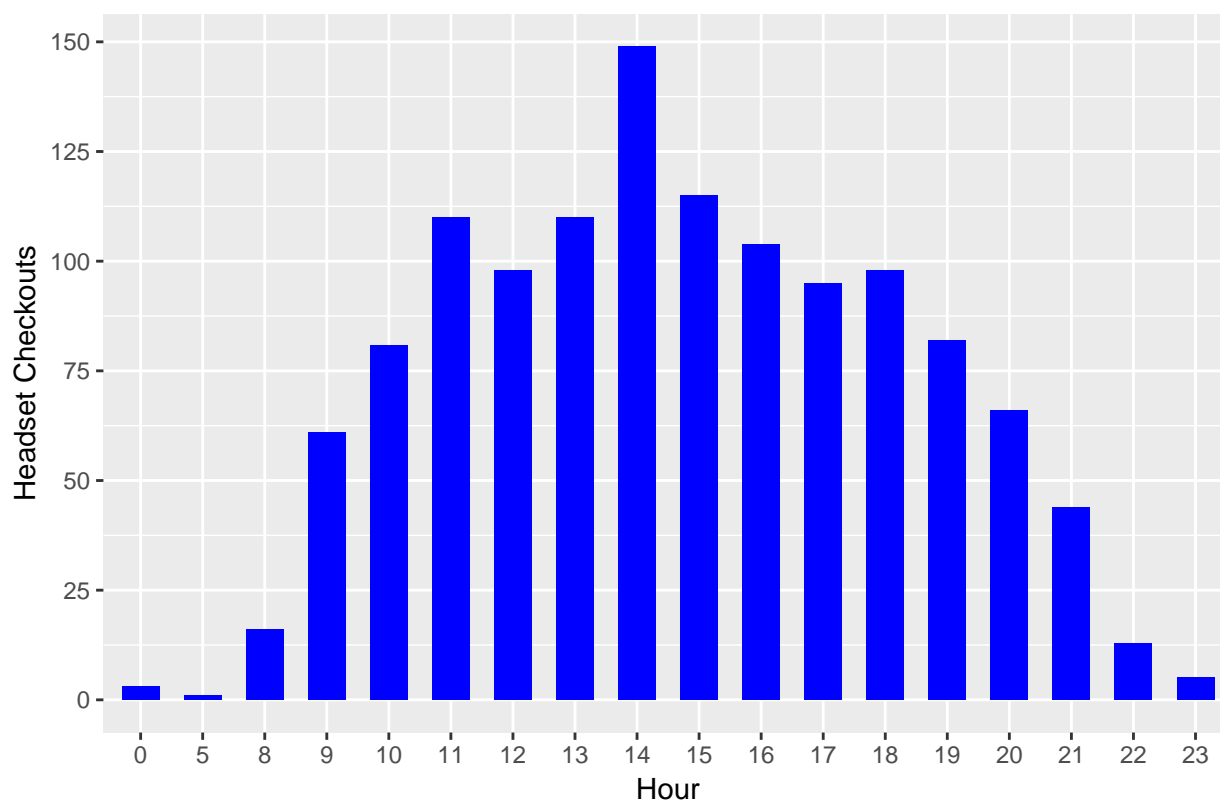
```

Time Analysis of CLICC Powell Headsets in '17-18 Academic Year



```
#Graphical representation 2
ggplot(powheadset_time, aes(x=Hour,y=`Headset Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,150,25)) +
  ggtitle("Time Analysis of CLICC Powell Headsets in '17-18 Academic Year")
```

Time Analysis of CLICC Powell Headsets in '17–18 Academic Year



ii.) CLICC YRL

```

yrlheadset <- headset[which(headset$CHARGE_PLACE=="CLICC YRL"),]

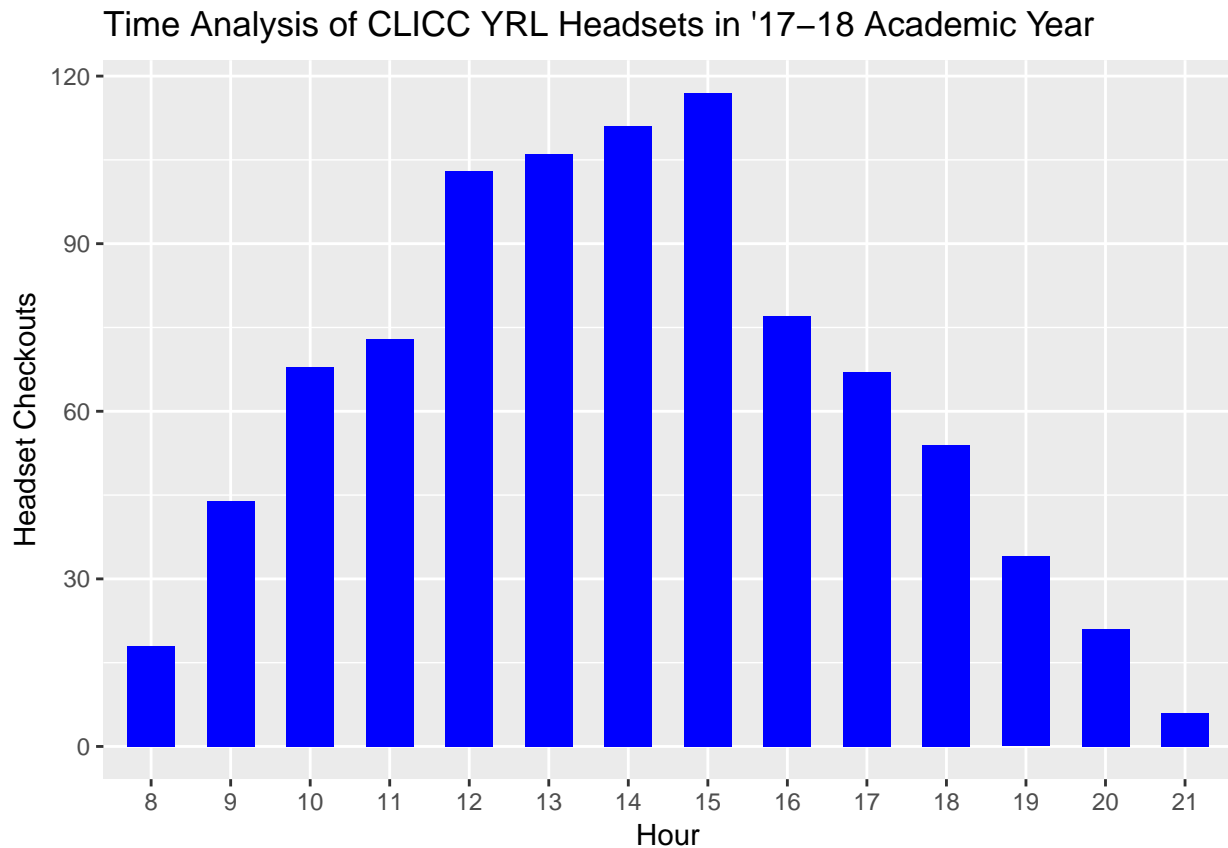
#Table Representation with Hour
yrlheadset_time <- table(yrlheadset$HOUR) %>% data.frame
names(yrlheadset_time) <- c("Hour", "Headset Checkouts")
yrlheadset_time %>% kable(caption="Number of Headset Checkouts per Hour at CLICC YRL")

```

Table 35: Number of Headset Checkouts per Hour at CLICC YRL

Hour	Headset Checkouts
8	18
9	44
10	68
11	73
12	103
13	106
14	111
15	117
16	77
17	67
18	54
19	34
20	21
21	6

```
#Graphical representation
ggplot(yrlheadset_time, aes(x=Hour,y=`Headset Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  ggtitle("Time Analysis of CLICC YRL Headsets in '17-18 Academic Year")
```



Part 6) EXPO MARKERS

A) Item Usage

i.) Number of Expo Marker checkouts by quarter

```
expo <- Accessories[str_detect(Accessories$ITEM_ENUM, "-EXP0-"),]

#subset Expo Marker by quarter
expoF17 <- subset(expo, expo$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  expo$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
expoW18 <- subset(expo, expo$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  expo$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
expoS18 <- subset(expo, expo$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  expo$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(expoF17),nrow(expoW18),nrow(expoS18),nrow(expo)),
```



```
row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
setNames("Frequency") %>% kable(caption="Number of Expo Marker Checkouts by Quarter")
```

Table 36: Number of Expo Marker Checkouts by Quarter

	Frequency
Fall 2017	1056
Winter 2018	827
Spring 2018	786
'17-18 Academic Year	2669

ii.) Number of Expo Marker checkouts by location

```
expo$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
kable(caption="Number of Expo Marker Checkouts by Location")
```

Table 37: Number of Expo Marker Checkouts by Location

.	Freq
CLICC YRL	1810
CLICC Powell	624
CLICC Lab	235

iii.) Number of Expo Marker checkouts by individual barcodes (from most to least used)

```
expo$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
kable(caption = "Expo Marker Checkouts by Individual Barcodes (from most to least used)")
```

Table 38: Expo Marker Checkouts by Individual Barcodes (from most to least used)

.	Freq
YRL-EXPO-08	221
YRL-EXPO-02	204
YRL-EXPO-03	194
YRL-EXPO-06	192
YRL-EXPO-10	188
YRL-EXPO-09	187
YRL-EXPO-05	182
YRL-EXPO-01	163
COLLEGE-EXPO-05	150
YRL-EXPO-07	140
YRL-EXPO-04	139
COLLEGE-EXPO-03	120
COLLEGE-EXPO-06	98
COLLEGE-EXPO-07	76
COLLEGE-EXPO-01	74
LAB-EXPO-05	66
COLLEGE-EXPO-04	60
LAB-EXPO-07	59
COLLEGE-EXPO-02	46

.	Freq
LAB-EXPO-01	32
LAB-EXPO-03	29
LAB-EXPO-04	22
LAB-EXPO-02	17
LAB-EXPO-06	10

*Note: Expo Markers with barcode “YRL-EXPO-11” was not used at all in the academic year.

iv.) Number of Expo Markers checkouts by location AND quarter

```
f <- expoF17$CHARGE_PLACE %>% table %>% data.frame()
w <- expoW18$CHARGE_PLACE %>% table %>% data.frame()
s <- expoS18$CHARGE_PLACE %>% table %>% data.frame()
expodf <- merge(f, w, by=".", all.y = T) %>% merge(., s, by = ".") %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
expodf1 <- expodf
expodf1$`'17-18 Academic Year` <- apply(expodf1[2:4], 1, sum)
expodf1 %>% kable(caption="Number of Expo Markers Checkouts by Location and Quarter")
```

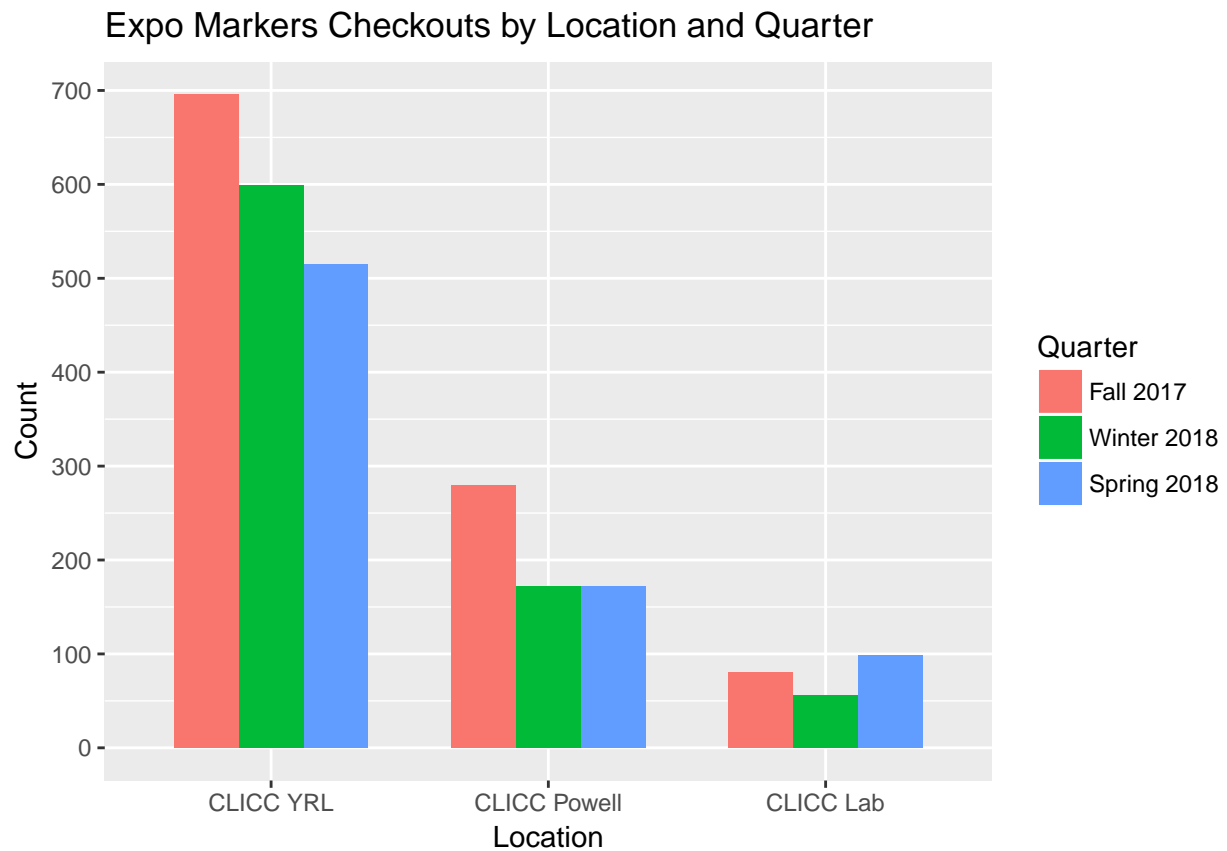
Table 39: Number of Expo Markers Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Lab	80	56	99	235
CLICC Powell	280	172	172	624
CLICC YRL	696	599	515	1810

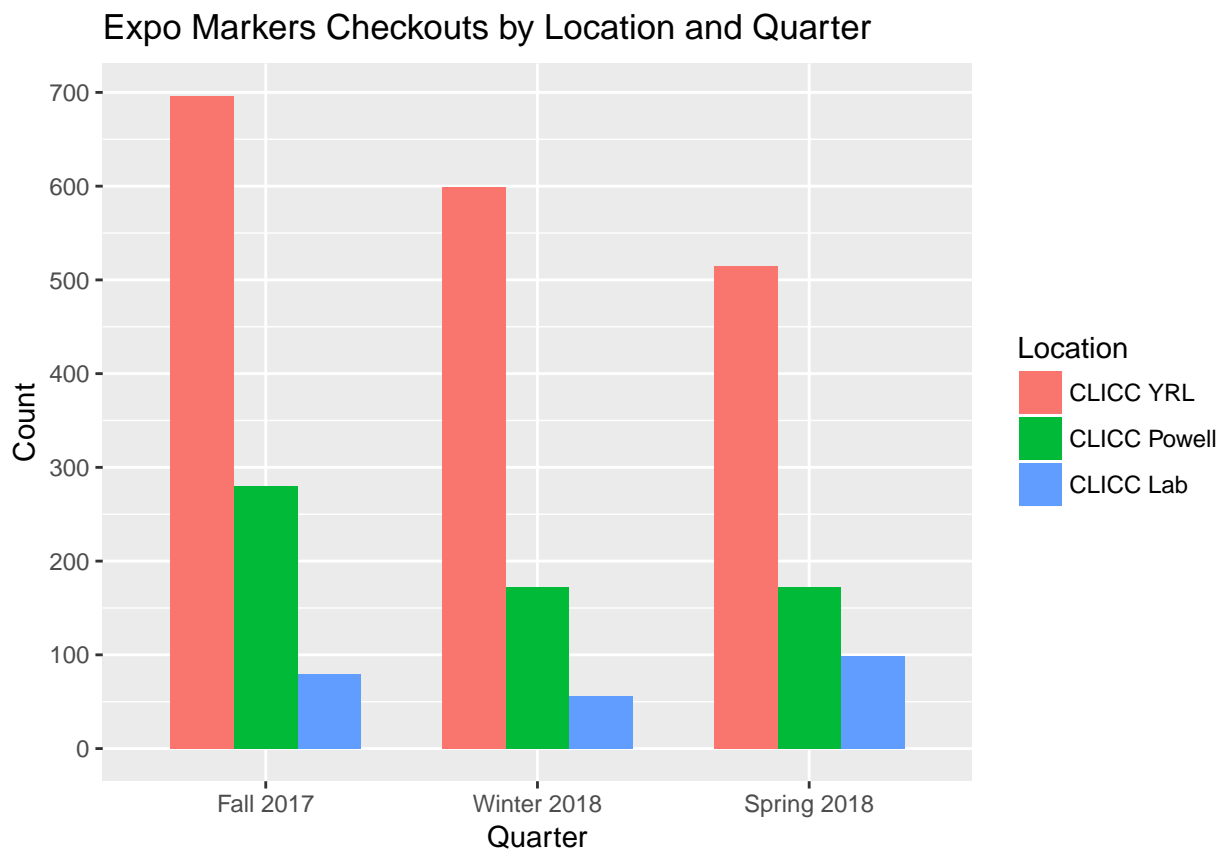
v.) Expo Markers Graphs

```
expodf2 <- melt(expodf, id.vars=c("Location"))
#Reorder the factor levels
expodf2$Location <- reorder(expodf2$Location, X=desc(expodf2$value))

ggplot(expodf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge", width=0.7) +
  ggtitle("Expo Markers Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_y_continuous(breaks=seq(0,700,100)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(expodf2, aes(x=variable, y=value, group=Location, fill=Location)) +  
  geom_col(position="dodge", width=0.7) +  
  ggtitle("Expo Markers Checkouts by Location and Quarter") +  
  ylab("Count") +  
  xlab("Quarter") +  
  scale_y_continuous(breaks=seq(0,700,100)) +  
  scale_fill_discrete(name = "Location")
```



B) Expo Markers Individual Users

