

Sinthuja-s-CIND-820-Code.R

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2021-07-10

```
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
```

```
#install.packages("polycor")  
library(polycor)  
EvaluationRaw <- read.csv('ApartmentBuildingEvaluation.csv', header= TRUE)  
summary(EvaluationRaw)
```

```
##      X_id      BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS  
## Min.   :260124   Min.    :1      Min.    : 0.000   Min.    :  0.00  
## 1st Qu.:260992   1st Qu.:3      1st Qu.: 3.000   1st Qu.: 24.00  
## Median :261861   Median :4      Median : 5.000   Median : 52.00  
## Mean   :261861   Mean    :4      Mean    : 7.713   Mean    : 90.83  
## 3rd Qu.:262730   3rd Qu.:5      3rd Qu.:10.000   3rd Qu.:124.00  
## Max.    :263598   Max.    :5      Max.    :51.000   Max.    :4111.00  
##  
##      NA's      :1314  
##      ELEVATORS  ENTRANCE_DOORS WINDOWS ENTRANCE_LOBBY  EVALUATION_COMPLETED_ON  
## Min.    :2.000   Min.    :1.000      Min.    :2.000      : 348  
## 1st Qu.:4.000   1st Qu.:4.000      1st Qu.:3.000   10/30/2019: 85  
## Median :4.000   Median :4.000      Median :4.000   11/27/2019: 80  
## Mean    :4.107   Mean    :3.924      Mean    :3.973   11/28/2019: 76  
## 3rd Qu.:5.000   3rd Qu.:4.000      3rd Qu.:4.000   10/28/2019: 71  
## Max.    :5.000   Max.    :5.000      Max.    :5.000   11/18/2019: 71  
## NA's    :1551   NA's    :353      NA's    :353      (Other)   :2744  
##      EXTERIOR_CLADDING EXTERIOR_GROUNDS EXTERIOR_WALKWAYS GARBAGE_BIN_STORAGE_AREA  
## Min.    :1.00    Min.    :1.000    Min.    :1.000    Min.    :1.000  
## 1st Qu.:3.00    1st Qu.:3.000    1st Qu.:3.000    1st Qu.:3.000  
## Median :4.00    Median :4.000    Median :4.000    Median :4.000  
## Mean    :3.74    Mean    :3.876    Mean    :3.856    Mean    :3.821
```

```

## 3rd Qu.:4.00      3rd Qu.:4.000      3rd Qu.:4.000      3rd Qu.:4.000
## Max.      :5.00      Max.      :5.000      Max.      :5.000      Max.      :5.000
## NA's      :354      NA's      :355      NA's      :354      NA's      :354
## GARBAGE_CHUTE_ROOMS      GRAFFITI      INTERIOR_LIGHTING_LEVELS
## Min.      :1.000      Min.      :1.000      Min.      :1.000
## 1st Qu.:3.000      1st Qu.:5.000      1st Qu.:3.000
## Median :4.000      Median :5.000      Median :4.000
## Mean    :3.816      Mean    :4.743      Mean    :3.936
## 3rd Qu.:4.000      3rd Qu.:5.000      3rd Qu.:4.000
## Max.      :5.000      Max.      :5.000      Max.      :5.000
## NA's      :2064      NA's      :354      NA's      :354
## INTERIOR_WALL_CEILING_FLOOR      INTERNAL_GUARDS_HANDRAILS      LAUNDRY_ROOMS
## Min.      :1.00      Min.      :2.000      Min.      :1.000
## 1st Qu.:3.00      1st Qu.:3.000      1st Qu.:3.000
## Median :4.00      Median :4.000      Median :4.000
## Mean    :3.74      Mean    :3.866      Mean    :3.803
## 3rd Qu.:4.00      3rd Qu.:4.000      3rd Qu.:4.000
## Max.      :5.00      Max.      :5.000      Max.      :5.000
## NA's      :354      NA's      :354      NA's      :465
## NO_OF_AREAS_EVALUATED      OTHER_FACILITIES      PARKING_AREA      PROPERTY_TYPE
## Min.      : 0.00      Min.      :2.000      Min.      :1.000      PRIVATE      :2909
## 1st Qu.:15.00      1st Qu.:4.000      1st Qu.:3.000      SOCIAL HOUSING: 238
## Median :17.00      Median :4.000      Median :4.000      TCHC      : 328
## Mean    :15.57      Mean    :4.322      Mean    :3.572
## 3rd Qu.:19.00      3rd Qu.:5.000      3rd Qu.:4.000
## Max.      :20.00      Max.      :5.000      Max.      :5.000
## NA's      :2838      NA's      :635
## RESULTS_OF_SCORE      RSN
## : 22      Min.      :4152554
## Building Audit : 19      1st Qu.:4153688
## Evaluation needs to be conducted in 1 year : 313      Median :4154609
## Evaluation needs to be conducted in 2 years:1847      Mean    :4172264
## Evaluation needs to be conducted in 3 years:1274      3rd Qu.:4155556
## Max.      :4902355
## SCORE      SECURITY      SITE_ADDRESS
## Min.      : 37.00      Min.      :1.00      1625-1641 KINGSTON RD      : 3
## 1st Qu.: 72.00      1st Qu.:4.00      40-50 ALEXANDER ST      : 3
## Median : 78.00      Median :5.00      2085-2101 ISLINGTON AVE      : 2
## Mean    : 77.41      Mean    :4.47      740 MIDLAND AVE      : 2
## 3rd Qu.: 83.00      3rd Qu.:5.00      75-85 SILVER SPRINGS BLVD : 2
## Max.      :100.00      Max.      :5.00      85-95 THORNCLIFFE PARK DR : 2
## NA's      :22      NA's      :355      (Other)      :3461
## STAIRWELLS      STORAGE_AREAS_LOCKERS      WARD
## Min.      :1.000      Min.      :1.000      Min.      : 1.00
## 1st Qu.:3.000      1st Qu.:3.000      1st Qu.: 5.00
## Median :4.000      Median :4.000      Median :12.00
## Mean    :3.724      Mean    :3.789      Mean    :11.08
## 3rd Qu.:4.000      3rd Qu.:4.000      3rd Qu.:16.00
## Max.      :5.000      Max.      :5.000      Max.      :25.00