```
a <- expoF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- expoW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- expoS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Expo Markers in '17-18 Academic Year")
```

Table 40: Individual Patrons for Expo Markers in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	606
Winter 2018	505
Spring 2018	476
'17-18 Academic Year	1587

C) Expo Markers Time Analysis

i.) CLICC YRL

```

yrlexpo <- expo[which(expo$CHARGE_PLACE=="CLICC YRL"),]

#Create data frame for a CLICC YRL Expo Marker time analysis
yrlexpo_time <- table(yrlexpo$HOUR, yrlexpo$DAY_OF_WEEK) %>% data.frame
names(yrlexpo_time) <- c("Hour", "Day of Week", "Expo Marker Checkouts")
yrlexpo_time$`Day of Week` <- factor(yrlexpo_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

#Table Representation with Hour
yrlexpo$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "Expo Marker Checkouts")) %>%
  kable(caption="Number of Expo Marker Checkouts per Hour at CLICC Powell")

```

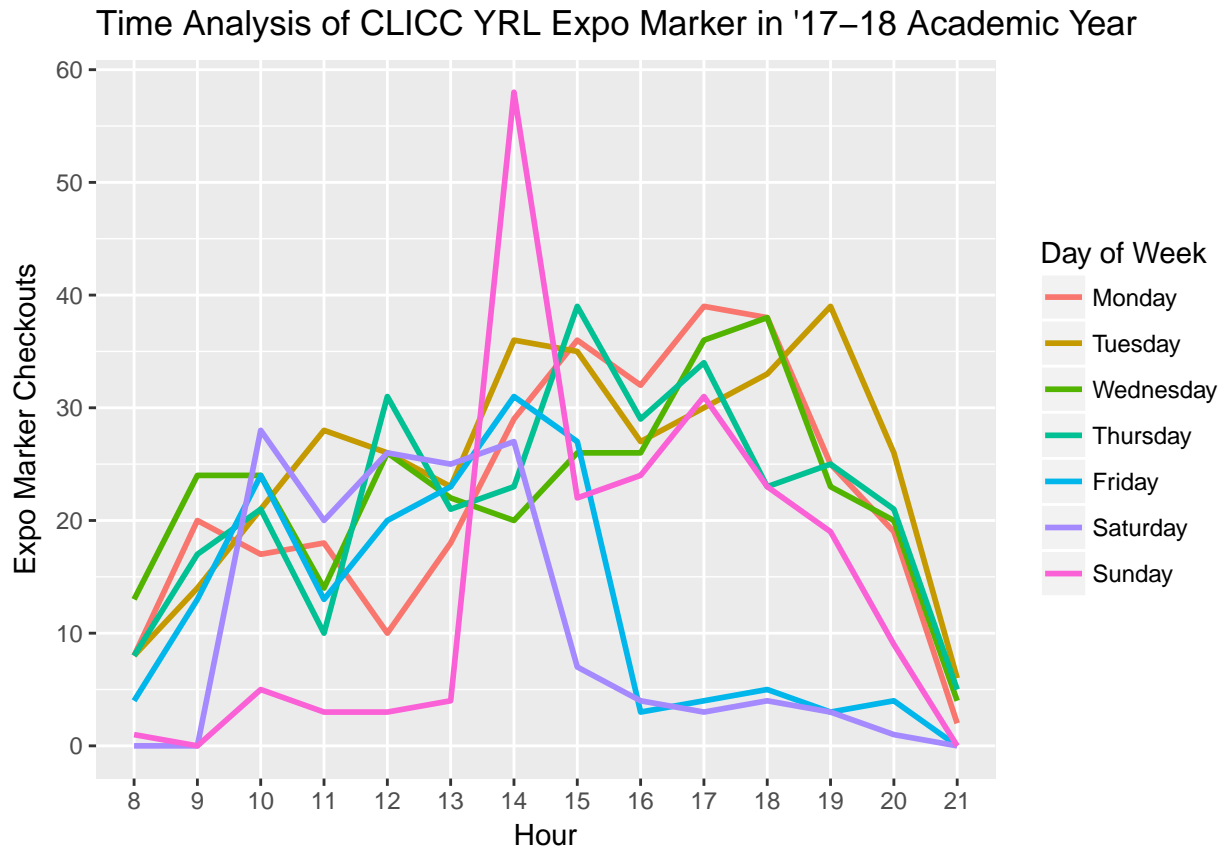
Table 41: Number of Expo Marker Checkouts per Hour at CLICC Powell

Hour	Expo Marker Checkouts
8	42
9	88
10	140
11	106
12	142
13	136
14	224
15	192
16	145
17	177
18	164
19	137
20	100
21	17

```

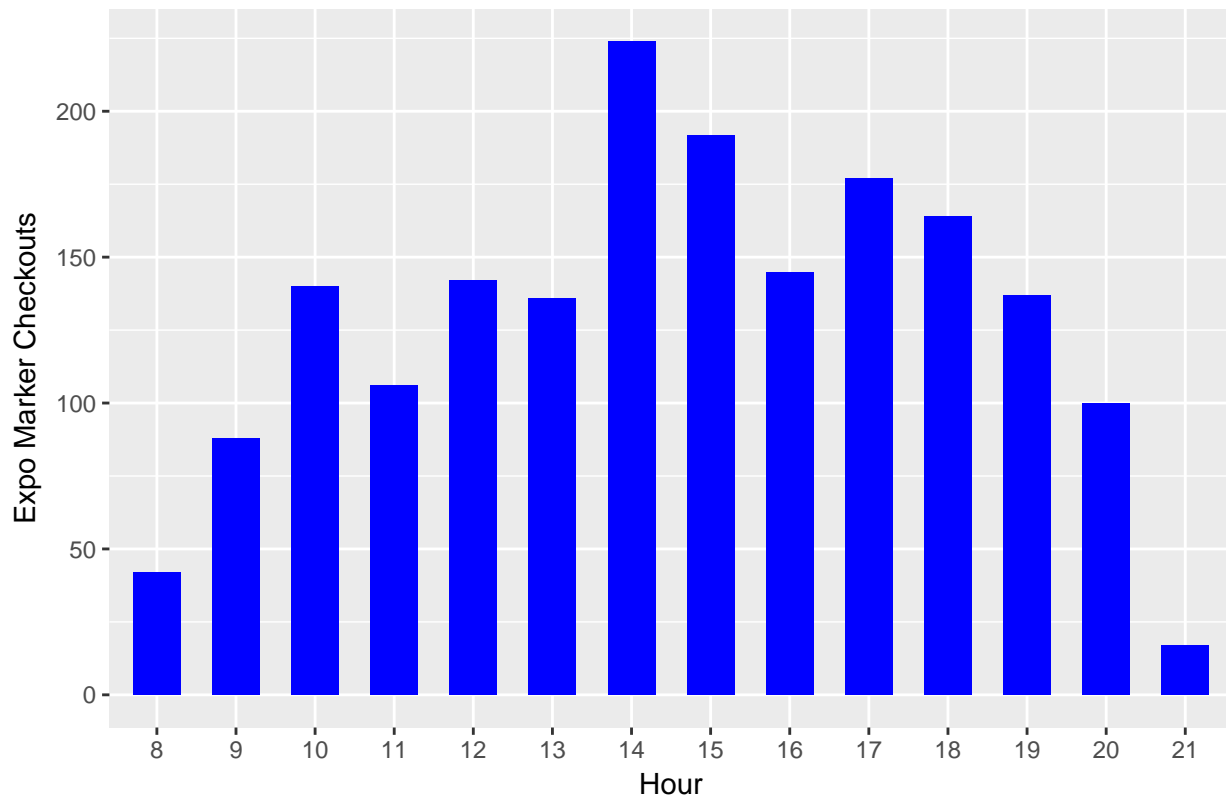
#Graphical representation 1
ggplot(yrlexpo_time,
  aes(x=Hour, y=`Expo Marker Checkouts`, group=`Day of Week`, color=`Day of Week`)) +
  geom_line(size=1) +
  scale_y_continuous(breaks=seq(0,60,10)) +
  ggtitle("Time Analysis of CLICC YRL Expo Marker in '17-18 Academic Year")

```



```
#Graphical representation 2
ggplot(yrlexpo_time, aes(x=Hour,y=`Expo Marker Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  ggtitle("Time Analysis of CLICC YRL Expo Marker in '17-18 Academic Year")
```

Time Analysis of CLICC YRL Expo Marker in '17–18 Academic Year



Part 7) MOUSE

A) Item Usage

i.) Number of Mouse checkouts by quarter

```
mouse <- Accessories[str_detect(Accessories$ITEM_ENUM, "-M-"),]

#subset mouse by quarter
mouseF17 <- subset(mouse, mouse$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  mouse$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
mouseW18 <- subset(mouse, mouse$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  mouse$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
mouseS18 <- subset(mouse, mouse$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  mouse$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(mouseF17),nrow(mouseW18),nrow(mouseS18),nrow(mouse)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Mouse Checkouts by Quarter")
```

Table 42: Number of Mouse Checkouts by Quarter

	Frequency
Fall 2017	291
Winter 2018	210
Spring 2018	257
'17-18 Academic Year	758

ii.) Number of Mouse checkouts by location

```
mouse$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%  
  kable(caption="Number of Mouse Checkouts by Location")
```

Table 43: Number of Mouse Checkouts by Location

.	Freq
CLICC Biomed	266
CLICC YRL	228
CLICC Powell	180
CLICC Arts	48
CLICC Music	16
CLICC SEL Boelter	13
CLICC SEL Geology	7

iii.) Number of Mouse checkouts by individual barcodes (from most to least used)

```
mouse$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%  
  kable(caption = "Mouse Checkouts by Individual Barcodes (from most to least used)")
```

Table 44: Mouse Checkouts by Individual Barcodes (from most to least used)

.	Freq
BIO-M-06	86
BIO-M-05	62
COLLEGE-M-09	57
YRL-M-05	46
BIO-M-01	40
BIO-M-09	40
COLLEGE-M-03	35
YRL-M-01	27
ART-M-02	26
YRL-M-07	26
YRL-M-03	25
YRL-M-06	25
COLLEGE-M-04	23
ART-M-01	22
BIO-M-04	20
YRL-M-08	20
YRL-M-09	20
COLLEGE-M-07	19
COLLEGE-M-02	18

.	Freq
COLLEGE-M-08	17
YRL-M-02	16
YRL-M-04	15
BIO-M-08	11
COLLEGE-M-10	11
BOE-M-01	9
MUS-M-02	9
YRL-M-10	8
MUS-M-01	7
GEO-M-02	5
BOE-M-02	4
BIO-M-03	3
BIO-M-02	2
BIO-M-07	2
GEO-M-01	2

*Note: Mouse items with barcodes “COLLEGE-M-05” and “COLLEGE-M-06” were not used at all in the academic year.

iv.) Number of Mouse checkouts by location AND quarter

```
f <- mouseF17$CHARGE_PLACE %>% table %>% data.frame()
w <- mouseW18$CHARGE_PLACE %>% table %>% data.frame()
s <- mouseS18$CHARGE_PLACE %>% table %>% data.frame()
mousedf <- merge(f, w, by=".", all.y = T) %>% merge(., s, by = ".") %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
mousedf1 <- mousedf
mousedf1$`'17-18 Academic Year` <- apply(mousedf1[2:4], 1, sum)
mousedf1 %>% kable(caption="Number of Mouse Checkouts by Location and Quarter")
```

Table 45: Number of Mouse Checkouts by Location and Quarter

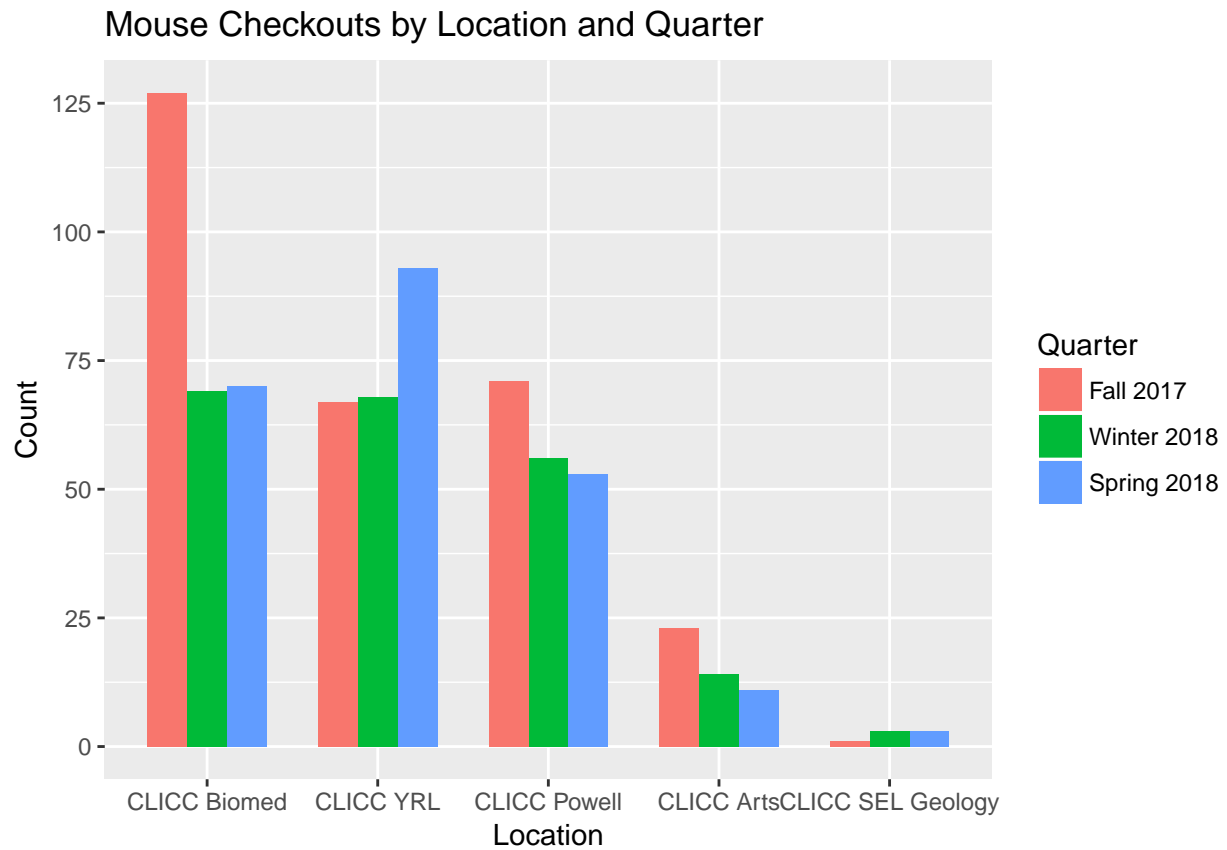
Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	23	14	11	48
CLICC Biomed	127	69	70	266
CLICC Powell	71	56	53	180
CLICC SEL Geology	1	3	3	7
CLICC YRL	67	68	93	228

v.) Mouse Graphs

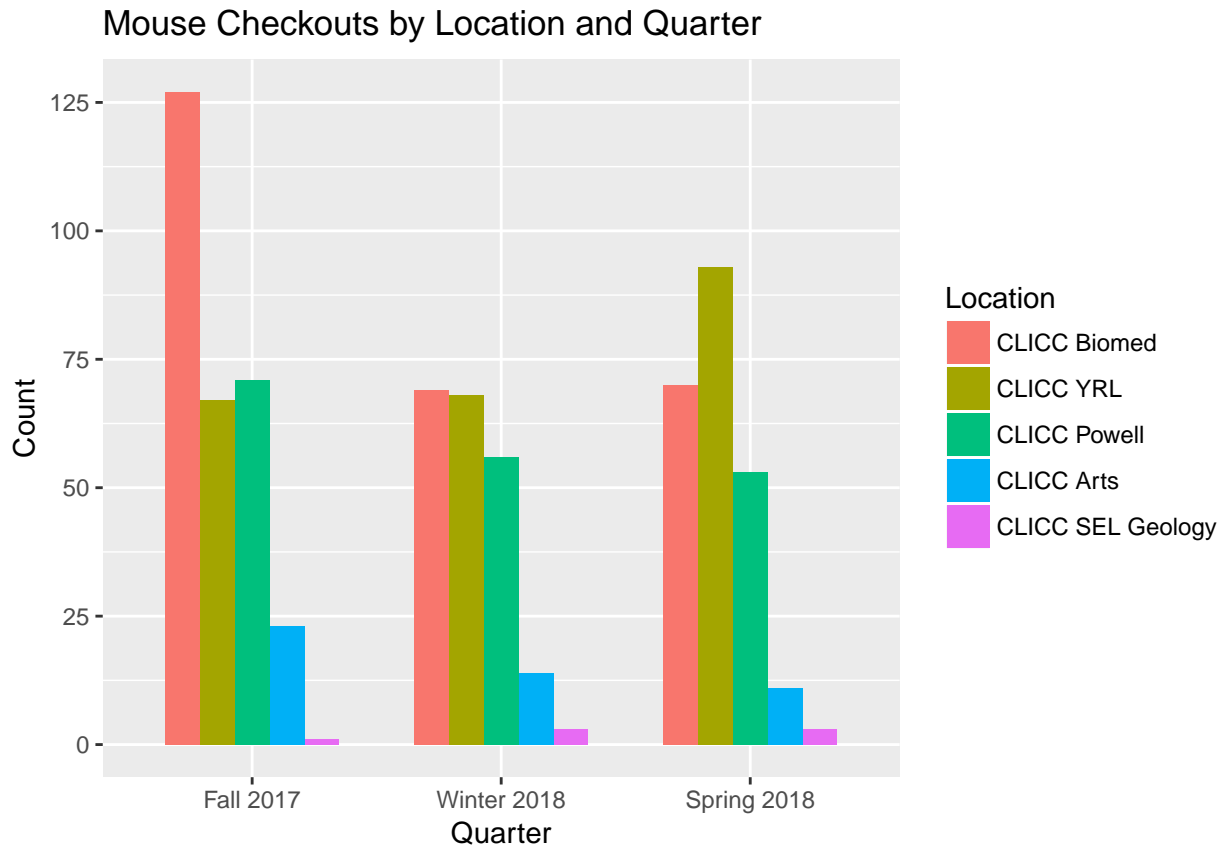
```
mousedf2 <- melt(mousedf, id.vars=c("Location"))
#Reorder the factor levels
mousedf2$Location <- reorder(mousedf2$Location, X=desc(mousedf2$value))

ggplot(mousedf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge", width=0.7) +
  ggtitle("Mouse Checkouts by Location and Quarter") +
  ylab("Count") +
```