```

```
## NA's :353 NA's :1934
## WATER_PEN_EXT_BLDG_ELEMENTS YEAR_BUILT YEAR_REGISTERED
## Min. :1.00 Min. :1805 Min. :2017
## 1st Qu.:4.00 1st Qu.:1955 1st Qu.:2017
## Median :4.00 Median :1962 Median :2017
## Mean :3.94 Mean :1962 Mean :2017
## 3rd Qu.:4.00 3rd Qu.:1970 3rd Qu.:2017
## Max. :5.00 Max. :2019 Max. :2021
## NA's :354 NA's :29 NA's :100
```

```
head(EvaluationRaw)
```

```
## X_id BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS ELEVATORS
## 1 260124 NA 4 29 3
## 2 260125 NA 3 11 NA
## 3 260126 NA 4 23 NA
## 4 260127 4 12 96 4
## 5 260128 NA 4 30 4
## 6 260129 NA 8 88 4
## ENTRANCE_DOORS_WINDOWS ENTRANCE_LOBBY EVALUATION_COMPLETED_ON
## 1 4 3 11/05/2020
## 2 NA NA
## 3 4 4 12/08/2020
## 4 4 4 11/10/2020
## 5 5 5 12/03/2019
## 6 3 4 12/16/2020
## EXTERIOR_CLADDING EXTERIOR_GROUNDS EXTERIOR_WALKWAYS GARBAGE_BIN_STORAGE_AREA
## 1 3 3 3 4
## 2 NA NA NA NA
## 3 4 3 3 3
## 4 4 4 4 3
## 5 4 4 4 5
## 6 4 3 3 4
## GARBAGE_CHUTE_ROOMS GRAFFITI INTERIOR_LIGHTING_LEVELS
## 1 NA 4 4
## 2 NA NA NA
## 3 NA 4 4
## 4 3 3 4
## 5 4 4 5
## 6 NA 4 4
## INTERIOR_WALL_CEILING_FLOOR INTERNAL_GUARDS_HANDRAILS LAUNDRY_ROOMS
## 1 3 4 4
## 2 NA NA NA
## 3 3 3 4
## 4 3 4 3
## 5 4 4 5
## 6 4 4 4
## NO_OF_AREAS_EVALUATED OTHER_FACILITIES PARKING_AREA PROPERTY_TYPE
## 1 15 NA NA SOCIAL HOUSING
```