```
scale_y_continuous(breaks=seq(0,125,25)) +  
scale_fill_discrete(name = "Quarter")
```



```
ggplot(mousedf2, aes(x=variable, y=value, group=Location, fill=Location)) +  
geom_col(position="dodge", width=0.7) +  
ggtitle("Mouse Checkouts by Location and Quarter") +  
ylab("Count") +  
xlab("Quarter") +  
scale_y_continuous(breaks=seq(0,125,25)) +  
scale_fill_discrete(name = "Location")
```



B) Mouse Individual Users

```
a <- mouseF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- mouseW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- mouseS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Mouse in '17-18 Academic Year")
```

Table 46: Individual Patrons for Mouse in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	85
Winter 2018	82
Spring 2018	108
'17-18 Academic Year	275

C) Mouse Time Analysis

```
#Table Representation with Hour
mouse_time <- table(mouse$HOUR) %>% data.frame
```

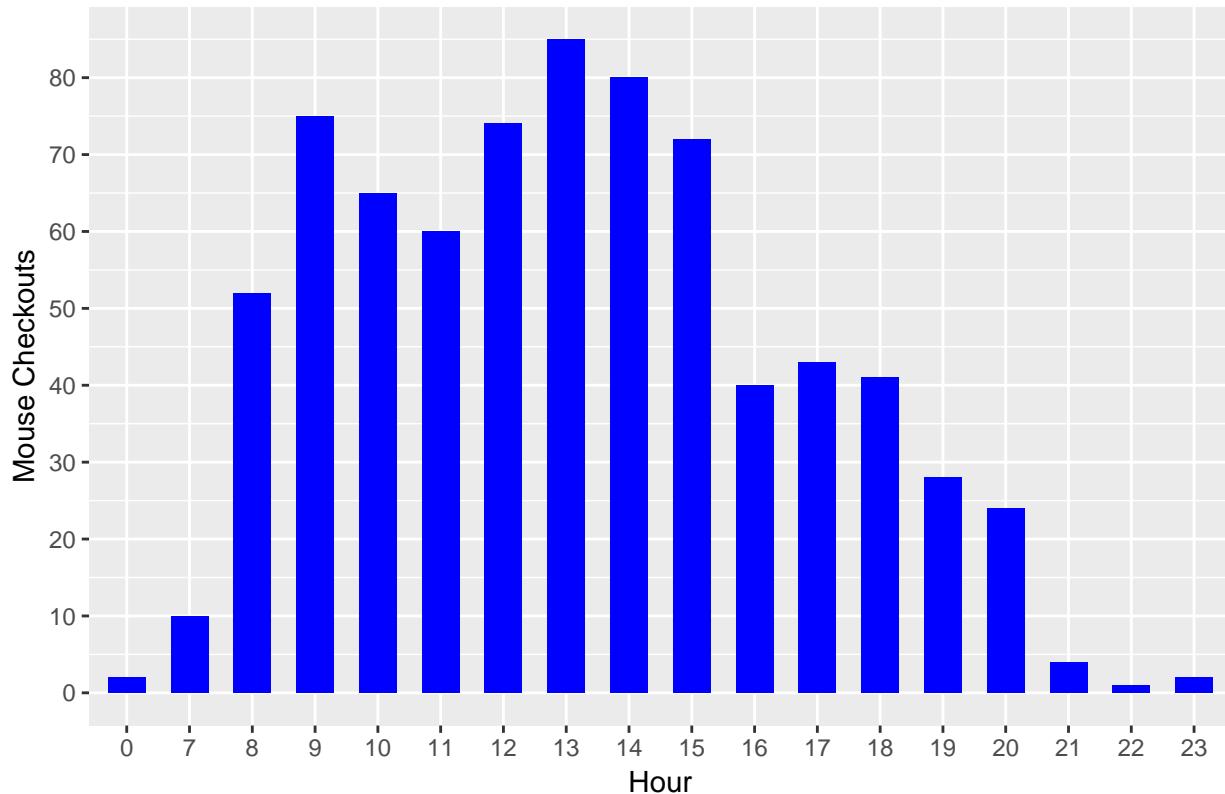
```
names(mouse_time) <- c("Hour","Mouse Checkouts")
mouse_time %>% kable(caption="Number of Mouse Checkouts per Hour")
```

Table 47: Number of Mouse Checkouts per Hour

Hour	Mouse Checkouts
0	2
7	10
8	52
9	75
10	65
11	60
12	74
13	85
14	80
15	72
16	40
17	43
18	41
19	28
20	24
21	4
22	1
23	2

```
#Graphical representation
ggplot(mouse_time, aes(x=Hour,y=`Mouse Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,90,10)) +
  ggtitle("Time Analysis of Mouse Checkouts in '17-18 Academic Year")
```

Time Analysis of Mouse Checkouts in '17–18 Academic Year



.....

Part 8) VGA Adapters

A) Item Usage

i.) Number of VGA Adapter checkouts by quarter

```
vgaAdapter <- Accessories[str_detect(Accessories$ITEM_ENUM, "-VGA-"),]

#subset VGA adapters by quarter
vgaAdapterF17 <- subset(vgaAdapter, vgaAdapter$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  vgaAdapter$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
vgaAdapterW18 <- subset(vgaAdapter, vgaAdapter$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  vgaAdapter$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
vgaAdapterS18 <- subset(vgaAdapter, vgaAdapter$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  vgaAdapter$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(vgaAdapterF17),nrow(vgaAdapterW18),nrow(vgaAdapterS18),nrow(vgaAdapter)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of VGA Adapter Checkouts by Quarter")
```

Table 48: Number of VGA Adapter Checkouts by Quarter

	Frequency
Fall 2017	676
Winter 2018	514
Spring 2018	615
'17-18 Academic Year	1805

ii.) Number of VGA Adapter checkouts by location

```
vgaAdapter$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%  
  kable(caption="Number of VGA Adapter Checkouts by Location")
```

Table 49: Number of VGA Adapter Checkouts by Location

.	Freq
CLICC YRL	631
CLICC Powell	440
CLICC Biomed	396
CLICC Lab	171
CLICC Arts	88
CLICC SEL Boelter	74
CLICC Music	3
CLICC SEL Geology	2

iii.) Number of VGA Adapter checkouts by individual barcodes (from most to least used)

```
vgaAdapter$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%  
  kable(caption = "VGA Adapter Checkouts by Individual Barcodes (from most to least used)")
```

Table 50: VGA Adapter Checkouts by Individual Barcodes (from most to least used)

.	Freq
COLLEGE-VGA-01	84
BIO-VGA-01	81
COLLEGE-VGA-08	68
BIO-VGA-10	67
BIO-VGA-08	62
LAB-VGA-05	61
BIO-VGA-07	56
COLLEGE-VGA-03	55
SEL-VGA-02	54
COLLEGE-VGA-10	51
ART-VGA-01	44
ART-VGA-02	44
LAB-VGA-01	43
COLLEGE-VGA-07	41
YRL-VGA-08	41
YRL-VGA-15	38
COLLEGE-VGA-11	36
BIO-VGA-02	34

.	Freq
LAB-VGA-02	32
BIO-VGA-06	31
YRL-VGA-12	31
YRL-VGA-27	31
COLLEGE-VGA-02	30
YRL-VGA-28	29
YRL-VGA-34	26
BIO-VGA-09	25
COLLEGE-VGA-09	25
LAB-VGA-04	25
COLLEGE-VGA-06	24
YRL-VGA-09	23
YRL-VGA-17	23
YRL-VGA-26	22
YRL-VGA-07	21
YRL-VGA-16	20
YRL-VGA-40	20
YRL-VGA-02	19
YRL-VGA-13	19
BIO-VGA-03	18
YRL-VGA-23	18
YRL-VGA-11	17
YRL-VGA-22	17
YRL-VGA-29	17
COLLEGE-VGA-05	16
YRL-VGA-14	16
YRL-VGA-38	16
YRL-VGA-01	15
YRL-VGA-10	15
YRL-VGA-18	15
YRL-VGA-20	15
YRL-VGA-36	14
YRL-VGA-24	13
YRL-VGA-25	13
YRL-VGA-30	13
YRL-VGA-37	13
BIO-VGA-05	12
YRL-VGA-21	12
YRL-VGA-33	12
COLLEGE-VGA-04	10
LAB-VGA-03	10
YRL-VGA-39	10
SEL-VGA-05	8
SEL-VGA-03	7
YRL-VGA-05	7
BIO-VGA-11	5
SEL-VGA-04	5
MUS-VGA-01	3
BIO-VGA-12	2
BIO-VGA-13	2
BIO-VGA-04	1
GEO-VGA-01	1

	Freq
GEO-VGA-02	1

*Note: VGA Adapters with barcodes “YRL-VGA-03”, “YRL-VGA-04”, “YRL-VGA-06”, “YRL-VGA-19”, “YRL-VGA-31”, “YRL-VGA-32”, and “YRL-VGA-35” were not used at all in the academic year.

iv.) Number of VGA Adapter checkouts by location AND quarter

```
f <- vgaAdapterF17$CHARGE_PLACE %>% table %>% data.frame()
w <- vgaAdapterW18$CHARGE_PLACE %>% table %>% data.frame()
s <- vgaAdapterS18$CHARGE_PLACE %>% table %>% data.frame()
vgaAdapterdf <- merge(f, w, by=".", all = T) %>% merge(., s, by = ".", all = T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
vgaAdapterdf1 <- vgaAdapterdf
vgaAdapterdf1$`'17-18 Academic Year` <- apply(vgaAdapterdf1[2:4], 1, sum)
vgaAdapterdf1 %>% kable(caption="Number of VGA Adapter Checkouts by Location and Quarter")
```

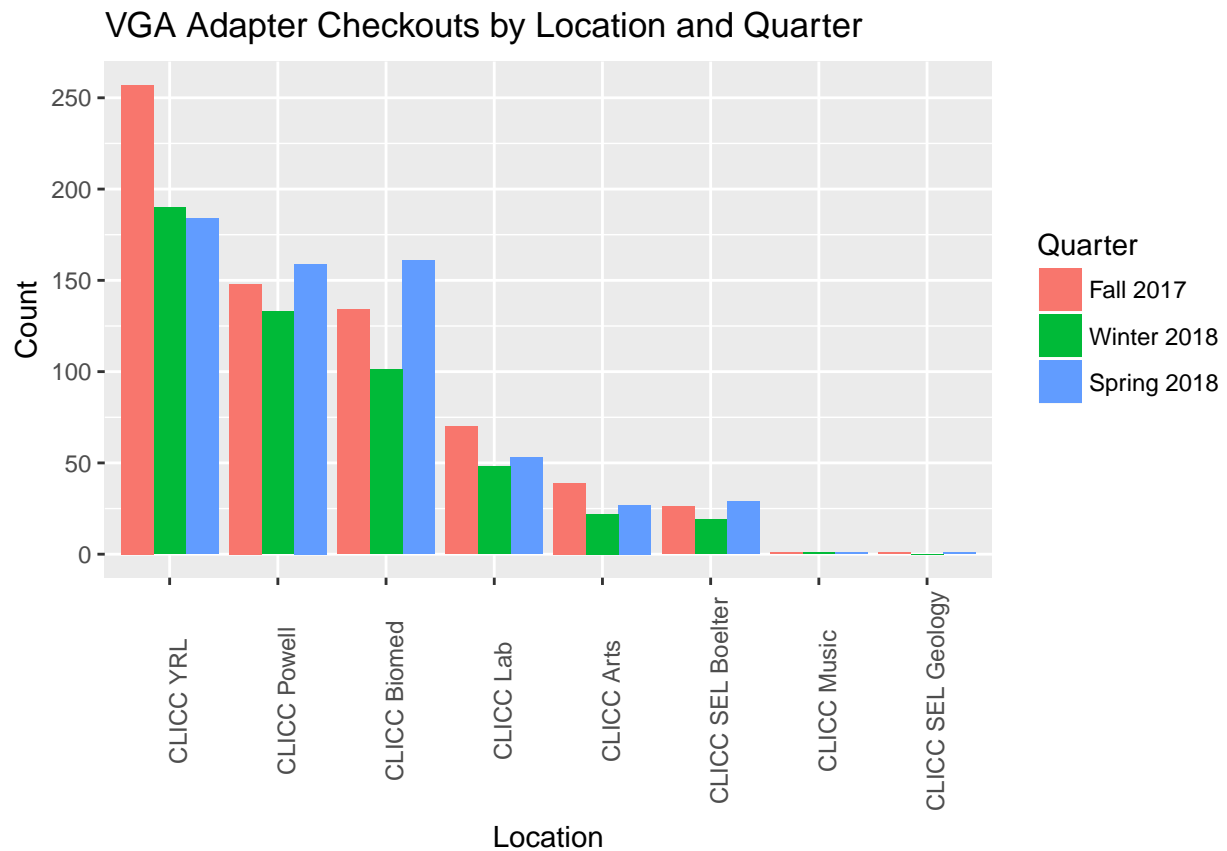
Table 51: Number of VGA Adapter Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	39	22	27	88
CLICC Biomed	134	101	161	396
CLICC Lab	70	48	53	171
CLICC Music	1	1	1	3
CLICC Powell	148	133	159	440
CLICC SEL Boelter	26	19	29	74
CLICC SEL Geology	1	0	1	2
CLICC YRL	257	190	184	631

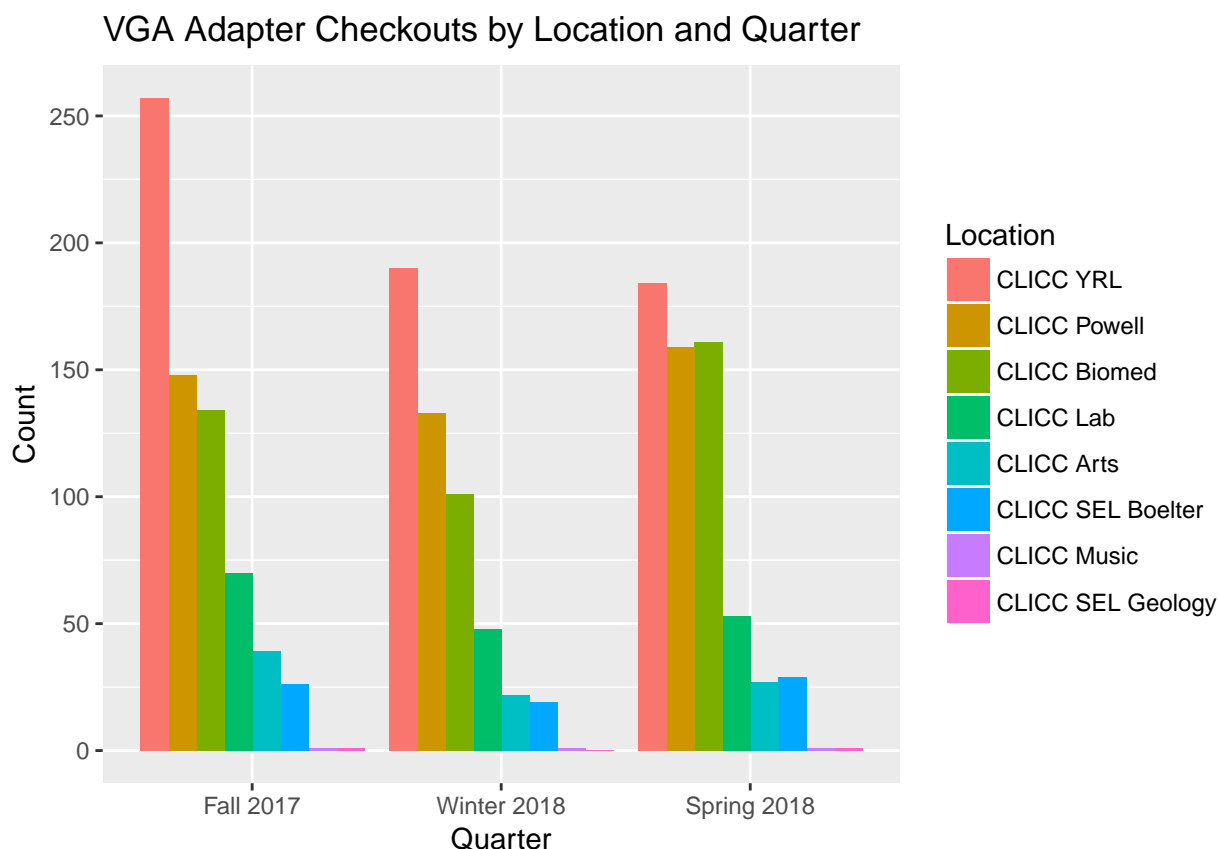
v.) VGA Adapters Graphs

```
vgaAdapterdf2 <- melt(vgaAdapterdf, id.vars=c("Location"))
#Reorder the factor levels
vgaAdapterdf2$Location <- reorder(vgaAdapterdf2$Location, X=desc(vgaAdapterdf2$value))

ggplot(vgaAdapterdf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("VGA Adapter Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_y_continuous(breaks=seq(0,300,50)) +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```

```
ggplot(vgaAdapterdf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("VGA Adapter Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_y_continuous(breaks=seq(0,300,50)) +
  scale_fill_discrete(name = "Location")
```



B) VGA Adapter Individual Users

```
a <- vgaAdapterF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- vgaAdapterW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- vgaAdapterS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for VGA Adapters in '17-18 Academic Year")
```

Table 52: Individual Patrons for VGA Adapters in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	402
Winter 2018	311
Spring 2018	332
'17-18 Academic Year	1045

C) VGA Adapter Time Analysis

i.) CLICC YRL

```

yrlvgaAdapter <- vgaAdapter[which(vgaAdapter$CHARGE_PLACE=="CLICC YRL"),]

#Table Representation with Hour
yrlvgaAdapter_time <- table(yrlvgaAdapter$HOUR) %>% data.frame
names(yrlvgaAdapter_time) <- c("Hour","VGA Adapter Checkouts")
yrlvgaAdapter_time %>% kable(caption="Number of VGA Adapter Checkouts per Hour at CLICC YRL")

```

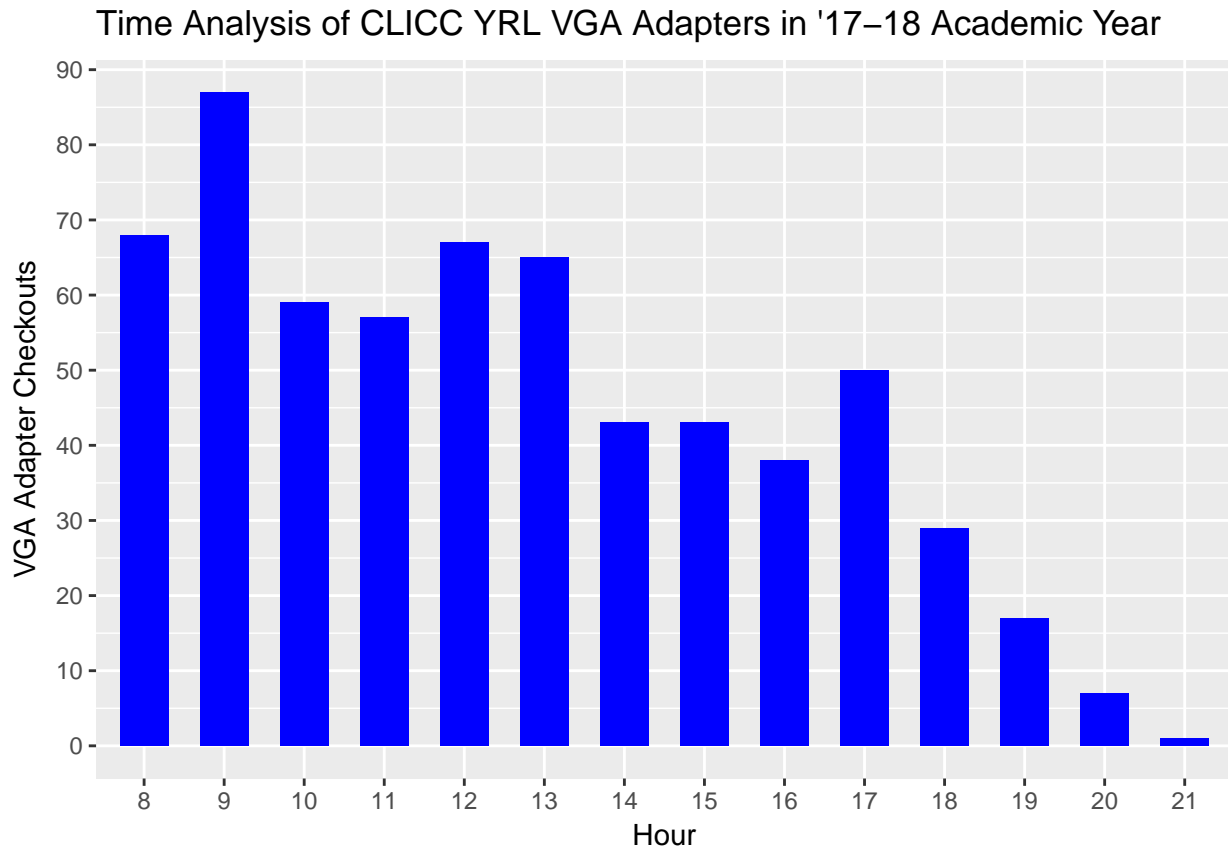
Table 53: Number of VGA Adapter Checkouts per Hour at CLICC YRL

Hour	VGA Adapter Checkouts
8	68
9	87
10	59
11	57
12	67
13	65
14	43
15	43
16	38
17	50
18	29
19	17
20	7
21	1

```

#Graphical representation
ggplot(yrlvgaAdapter_time, aes(x=Hour,y=`VGA Adapter Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,90,10)) +
  ggtitle("Time Analysis of CLICC YRL VGA Adapters in '17-18 Academic Year")

```



ii.) CLICC Powell

```
powvgaAdapter <- vgaAdapter[which(vgaAdapter$CHARGE_PLACE=="CLICC Powell"),]

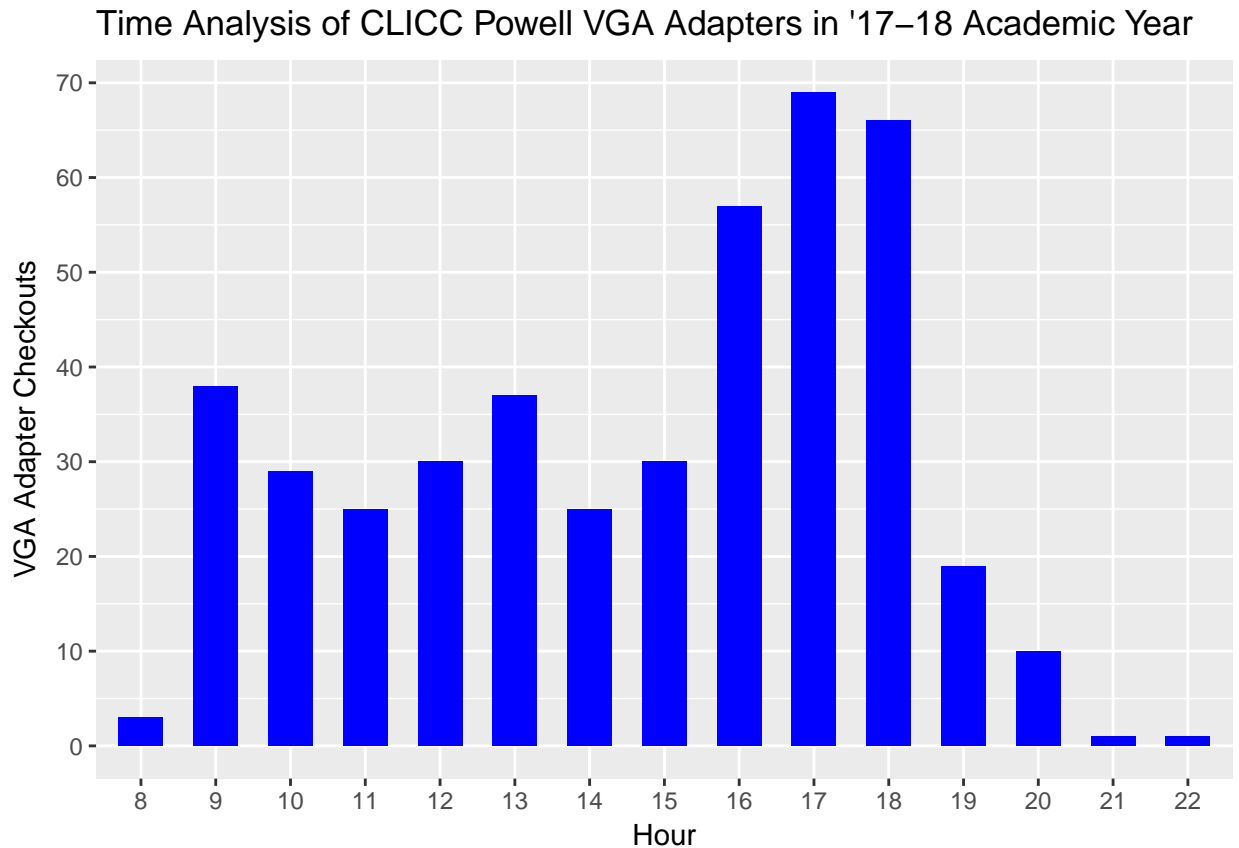
#Table Representation with Hour
powvgaAdapter_time <- table(powvgaAdapter$HOUR) %>% data.frame
names(powvgaAdapter_time) <- c("Hour", "VGA Adapter Checkouts")
powvgaAdapter_time %>% kable(caption="Number of VGA Adapter Checkouts per Hour at CLICC Powell")
```

Table 54: Number of VGA Adapter Checkouts per Hour at CLICC Powell

Hour	VGA Adapter Checkouts
8	3
9	38
10	29
11	25
12	30
13	37
14	25
15	30
16	57
17	69
18	66
19	19
20	10
21	1

Hour	VGA Adapter Checkouts
22	1

```
#Graphical representation
ggplot(powvgaAdapter_time, aes(x=Hour,y=`VGA Adapter Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,70,10)) +
  ggtitle("Time Analysis of CLICC Powell VGA Adapters in '17-18 Academic Year")
```



iii.) CLICC Biomed

```
biovgaAdapter <- vgaAdapter[which(vgaAdapter$CHARGE_PLACE=="CLICC Biomed"),]
```

```
#Table Representation with Hour
biovgaAdapter_time <- table(biovgaAdapter$HOUR) %>% data.frame
names(biovgaAdapter_time) <- c("Hour","VGA Adapter Checkouts")
biovgaAdapter_time %>% kable(caption="Number of VGA Adapter Checkouts per Hour at CLICC Biomed")
```

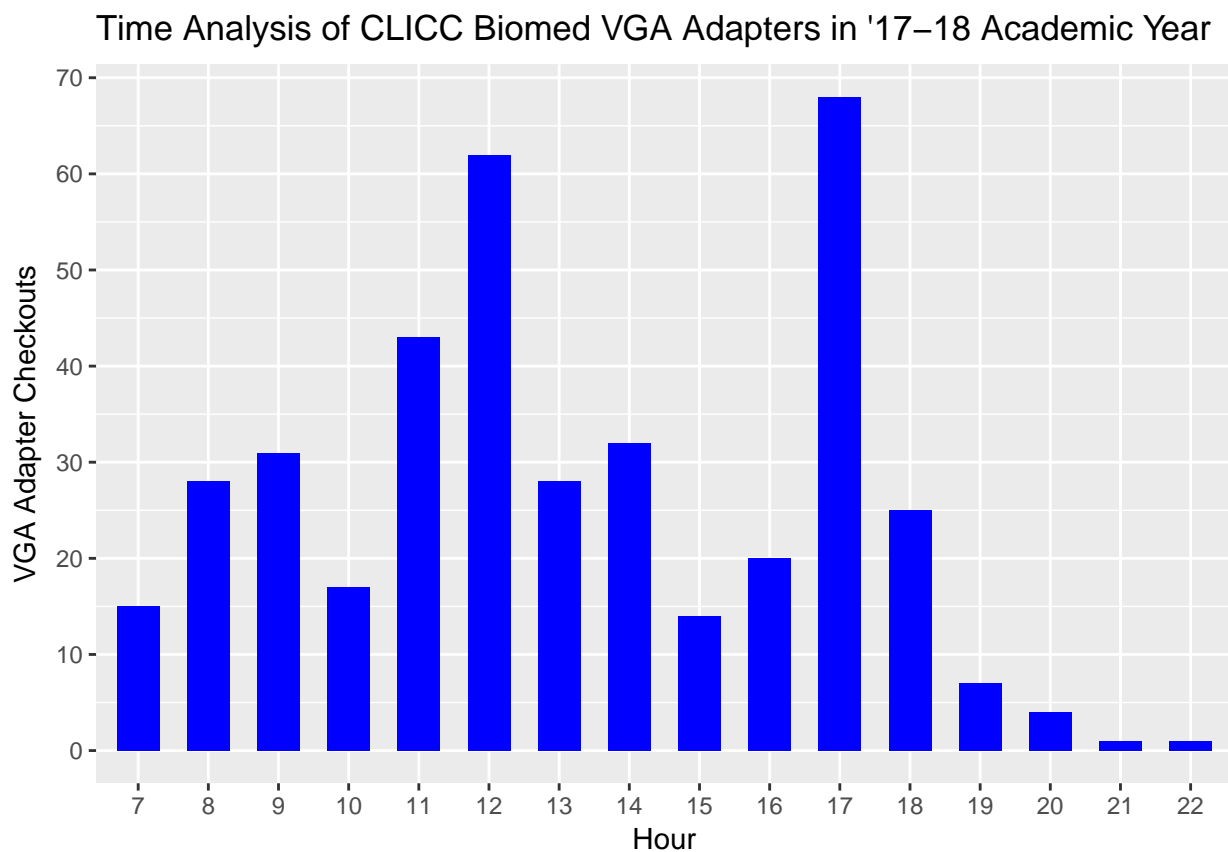
Table 55: Number of VGA Adapter Checkouts per Hour at CLICC Biomed

Hour	VGA Adapter Checkouts
7	15
8	28
9	31
10	17

Hour	VGA Adapter Checkouts
11	43
12	62
13	28
14	32
15	14
16	20
17	68
18	25
19	7
20	4
21	1
22	1

#Graphical representation

```
ggplot(biovgaAdapter_time, aes(x=Hour,y=`VGA Adapter Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,70,10)) +
  ggtitle("Time Analysis of CLICC Biomed VGA Adapters in '17-18 Academic Year")
```



Part 9) VGA Cables

A) Item Usage

i.) Number of VGA Cable checkouts by quarter

```
vgaCable <- Accessories[str_detect(Accessories$ITEM_ENUM, "-VGAC-"),]

#subset VGA adapters by quarter
vgaCableF17 <- subset(vgaCable, vgaCable$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  vgaCable$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
vgaCableW18 <- subset(vgaCable, vgaCable$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  vgaCable$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
vgaCableS18 <- subset(vgaCable, vgaCable$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  vgaCable$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(vgaCableF17),nrow(vgaCableW18),nrow(vgaCableS18),nrow(vgaCable)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of VGA Cable Checkouts by Quarter")
```

Table 56: Number of VGA Cable Checkouts by Quarter

	Frequency
Fall 2017	182
Winter 2018	125
Spring 2018	143
'17-18 Academic Year	450

ii.) Number of VGA Cable checkouts by location

```
vgaCable$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
  kable(caption="Number of VGA Cable Checkouts by Location")
```

Table 57: Number of VGA Cable Checkouts by Location

.	Freq
CLICC Biomed	147
CLICC YRL	138
CLICC Powell	88
CLICC Lab	51
CLICC Music	22
CLICC SEL Boelter	4

iii.) Number of VGA Cable checkouts by individual barcodes (from most to least used)

```
vgaCable$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
  kable(caption = "VGA Cable Checkouts by Individual Barcodes (from most to least used)")
```

Table 58: VGA Cable Checkouts by Individual Barcodes (from most to least used)

.	Freq
COLLEGE-VGAC-04	57
BIO-VGAC-05	39
BIO-VGAC-02	34
BIO-VGAC-07	30
BIO-VGAC-08	27
LAB-VGAC-02	26
YRL-VGAC-06	25
YRL-VGAC-04	23
MUS-VGAC-02	22
YRL-VGAC-05	20
YRL-VGAC-07	20
YRL-VGAC-09	19
COLLEGE-VGAC-01	18
YRL-VGAC-02	18
LAB-VGAC-04	12
YRL-VGAC-03	10
LAB-VGAC-01	8
BIO-VGAC-10	7
BIO-VGAC-01	6
BOE-VGAC-03	4
LAB-VGAC-05	4
BIO-VGAC-06	3
COLLEGE-VGAC-09	3
COLLEGE-VGAC-10	3
YRL-VGAC-01	3
COLLEGE-VGAC-02	2
COLLEGE-VGAC-08	2
BIO-VGAC-04	1
COLLEGE-VGAC-03	1
COLLEGE-VGAC-05	1
COLLEGE-VGAC-06	1
LAB-VGAC-03	1

*Note: VGA Cables with barcodes “BIO-VGAC-03”, “BIO-VGAC-09”, “BOE-VGAC-01”, “BOE-VGAC-02”, “COLLEGE-VGAC-07”, “MUS-VGAC-01”, “YRL-VGAC-08”, and “YRL-VGAC-10” were not used at all in the academic year.

iv.) Number of VGA Cable checkouts by location AND quarter

```
f <- vgaCableF17$CHARGE_PLACE %>% table %>% data.frame()
w <- vgaCableW18$CHARGE_PLACE %>% table %>% data.frame()
s <- vgaCableS18$CHARGE_PLACE %>% table %>% data.frame()
vgaCabledf <- merge(f, w, by=".", all = T) %>% merge(., s, by = ".", all = T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
vgaCabledf1 <- vgaCabledf
vgaCabledf1$`'17-18 Academic Year` <- apply(vgaCabledf1[2:4], 1, sum)
vgaCabledf1 %>% kable(caption="Number of VGA Cable Checkouts by Location and Quarter")
```