## 2	0	NA	NA	PRIVATE
## 3	14	NA	NA	SOCIAL HOUSING
## 4	19	NA	3	PRIVATE
## 5	16	NA	NA	PRIVATE
## 6	16	NA	3	PRIVATE
##		RESULTS_OF_SCORE	RSN SCORE	SECURITY
## 1	Evaluation needs to be conducted in 2 years		4153010	69 4
## 2	Evaluation needs to be conducted in 1 year		4153027	60 NA
## 3	Evaluation needs to be conducted in 2 years		4153035	73 5
## 4	Evaluation needs to be conducted in 2 years		4153486	74 5
## 5	Evaluation needs to be conducted in 3 years		4153496	86 4
## 6	Evaluation needs to be conducted in 2 years		4153497	75 4
##	SITE_ADDRESS	STAIRWELLS	STORAGE_AREAS	LOCKERS WARD
## 1	194 DOWLING AVE	3	NA	4
## 2	1479 QUEEN ST W	NA	NA	4
## 3	1387 QUEEN ST W	3	NA	4
## 4	100 ALEXANDER ST	3	4	13
## 5	77 WELLESLEY ST E	4	NA	13
## 6	85 WELLESLEY ST E	4	NA	13
##	WATER_PEN_EXT_BLDG_ELEMENTS	YEAR_BUILT	YEAR_REGISTERED	
## 1		3	2010	2017
## 2		NA	1917	2017
## 3		4	1910	2017
## 4		4	1968	2017
## 5		4	1926	2017
## 6		4	1965	2018

```
Evaluation1 <- na.omit(EvaluationRaw)
```

#Removed the blanks from the data set as it was incomplete data. The N/A were removed to ensure that all data was filled accurately missing data was removed as there was no score or certain attributes were not taken into consideration.

```
summary(Evaluation1)
```