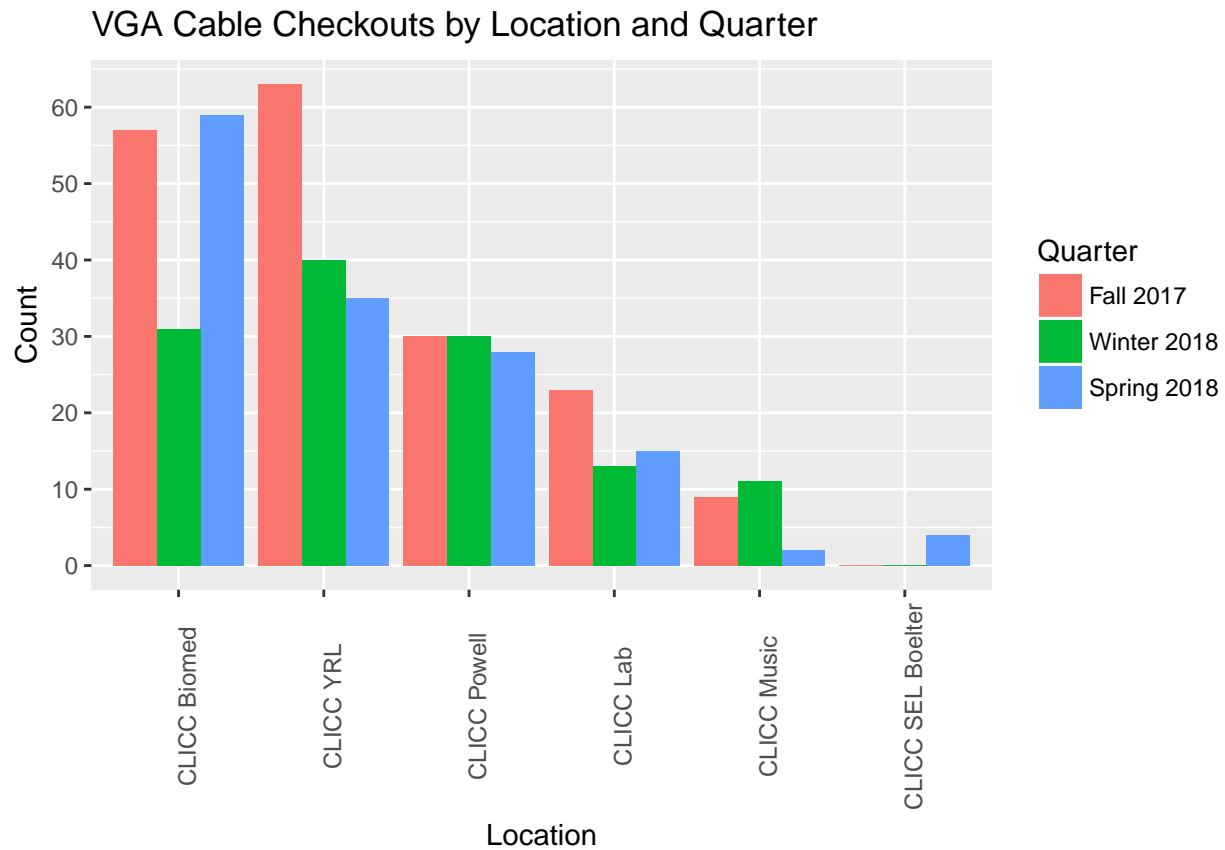

Table 59: Number of VGA Cable Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Biomed	57	31	59	147
CLICC Lab	23	13	15	51
CLICC Music	9	11	2	22
CLICC Powell	30	30	28	88
CLICC YRL	63	40	35	138
CLICC SEL Boelter	0	0	4	4

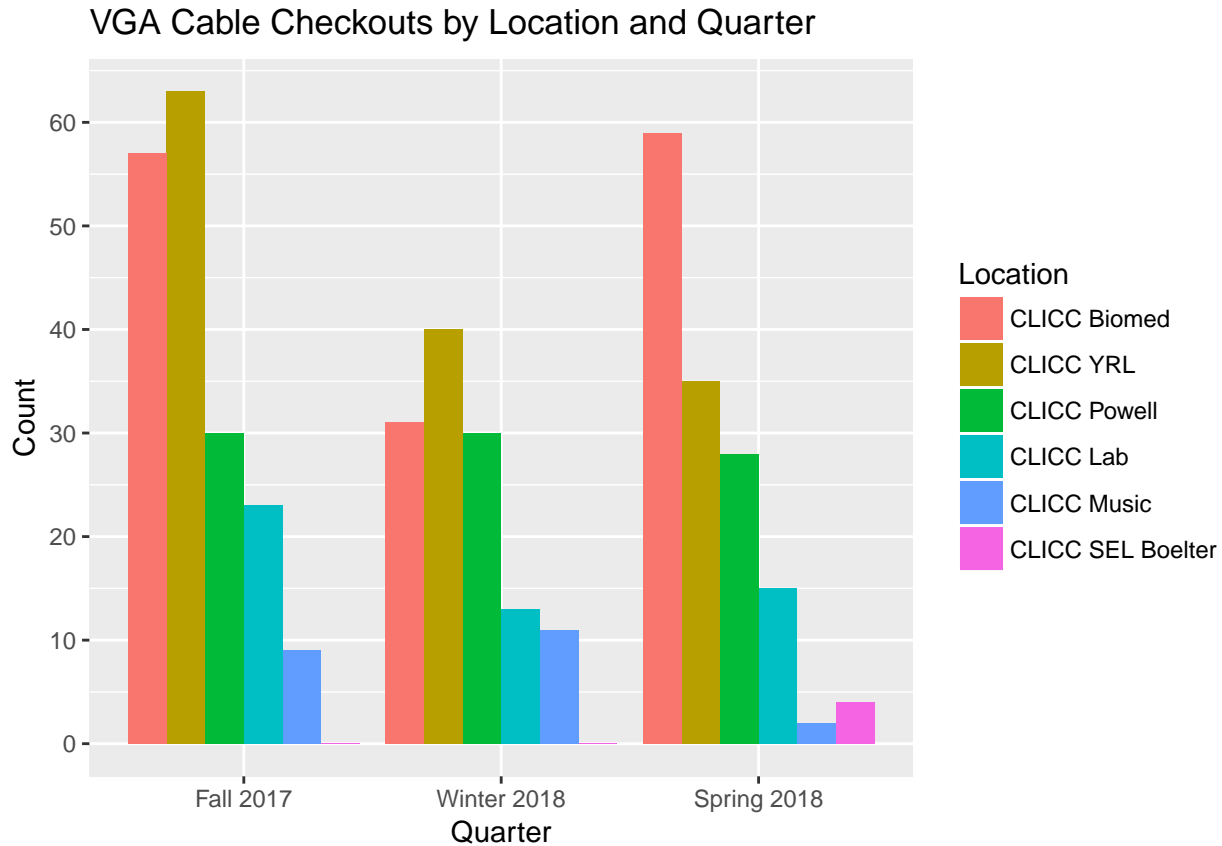
v.) VGA Cable Graphs

```
vgaCabledf2 <- melt(vgaCabledf, id.vars=c("Location"))
#Reorder the factor levels
vgaCabledf2$Location <- reorder(vgaCabledf2$Location, X=desc(vgaCabledf2$value))

ggplot(vgaCabledf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("VGA Cable Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_y_continuous(breaks=seq(0,60,10)) +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(vgaCabledf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("VGA Cable Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_y_continuous(breaks=seq(0,60,10)) +
  scale_fill_discrete(name = "Location")
```



B) VGA Cable Individual Users

```
a <- vgaCableF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- vgaCableW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- vgaCableS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for VGA Cable in '17-18 Academic Year")
```

Table 60: Individual Patrons for VGA Cable in '17-18 Academic Year

Number of Individual Patrons	
Fall 2017	150
Winter 2018	96

	Number of Individual Patrons
Spring 2018	103
'17-18 Academic Year	349

C) VGA Cable Time Analysis

i.) CLICC Biomed

```
biovgaCable <- vgaCable[which(vgaCable$CHARGE_PLACE=="CLICC Biomed"),]

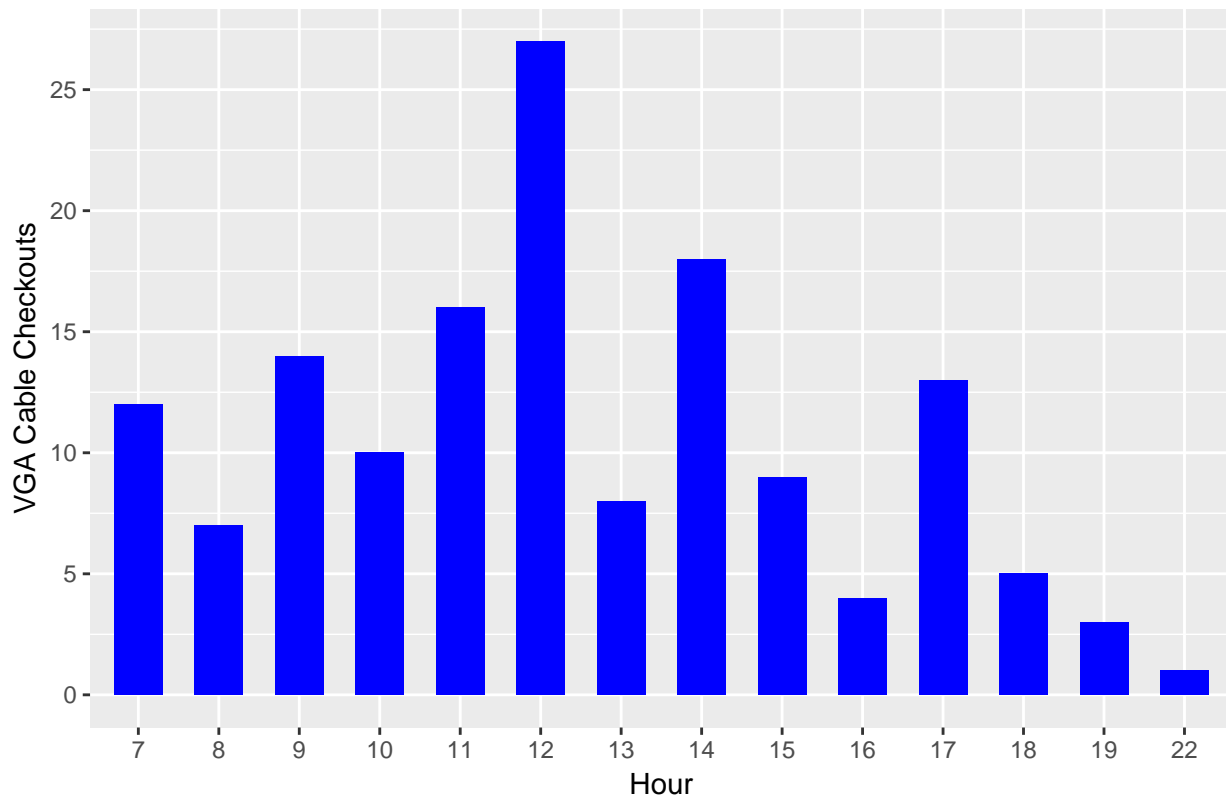
#Table Representation with Hour
biovgaCable_time <- table(biovgaCable$HOUR) %>% data.frame
names(biovgaCable_time) <- c("Hour", "VGA Cable Checkouts")
biovgaCable_time %>% kable(caption="Number of VGA Cable Checkouts per Hour at CLICC Biomed")
```

Table 61: Number of VGA Cable Checkouts per Hour at CLICC Biomed

Hour	VGA Cable Checkouts
7	12
8	7
9	14
10	10
11	16
12	27
13	8
14	18
15	9
16	4
17	13
18	5
19	3
22	1

```
#Graphical representation
ggplot(biovgaCable_time, aes(x=Hour, y=`VGA Cable Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,30,5)) +
  ggtitle("Time Analysis of CLICC Biomed VGA Cable in '17-18 Academic Year")
```

Time Analysis of CLICC Biomed VGA Cable in '17–18 Academic Year



Part 10) HDMI Cables

A) Item Usage

i.) Number of HDMI Cable checkouts by quarter

```
HDMICable <- Accessories[str_detect(Accessories$ITEM_ENUM, "-HDMI-"),]

#subset VGA adapters by quarter
HDMICableF17 <- subset(HDMICable, HDMICable$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  HDMICable$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
HDMICableW18 <- subset(HDMICable, HDMICable$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  HDMICable$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
HDMICableS18 <- subset(HDMICable, HDMICable$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  HDMICable$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(HDMICableF17),nrow(HDMICableW18),nrow(HDMICableS18),nrow(HDMICable)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of HDMI Cable Checkouts by Quarter")
```

Table 62: Number of HDMI Cable Checkouts by Quarter

	Frequency
Fall 2017	532
Winter 2018	556
Spring 2018	520
'17-18 Academic Year	1608

ii.) Number of HDMI Cable checkouts by location

```
HDMICable$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
  kable(caption="Number of HDMI Cable Checkouts by Location")
```

Table 63: Number of HDMI Cable Checkouts by Location

.	Freq
CLICC YRL	1458
CLICC Powell	133
CLICC Biomed	16
CLICC SEL Boelter	1

iii.) Number of HDMI Cable checkouts by individual barcodes (from most to least used)

```
HDMICable$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
  kable(caption = "HDMI Cable Checkouts by Individual Barcodes (from most to least used)")
```

Table 64: HDMI Cable Checkouts by Individual Barcodes (from most to least used)

.	Freq
YRL-HDMI-12	102
YRL-HDMI-08	93
YRL-HDMI-11	92
YRL-HDMI-10	87
YRL-HDMI-03	86
YRL-HDMI-13	86
YRL-HDMI-20	81
YRL-HDMI-16	80
YRL-HDMI-02	76
YRL-HDMI-19	72
YRL-HDMI-04	71
YRL-HDMI-07	71
YRL-HDMI-18	70
YRL-HDMI-01	69
YRL-HDMI-17	64
YRL-HDMI-05	61
YRL-HDMI-14	61
YRL-HDMI-06	58
YRL-HDMI-09	55
POW-HDMI-08	28
POW-HDMI-06	25
POW-HDMI-02	23

.	Freq
YRL-HDMI-15	23
POW-HDMI-04	17
POW-HDMI-05	15
POW-HDMI-09	12
BIO-HDMI-04	8
POW-HDMI-03	7
BIO-HDMI-03	6
POW-HDMI-10	6
BIO-HDMI-02	2
BOE-HDMI-01	1

*Note: HDMI Cables with barcodes “BIO-HDMI-01”, “POW-HDMI-01”, “POW-HDMI-07”, and cables in CLICC Geology were not used at all in the academic year.

iv.) Number of HDMI Cable checkouts by location AND quarter

```
f <- HDMICableF17$CHARGE_PLACE %>% table %>% data.frame()
w <- HDMICableW18$CHARGE_PLACE %>% table %>% data.frame()
s <- HDMICableS18$CHARGE_PLACE %>% table %>% data.frame()
HDMICabledf <- merge(f, w, by=".", all = T) %>% merge(., s, by = ".", all = T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
HDMICabledf1 <- HDMICabledf
HDMICabledf1$`'17-18 Academic Year` <- apply(HDMICabledf1[2:4], 1, sum)
HDMICabledf1 %>% kable(caption="Number of HDMI Cable Checkouts by Location and Quarter")
```

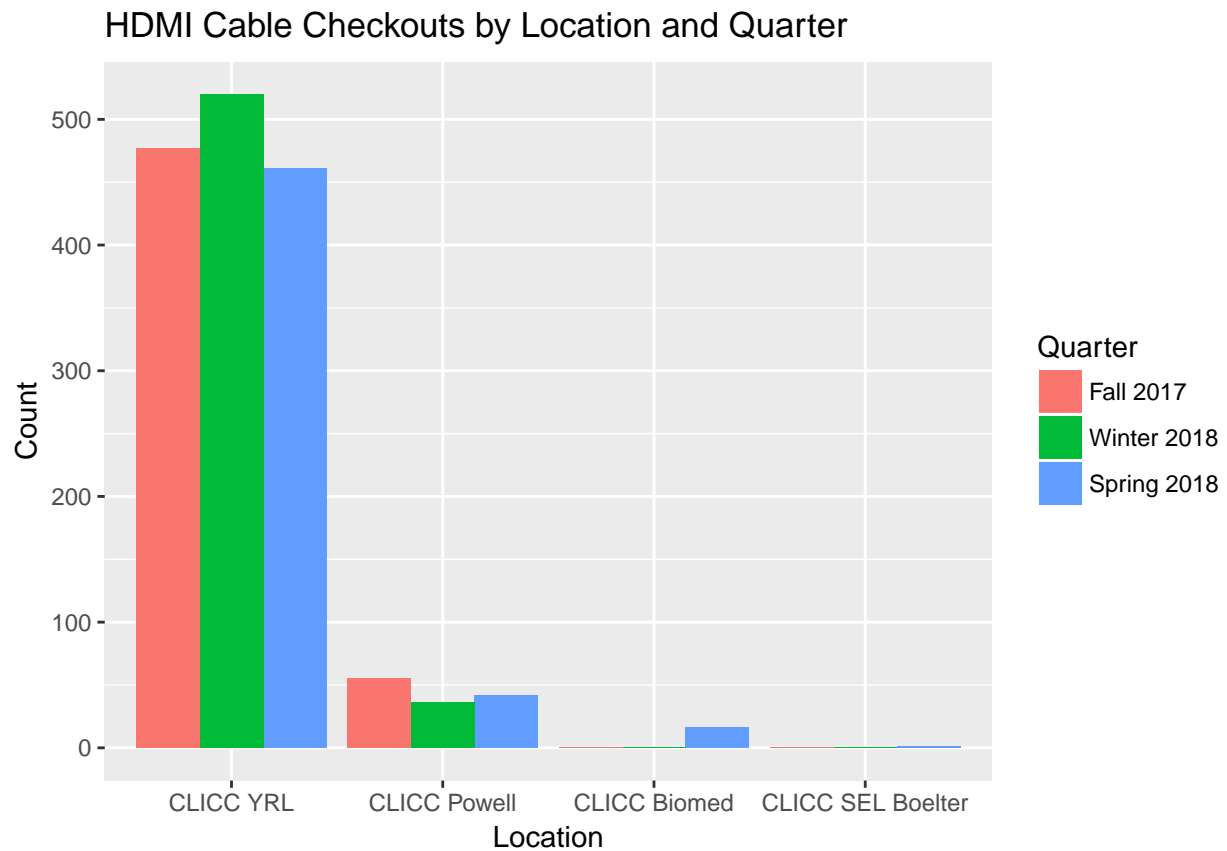
Table 65: Number of HDMI Cable Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Powell	55	36	42	133
CLICC YRL	477	520	461	1458
CLICC Biomed	0	0	16	16
CLICC SEL Boelter	0	0	1	1

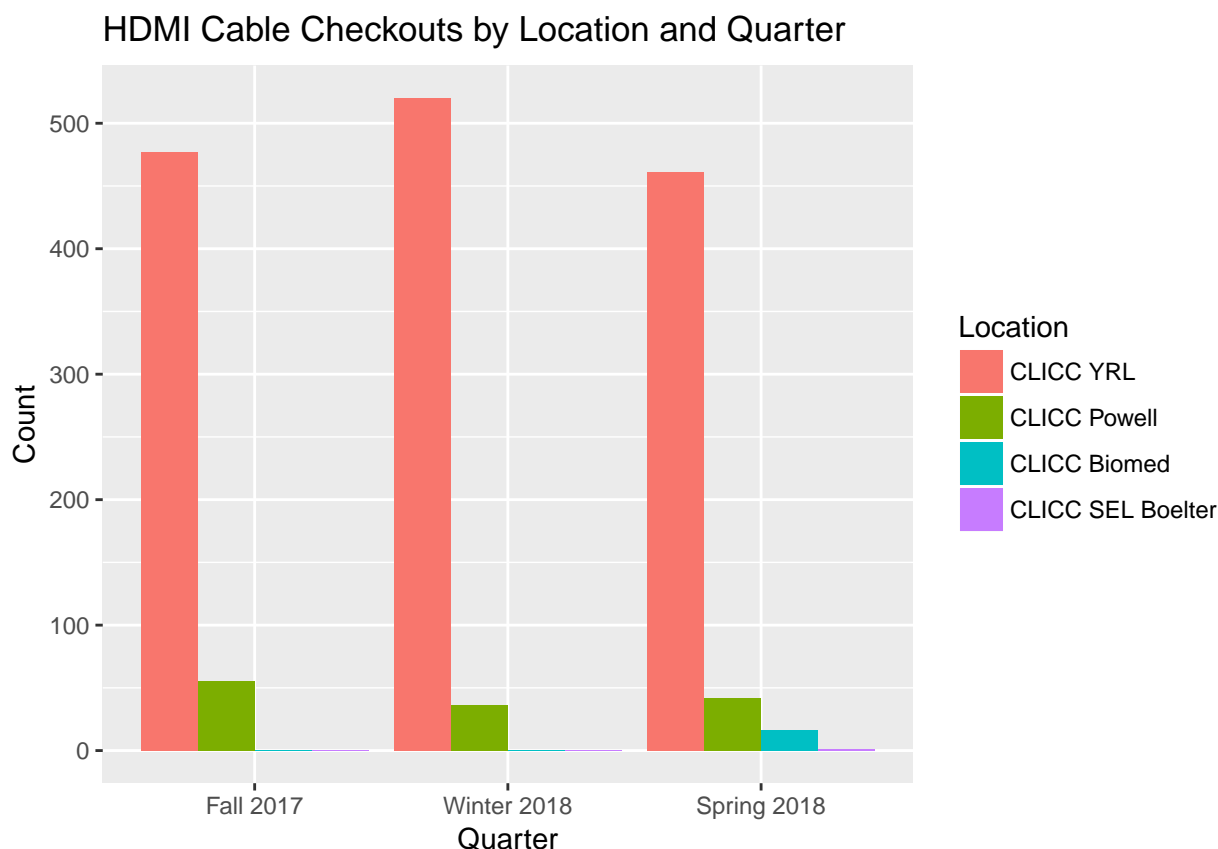
v.) HDMI Cable Graphs

```
HDMICabledf2 <- melt(HDMICabledf, id.vars=c("Location"))
#Reorder the factor levels
HDMICabledf2$Location <- reorder(HDMICabledf2$Location, X=desc(HDMICabledf2$value))

ggplot(HDMICabledf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("HDMI Cable Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(HDMICabledf2, aes(x=variable, y=value, group=Location, fill=Location)) +  
  geom_col(position="dodge") +  
  ggtitle("HDMI Cable Checkouts by Location and Quarter") +  
  ylab("Count") +  
  xlab("Quarter") +  
  scale_fill_discrete(name = "Location")
```



B) HDMI Cable Individual Users

```
a <- HDMICableF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- HDMICableW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- HDMICableS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for HDMI Cable in '17-18 Academic Year")
```

Table 66: Individual Patrons for HDMI Cable in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	378
Winter 2018	382
Spring 2018	362
'17-18 Academic Year	1122

C) HDMI Cable Time Analysis

i.) CLICC YRL


```

yrlHDMICable <- HDMICable[which(HDMICable$CHARGE_PLACE=="CLICC YRL"),]

#Create data frame for a CLICC YRL HDMI Cable time analysis
yrlHDMICable_time <- table(yrlHDMICable$HOUR, yrlHDMICable$DAY_OF_WEEK) %>% data.frame
names(yrlHDMICable_time) <- c("Hour", "Day of Week", "HDMI Cable Checkouts")
yrlHDMICable_time$`Day of Week` <- factor(yrlHDMICable_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

#Table Representation with Hour
yrlHDMICable$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "HDMI Cable Checkouts")) %>%
  kable(caption="Number of HDMI Cable Checkouts per Hour at CLICC YRL")

```

Table 67: Number of HDMI Cable Checkouts per Hour at CLICC YRL

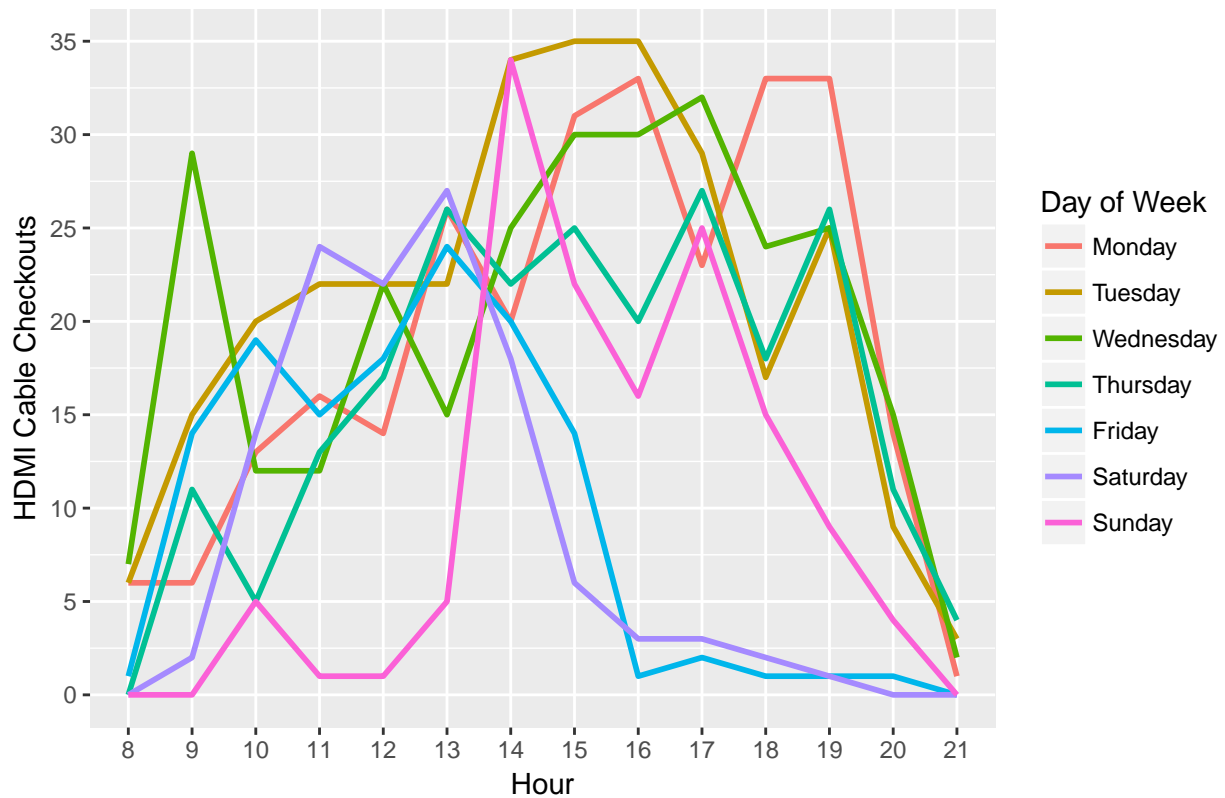
Hour	HDMI Cable Checkouts
8	20
9	77
10	88
11	103
12	116
13	145
14	173
15	163
16	138
17	141
18	110
19	120
20	54
21	10

```

#Graphical representation 1
ggplot(yrlHDMICable_time, aes(x=Hour, y=`HDMI Cable Checkouts`, group=`Day of Week`, color=`Day of Week`))
  geom_line(size=1) +
  scale_y_continuous(breaks=seq(0,35,5)) +
  ggtitle("Time Analysis of CLICC YRL HDMI Cables in '17-18 Academic Year")

```

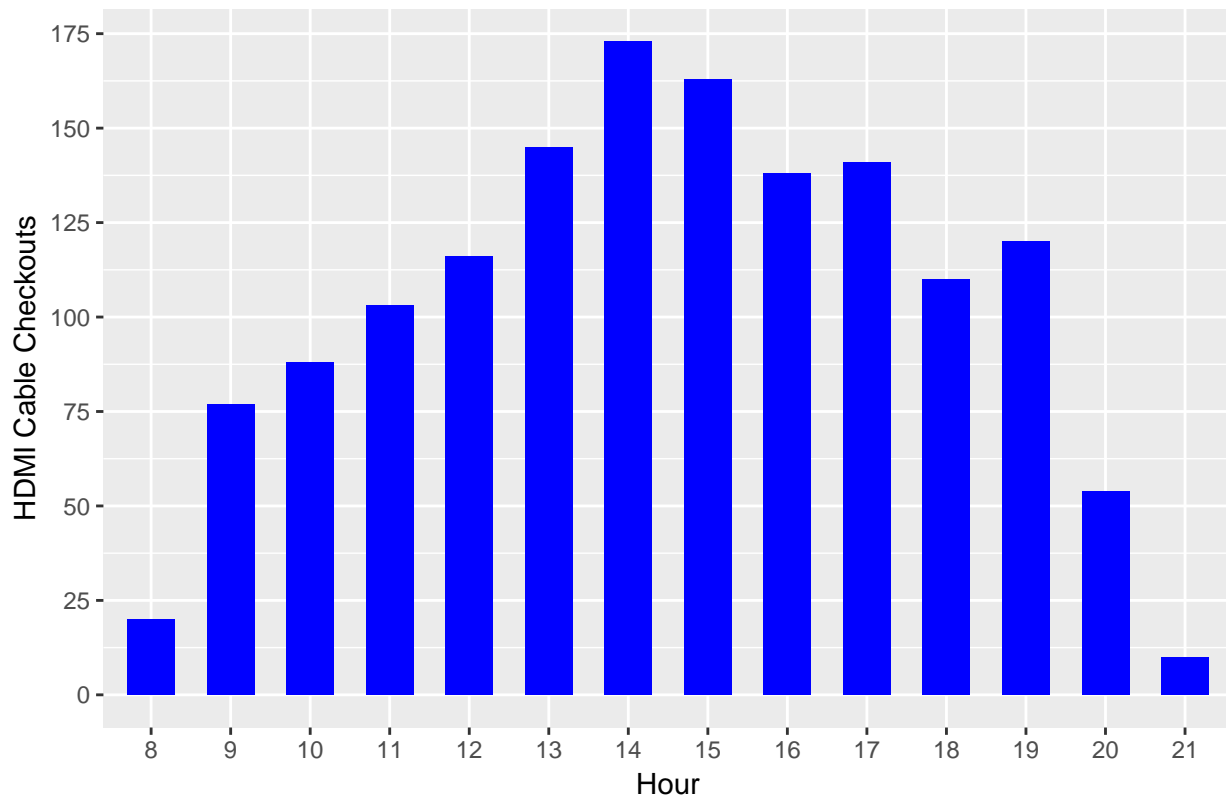
Time Analysis of CLICC YRL HDMI Cables in '17–18 Academic Year



#Graphical representation 2

```
ggplot(yrlHDMICable_time, aes(x=Hour,y=`HDMI Cable Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,175,25)) +
  ggtitle("Time Analysis of CLICC YRL HDMI Cables in '17-18 Academic Year")
```

Time Analysis of CLICC YRL HDMI Cables in '17–18 Academic Year



Part 11) WALL CHARGERS

A) Item Usage

i.) Number of Wall Charger checkouts by quarter

```

wall <- Accessories[str_detect(Accessories$ITEM_ENUM, "-WALL-"),]

#subset wall chargers by quarter
wallF17 <- subset(wall, wall$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  wall$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
wallW18 <- subset(wall, wall$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  wall$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
wallS18 <- subset(wall, wall$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  wall$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(wallF17),nrow(wallW18),nrow(wallS18),nrow(wall)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Wall Charger Checkouts by Quarter")

```

Table 68: Number of Wall Charger Checkouts by Quarter

	Frequency
Fall 2017	263
Winter 2018	444
Spring 2018	650
'17-18 Academic Year	1357

ii.) Number of Wall Charger checkouts by location

```
wall$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%  
  kable(caption="Number of Wall Charger Checkouts by Location")
```

Table 69: Number of Wall Charger Checkouts by Location

.	Freq
CLICC Lab	1206
CLICC Biomed	69
CLICC SEL Boelter	56
CLICC SEL Geology	26

iii.) Number of Wall Charger checkouts by individual barcodes (from most to least used)

```
wall$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%  
  kable(caption = "Wall Charger Checkouts by Individual Barcodes (from most to least used)")
```

Table 70: Wall Charger Checkouts by Individual Barcodes (from most to least used)

.	Freq
LAB-WALL-02	357
LAB-WALL-01	330
LAB-WALL-04	325
LAB-WALL-03	194
BIO-WALL-05	21
BIO-WALL-02	15
BOE-WALL-05	15
BIO-WALL-08	14
GEO-WALL-02	12
BOE-WALL-02	11
BOE-WALL-08	10
BOE-WALL-04	8
GEO-WALL-01	8
BIO-WALL-13	6
BOE-WALL-09	6
GEO-WALL-03	6
BIO-WALL-09	5
BIO-WALL-04	3
BIO-WALL-12	3
BOE-WALL-07	3
BOE-WALL-03	2
BIO-WALL-07	1

.	Freq
BIO-WALL-11	1
BOE-WALL-10	1

*Note: Wall Chargers with barcodes “BIO-WALL-01”, “BIO-WALL-02”, “BIO-WALL-03”, “BIO-WALL-04”, “BIO-WALL-06”, “BIO-WALL-10”, “BOE-WALL-01”, and “BOE-WALL-06” were not used at all in the academic year.

iv.) Number of Wall Charger checkouts by location AND quarter

```
f <- wallF17$CHARGE_PLACE %>% table %>% data.frame()
w <- wallW18$CHARGE_PLACE %>% table %>% data.frame()
s <- wallS18$CHARGE_PLACE %>% table %>% data.frame()
walldf <- merge(f, w, by=".", all = T) %>% merge(., s, by = ".", all = T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
walldf1 <- walldf
walldf1$`'17-18 Academic Year` <- apply(walldf1[2:4], 1, sum)
walldf1 %>% kable(caption="Number of Wall Adapter Checkouts by Location and Quarter")
```

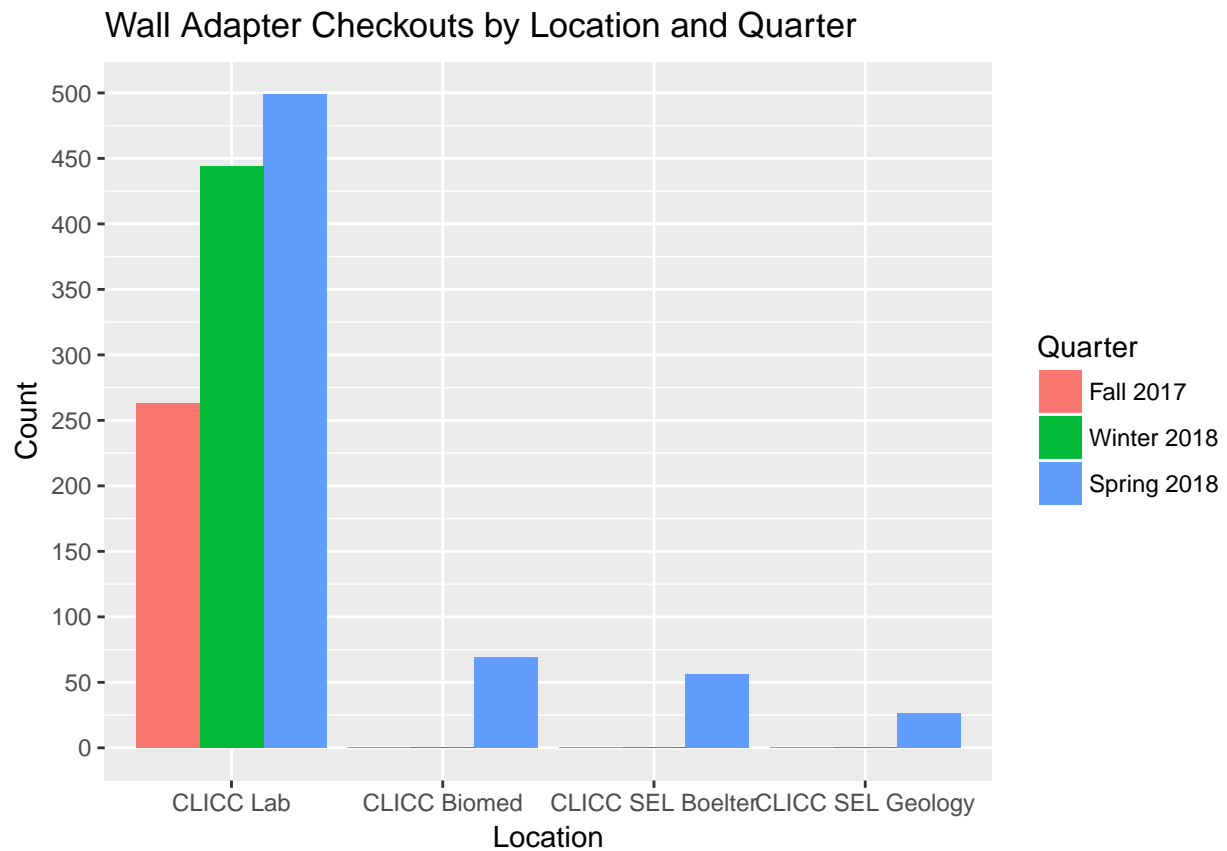
Table 71: Number of Wall Adapter Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Lab	263	444	499	1206
CLICC Biomed	0	0	69	69
CLICC SEL Boelter	0	0	56	56
CLICC SEL Geology	0	0	26	26

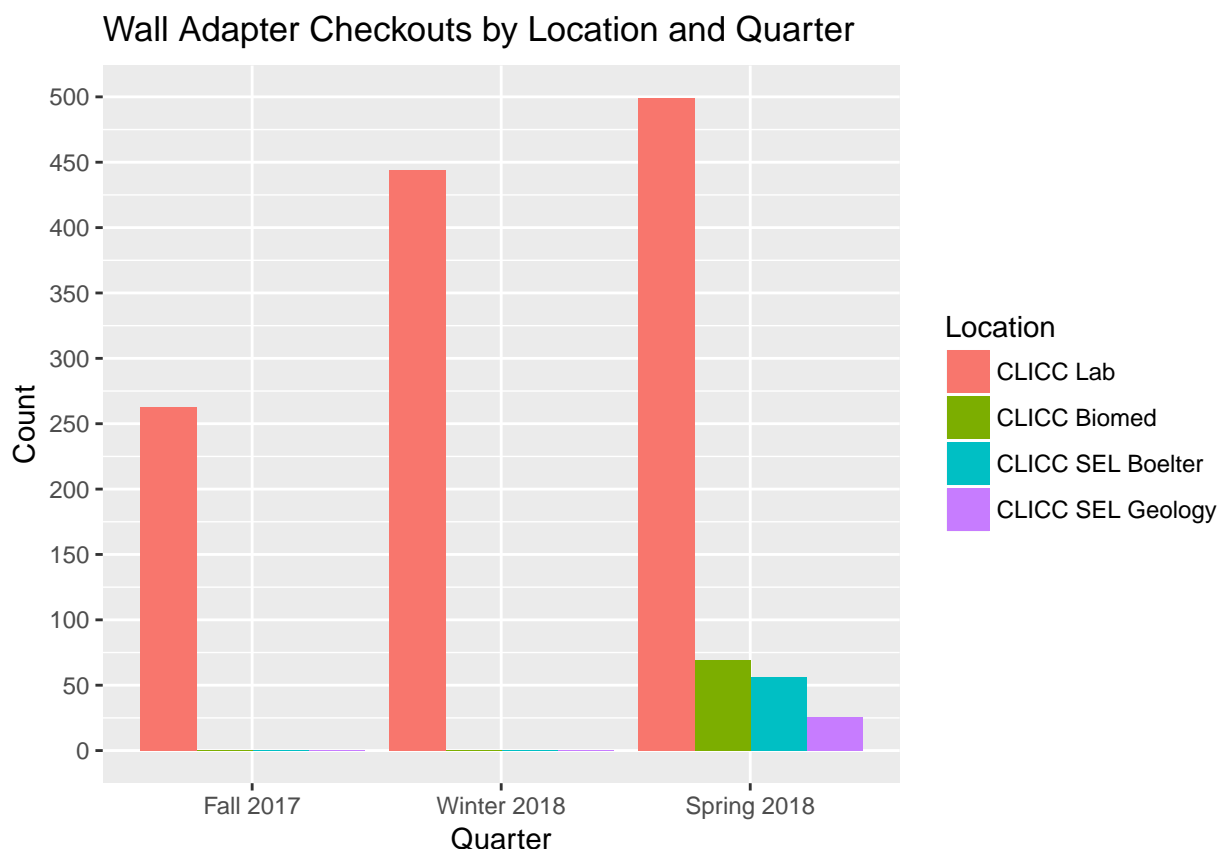
v.) Wall Adapter Graphs

```
walldf2 <- melt(walldf, id.vars=c("Location"))
#Reorder the factor levels
walldf2$Location <- reorder(walldf2$Location, X=desc(walldf2$value))

ggplot(walldf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("Wall Adapter Checkouts by Location and Quarter") +
  ylab("Count") +
  scale_y_continuous(breaks=seq(0,500,50)) +
  scale_fill_discrete(name = "Quarter")
```



```
ggplot(walldf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("Wall Adapter Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_y_continuous(breaks=seq(0,500,50)) +
  scale_fill_discrete(name = "Location")
```



B) Wall Charger Individual Users

```
a <- wallF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- wallW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- wallS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Wall Chargers in '17-18 Academic Year")
```

Table 72: Individual Patrons for Wall Chargers in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	158
Winter 2018	281
Spring 2018	383
'17-18 Academic Year	822

C) Wall Charger Time Analysis

i.) CLICC Lab

```
labwall <- wall[which(wall$CHARGE_PLACE=="CLICC Lab"),]

#Create data frame for a CLICC lab wall chargers time analysis
labwall_time <- table(labwall$HOUR, labwall$DAY_OF_WEEK) %>% data.frame
names(labwall_time) <- c("Hour","Day of Week","Wall Charger Checkouts")
labwall_time$`Day of Week` <- factor(labwall_time$`Day of Week`,
  levels = c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"))

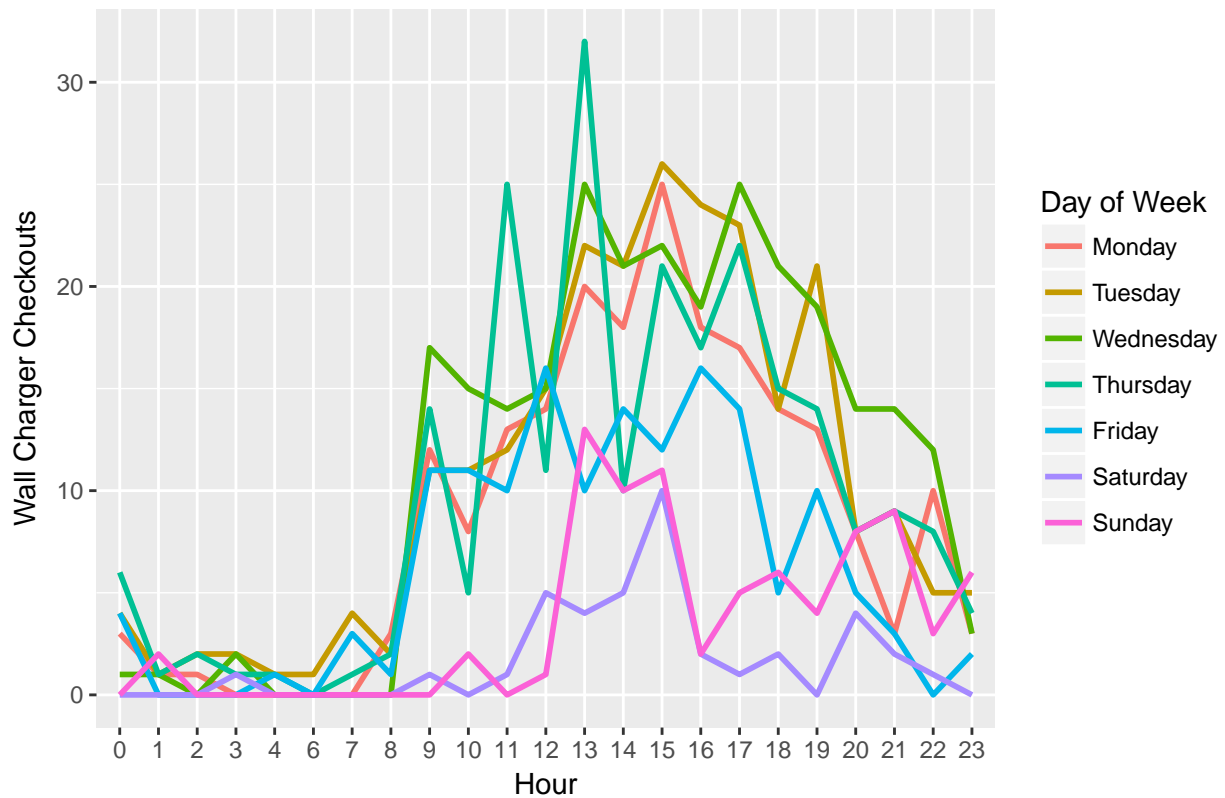
#Table Representation with Hour
labwall$HOUR %>% table %>% data.frame %>% setNames(c("Hour", "Wall Charger Checkouts")) %>%
  kable(caption="Number of Wall Charger Checkouts per Hour at CLICC Lab")
```

Table 73: Number of Wall Charger Checkouts per Hour at CLICC Lab

Hour	Wall Charger Checkouts
0	18
1	6
2	5
3	6
4	3
6	1
7	8
8	8
9	66
10	52
11	75
12	77
13	126
14	99
15	127
16	98
17	107
18	77
19	81
20	55
21	49
22	39
23	23

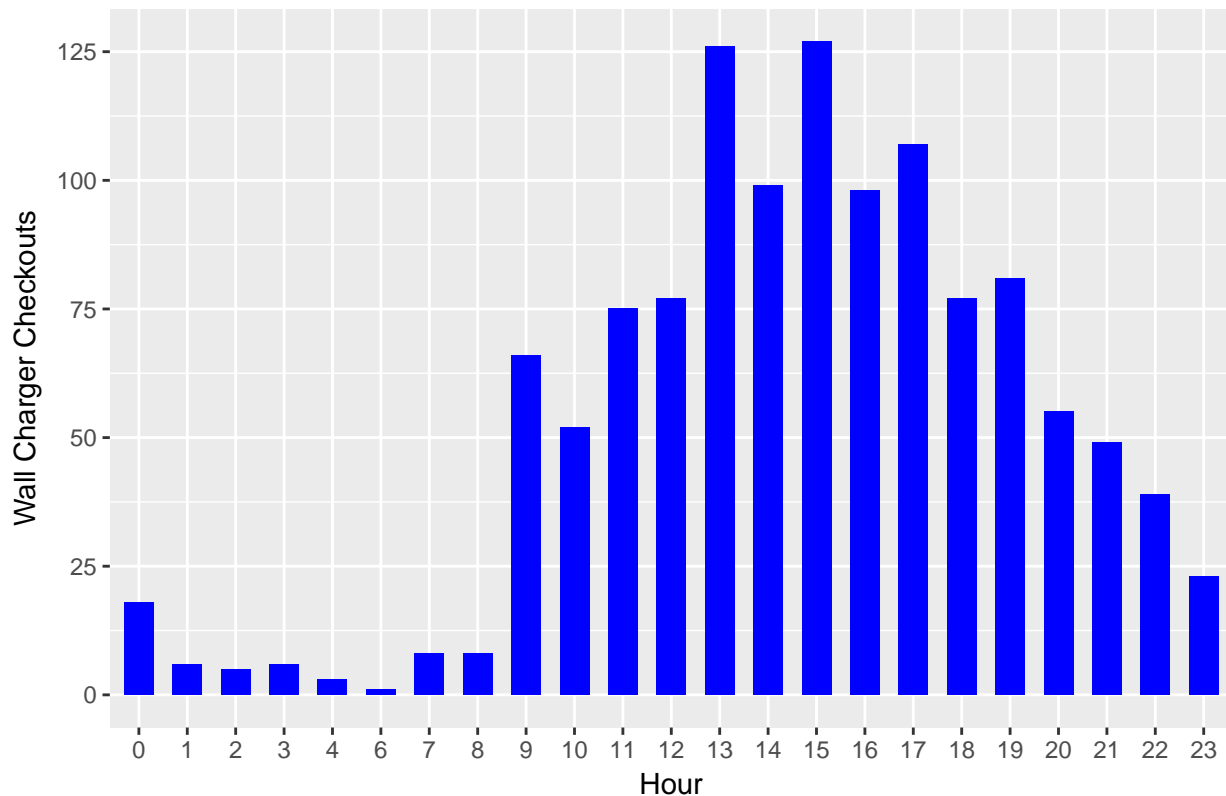
```
#Graphical representation 1
ggplot(labwall_time,
  aes(x=Hour,y=`Wall Charger Checkouts`, group=`Day of Week`,color=`Day of Week`)) +
  geom_line(size=1) +
  ggtitle("Time Analysis of CLICC Lab Wall Chargers in '17-18 Academic Year")
```


Time Analysis of CLICC Lab Wall Chargers in '17-18 Academic Year



```
#Graphical representation 2
ggplot(labwall_time, aes(x=Hour,y=`Wall Charger Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  scale_y_continuous(breaks=seq(0,150,25)) +
  ggtitle("Time Analysis of CLICC Lab Wall Chargers in '17-18 Academic Year")
```

Time Analysis of CLICC Lab Wall Chargers in '17–18 Academic Year



Part 12) CALCULATORS

A) Item Usage

i.) Number of Calculators checkouts by quarter

```
calc <- Accessories[str_detect(Accessories$ITEM_ENUM, "CALC") |
                     str_detect(Accessories$ITEM_ENUM, "GRAPH"),]

#subset calculators by quarter
calcF17 <- subset(calc, calc$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
                  calc$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
calcW18 <- subset(calc, calc$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
                  calc$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
calcS18 <- subset(calc, calc$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
                  calc$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

calcdf <- c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year") %>% data.frame
calcdf$Frequency <- c(nrow(calcF17),nrow(calcW18),nrow(calcS18),nrow(calc))
names(calcdf) <- c("Quarter","Frequency")
calcdf %>% kable(caption="Number of Calculator Checkouts by Quarter")
```

Table 74: Number of Calculator Checkouts by Quarter

Quarter	Frequency
Fall 2017	298
Winter 2018	266
Spring 2018	310
'17-18 Academic Year	874

*Note: Calculators are only available for checkout at CLICC Lab

ii.) Number of Calculator checkouts by individual barcodes (from most to least used)

```
calc$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
  kable(caption = "Calculator Checkouts by Individual Barcodes (from most to least used)")
```

Table 75: Calculator Checkouts by Individual Barcodes (from most to least used)

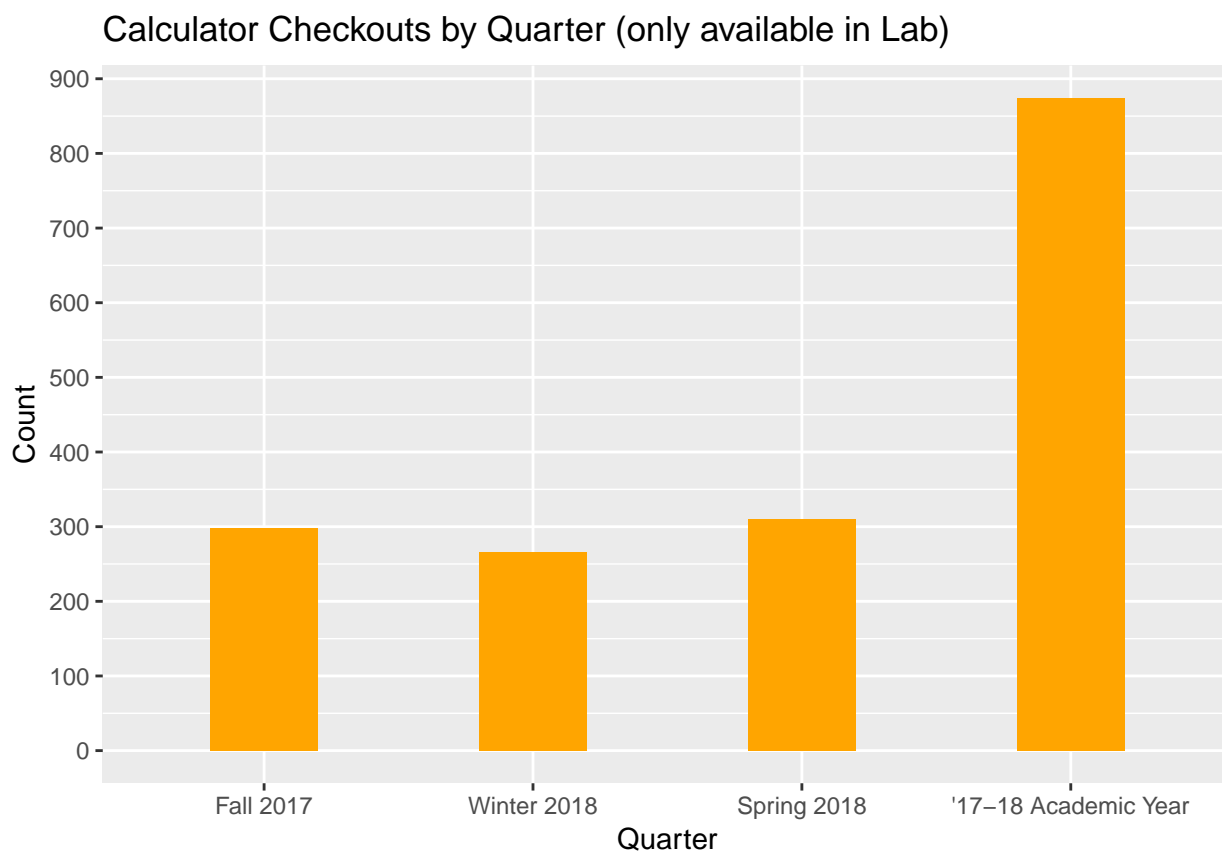
.	Freq
LAB-GRAPH-01	155
LAB-CALCTI-05	139
LAB-CALCTI-03	119
LAB-CALCTI-01	114
LAB-CALCTI-04	105
LAB-CALCTI-02	75
LAB-CALC-02	47
LAB-CALC-05	46
LAB-CALC-03	40
LAB-CALC-04	34

**Note: Calculator with barcode “LAB-CALC-01” was not used at all.

iii.) Calculator Graph

```
calcdf$Quarter <- factor(calcdf$Quarter,
  c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year"))

ggplot(calcdf, aes(x=Quarter, y=Frequency)) +
  geom_col(width=0.4, fill="orange") +
  ggtitle("Calculator Checkouts by Quarter (only available in Lab)") +
  ylab("Count") +
  scale_y_continuous(breaks = seq(0,900,100))
```



B) Calculator Individual Users

```
a <- calcF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- calcW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- calcS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Calculators in '17-18 Academic Year")
```

Table 76: Individual Patrons for Calculators in '17-18 Academic Year

Number of Individual Patrons	
Fall 2017	161
Winter 2018	165
Spring 2018	196
'17-18 Academic Year	522

C) Calculator Time Analysis

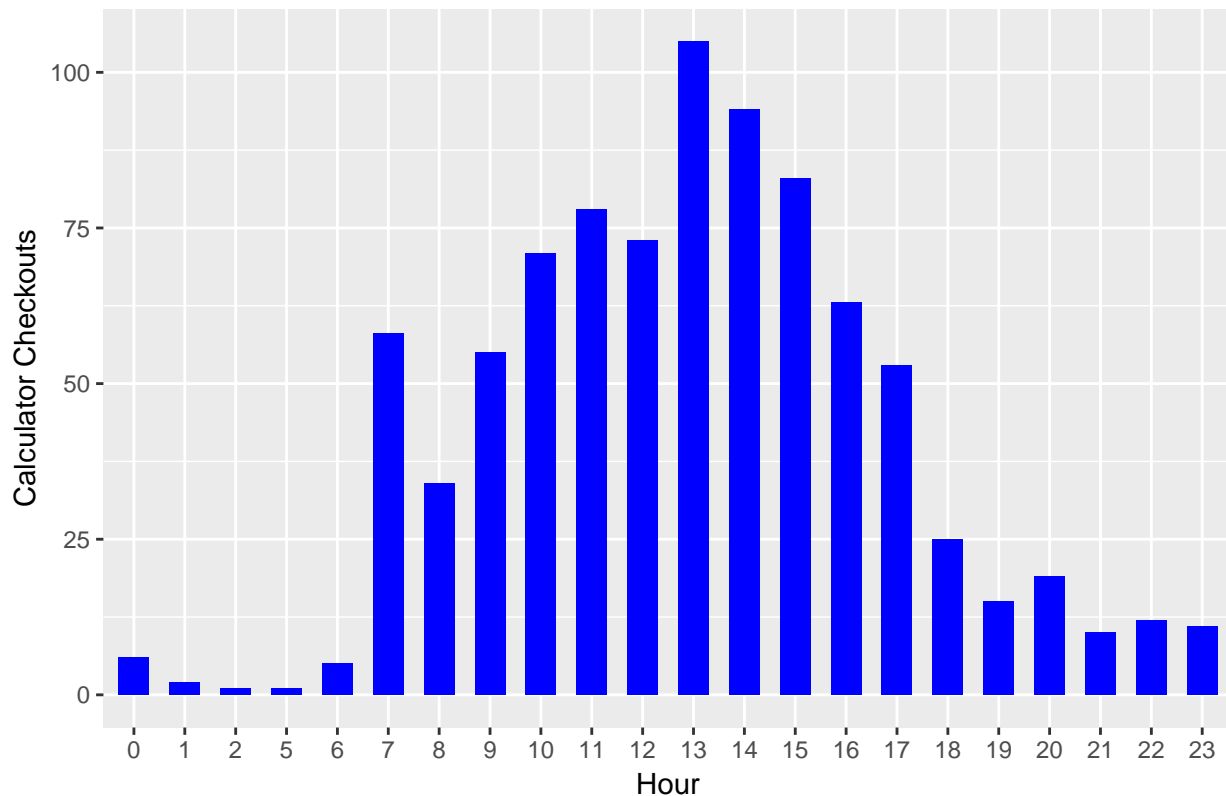
```
#Table Representation with Hour
calc_time <- table(calc$HOUR) %>% data.frame
names(calc_time) <- c("Hour","Calculator Checkouts")
calc_time %>% kable(caption="Number of Calculator Checkouts per Hour at CLICC Lab")
```

Table 77: Number of Calculator Checkouts per Hour at CLICC Lab

Hour	Calculator Checkouts
0	6
1	2
2	1
5	1
6	5
7	58
8	34
9	55
10	71
11	78
12	73
13	105
14	94
15	83
16	63
17	53
18	25
19	15
20	19
21	10
22	12
23	11

```
#Graphical representation
ggplot(calc_time, aes(x=Hour,y=`Calculator Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  ggtitle("Time Analysis of CLICC Lab Calculators in '17-18 Academic Year")
```

Time Analysis of CLICC Lab Calculators in '17–18 Academic Year



Part 13) SUPER DRIVES

A) Item Usage

i.) Number of Super drive checkouts by quarter

```
superdrive <- Accessories[str_detect(Accessories$ITEM_ENUM, "-SUP-"),]

#subset super drive by quarter
superdriveF17 <- subset(superdrive, superdrive$CHARGE_DATE >= as.POSIXct("2017-10-02 00:01:00") &
  superdrive$CHARGE_DATE <= as.POSIXct("2017-12-15 00:01:00"))
superdriveW18 <- subset(superdrive, superdrive$CHARGE_DATE >= as.POSIXct("2018-01-08 00:01:00") &
  superdrive$CHARGE_DATE <= as.POSIXct("2018-03-23 00:01:00"))
superdriveS18 <- subset(superdrive, superdrive$CHARGE_DATE >= as.POSIXct("2018-04-02 00:01:00") &
  superdrive$CHARGE_DATE <= as.POSIXct("2018-06-15 00:01:00"))

data.frame(c(nrow(superdriveF17),nrow(superdriveW18),nrow(superdriveS18),nrow(superdrive)),
  row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Frequency") %>% kable(caption="Number of Superdrive Checkouts by Quarter")
```

Table 78: Number of Superdrive Checkouts by Quarter

	Frequency
Fall 2017	33
Winter 2018	56
Spring 2018	69
'17-18 Academic Year	158

ii.) Number of Super drive checkouts by location

```
superdrive$CHARGE_PLACE %>% table %>% sort(decreasing=T) %>%
  kable(caption="Number of Super drive Checkouts by Location")
```

Table 79: Number of Super drive Checkouts by Location

.	Freq
CLICC YRL	42
CLICC Music	40
CLICC Powell	36
CLICC Biomed	22
CLICC Arts	10
CLICC SEL Boelter	7
CLICC Classrooms	1

iii.) Number of Super drive checkouts by individual barcodes (from most to least used)

```
superdrive$ITEM_ENUM %>% table %>% sort(decreasing=T) %>%
  kable(caption = "Super drive Checkouts by Individual Barcodes (from most to least used)")
```

Table 80: Super drive Checkouts by Individual Barcodes (from most to least used)

.	Freq
YRL-SUP-01	24
MUS-SUP-01	21
POW-SUP-01	20
MUS-SUP-02	19
YRL-SUP-02	18
BIO-SUP-01	17
POW-SUP-02	16
ART-SUP-02	9
BIO-SUP-02	5
BOE-SUP-02	5
BOE-SUP-01	2
ART-SUP-01	1
CLASS-SUP-01	1

iv.) Number of Super drive checkouts by location AND quarter

```
f <- superdriveF17$CHARGE_PLACE %>% table %>% data.frame()
w <- superdriveW18$CHARGE_PLACE %>% table %>% data.frame()
```

```

s <- superdriveS18$CHARGE_PLACE %>% table %>% data.frame()
superdrivedf <- merge(f, w, by=".", all = T) %>% merge(., s, by = ".", all = T) %>%
  setNames(c("Location", "Fall 2017", "Winter 2018", "Spring 2018")) %>%
  mutate_if(is.numeric, funs(ifelse(is.na(.), 0, .)))
#Make a new dataframe to include the entire academic year
superdrivedf1 <- superdrivedf
superdrivedf1$`'17-18 Academic Year` <- apply(superdrivedf1[2:4], 1, sum)
superdrivedf1 %>% kable(caption="Number of Super drive Checkouts by Location and Quarter")

```

Table 81: Number of Super drive Checkouts by Location and Quarter

Location	Fall 2017	Winter 2018	Spring 2018	'17-18 Academic Year
CLICC Arts	1	5	4	10
CLICC Biomed	5	7	10	22
CLICC Music	10	21	9	40
CLICC Powell	5	9	22	36
CLICC SEL Boelter	2	3	2	7
CLICC YRL	10	10	22	42
CLICC Classrooms	0	1	0	1

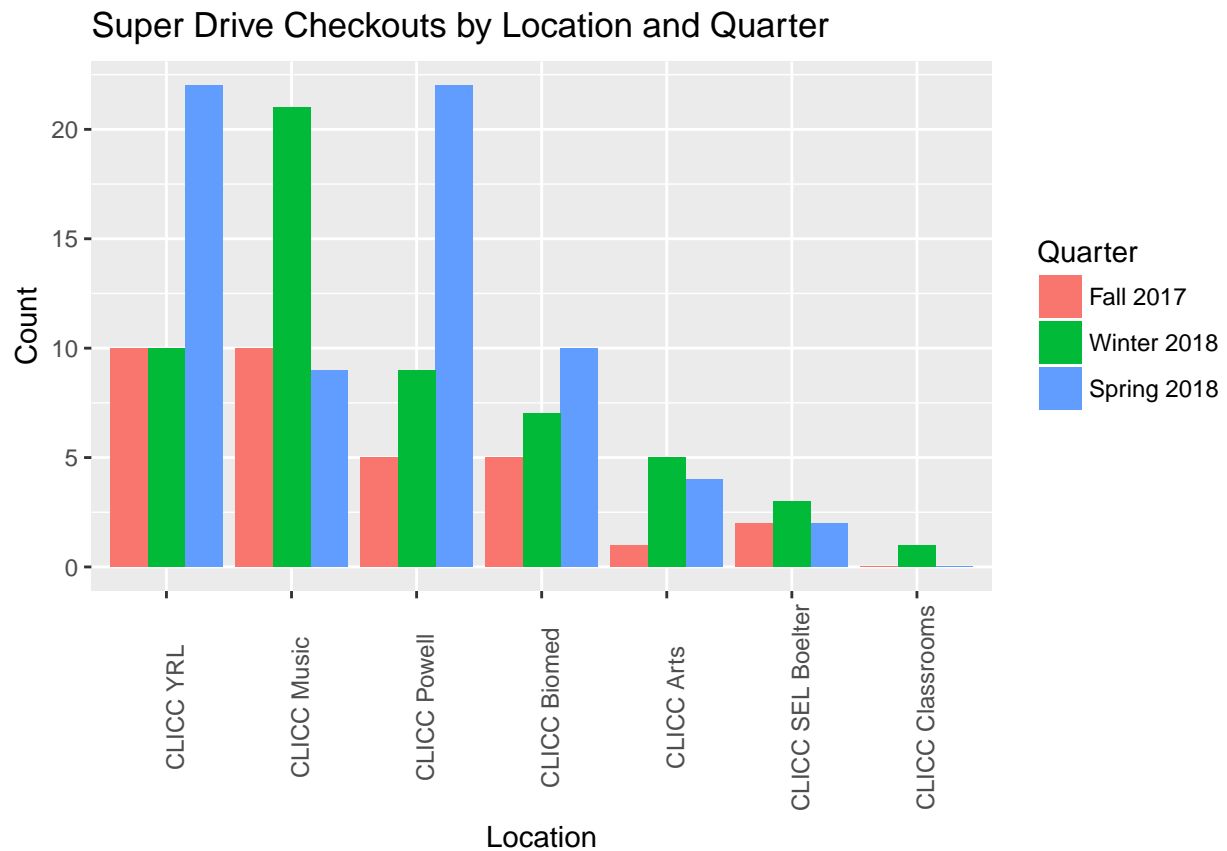
v.) Super Drive Graphs

```

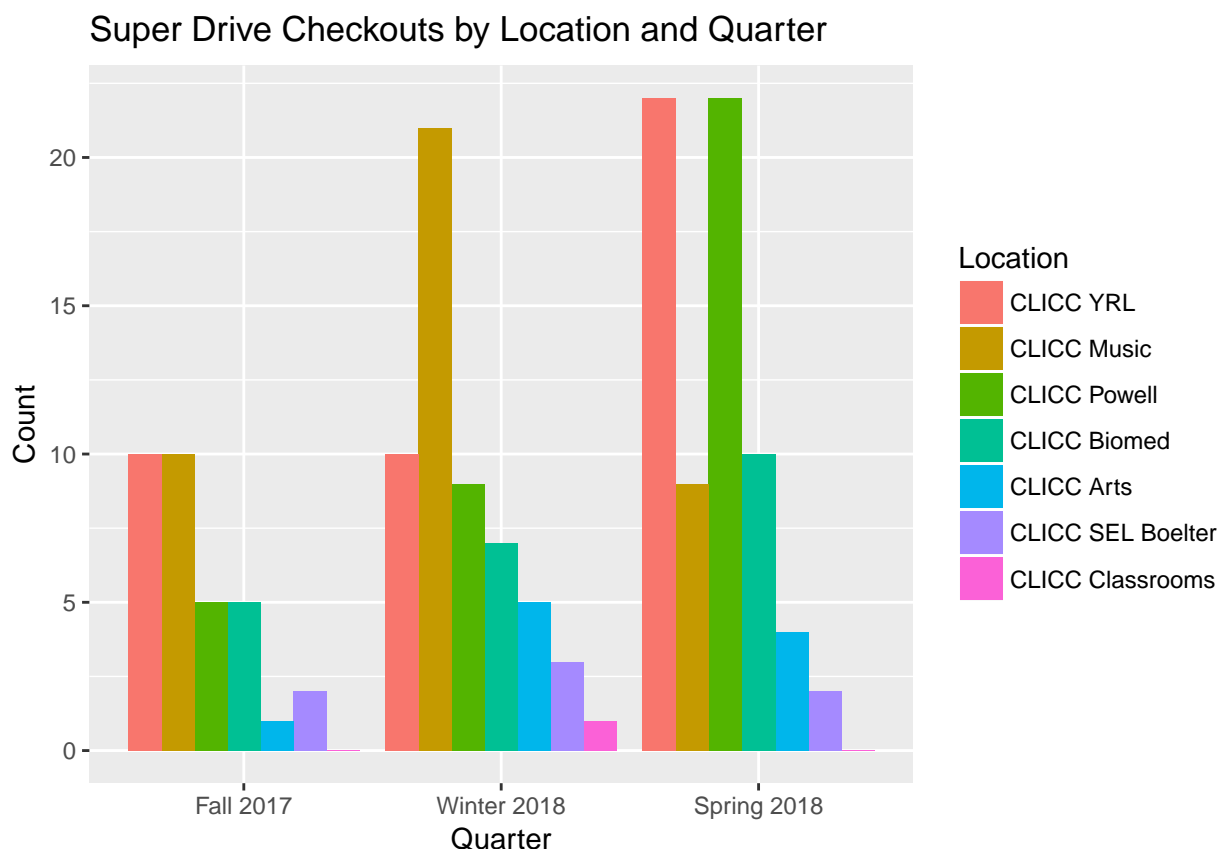
superdrivedf2 <- melt(superdrivedf, id.vars=c("Location"))
#Reorder the factor levels
superdrivedf2$Location <- reorder(superdrivedf2$Location, X=desc(superdrivedf2$value))

ggplot(superdrivedf2, aes(x=Location, y=value, group=variable, fill=variable)) +
  geom_col(position="dodge") +
  ggtitle("Super Drive Checkouts by Location and Quarter") +
  ylab("Count") +
  theme(axis.text.x = element_text(angle = 90)) +
  scale_fill_discrete(name = "Quarter")

```

```
ggplot(superdrivedf2, aes(x=variable, y=value, group=Location, fill=Location)) +
  geom_col(position="dodge") +
  ggtitle("Super Drive Checkouts by Location and Quarter") +
  ylab("Count") +
  xlab("Quarter") +
  scale_fill_discrete(name = "Location")
```



B) Super Drive Individual Users

```
a <- superdriveF17$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
b <- superdriveW18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length
c <- superdriveS18$INSTITUTION_ID %>% table %>% sort(decreasing = T) %>% length

c(a, b, c, (a+b+c)) %>%
  as.data.frame(row.names = c("Fall 2017", "Winter 2018", "Spring 2018", "'17-18 Academic Year")) %>%
  setNames("Number of Individual Patrons") %>%
  kable(caption="Individual Patrons for Super Drives in '17-18 Academic Year")
```

Table 82: Individual Patrons for Super Drives in '17-18 Academic Year

	Number of Individual Patrons
Fall 2017	25
Winter 2018	32
Spring 2018	46
'17-18 Academic Year	103

C) Super Drive Time Analysis

```
#Table Representation with Hour
superdrive_time <- table(superdrive$HOUR) %>% data.frame
names(superdrive_time) <- c("Hour", "Super Drive Checkouts")
superdrive_time %>% kable(caption="Number of Super Drive Checkouts per Hour")
```

Table 83: Number of Super Drive Checkouts per Hour

Hour	Super Drive Checkouts
9	10
10	6
11	17
12	16
13	25
14	16
15	17
16	12
17	19
18	12
19	5
20	2
21	1

```
#Graphical representation
ggplot(superdrive_time, aes(x=Hour, y=`Super Drive Checkouts`)) +
  geom_col(width=0.6, fill="blue") +
  ggtitle("Time Analysis of Super Drive Checkouts in '17-18 Academic Year")
```

Time Analysis of Super Drive Checkouts in '17–18 Academic Year