##	X_id	BALCONY_GUARDS	CONFIRMED_STOREYS	CONFIRMED_UNITS
##	Min. :260132	Min. :2.000	Min. : 3.0	Min. : 21
##	1st Qu.:261110	1st Qu.:4.000	1st Qu.:10.0	1st Qu.:121
##	Median :261989	Median :4.000	Median :16.0	Median :175
##	Mean :261942	Mean :4.235	Mean :15.5	Mean :194
##	3rd Qu.:262832	3rd Qu.:5.000	3rd Qu.:19.0	3rd Qu.:235
##	Max. :263562	Max. :5.000	Max. :37.0	Max. :575
##	ELEVATORS	ENTRANCE_DOORS_WINDOWS	ENTRANCE_LOBBY	EVALUATION_COMPLETED_ON
##	Min. :2.00	Min. :3.000	Min. :3.00	10/29/2019: 17
##	1st Qu.:4.00	1st Qu.:4.000	1st Qu.:4.00	11/07/2019: 15
##	Median :4.00	Median :4.000	Median :5.00	11/27/2019: 14
##	Mean :4.28	Mean :4.263	Mean :4.49	11/06/2019: 13
##	3rd Qu.:5.00	3rd Qu.:5.000	3rd Qu.:5.00	10/28/2019: 12
##	Max. :5.00	Max. :5.000	Max. :5.00	11/28/2019: 10
##				(Other) :162

```

## EXTERIOR_CLADDING EXTERIOR_GROUNDS EXTERIOR_WALKWAYS GARBAGE_BIN_STORAGE_AREA
## Min. :2.000 Min. :3.000 Min. :2.000 Min. :2.00
## 1st Qu.:4.000 1st Qu.:4.000 1st Qu.:4.000 1st Qu.:4.00
## Median :4.000 Median :4.000 Median :4.000 Median :4.00
## Mean :3.979 Mean :4.148 Mean :4.049 Mean :4.14
## 3rd Qu.:4.000 3rd Qu.:5.000 3rd Qu.:5.000 3rd Qu.:5.00
## Max. :5.000 Max. :5.000 Max. :5.000 Max. :5.00
##
## GARBAGE_CHUTE_ROOMS GRAFFITI INTERIOR_LIGHTING_LEVELS
## Min. :2.00 Min. :2.000 Min. :2.000
## 1st Qu.:4.00 1st Qu.:5.000 1st Qu.:4.000
## Median :4.00 Median :5.000 Median :4.000
## Mean :4.07 Mean :4.844 Mean :4.309
## 3rd Qu.:5.00 3rd Qu.:5.000 3rd Qu.:5.000
## Max. :5.00 Max. :5.000 Max. :5.000
##
## INTERIOR_WALL_CEILING_FLOOR INTERNAL_GUARDS_HANDRAILS LAUNDRY_ROOMS
## Min. :2.000 Min. :3.000 Min. :3.00
## 1st Qu.:4.000 1st Qu.:4.000 1st Qu.:4.00
## Median :4.000 Median :4.000 Median :4.00
## Mean :3.992 Mean :4.148 Mean :4.21
## 3rd Qu.:4.000 3rd Qu.:5.000 3rd Qu.:5.00
## Max. :5.000 Max. :5.000 Max. :5.00
##
## NO_OF_AREAS_EVALUATED OTHER_FACILITIES PARKING_AREA PROPERTY_TYPE
## Min. :20 Min. :3.000 Min. :1.000 PRIVATE :200
## 1st Qu.:20 1st Qu.:4.000 1st Qu.:3.000 SOCIAL HOUSING: 25
## Median :20 Median :5.000 Median :4.000 TCHC : 18
## Mean :20 Mean :4.428 Mean :3.667
## 3rd Qu.:20 3rd Qu.:5.000 3rd Qu.:4.000
## Max. :20 Max. :5.000 Max. :5.000
##
##
## RESULTS_OF_SCORE RSN
## : 0 Min. :4152570
## Building Audit : 0 1st Qu.:4153814
## Evaluation needs to be conducted in 1 year : 3 Median :4154773
## Evaluation needs to be conducted in 2 years: 69 Mean :4166086
## Evaluation needs to be conducted in 3 years:171 3rd Qu.:4155798
## Max. :4626360
##
##
## SCORE SECURITY SITE_ADDRESS STAIRWELLS
## Min. :59.00 Min. :3.00 40-50 ALEXANDER ST : 3 Min. :2.000
## 1st Qu.:79.50 1st Qu.:5.00 2085-2101 ISLINGTON AVE : 2 1st Qu.:4.000
## Median :85.00 Median :5.00 1 RICHVIEW RD : 1 Median :4.000
## Mean :84.12 Mean :4.72 1 ROSEMOUNT DR : 1 Mean :3.979
## 3rd Qu.:90.00 3rd Qu.:5.00 10 BOULTBEE AVE : 1 3rd Qu.:4.500
## Max. :99.00 Max. :5.00 10 CHICHESTER PL : 1 Max. :5.000
## (Other) :234
##
## STORAGE_AREAS_LOCKERS WARD WATER_PEN_EXT_BLDG_ELEMENTS
## Min. :2.000 Min. : 1.00 Min. :2.000

```

```
## 1st Qu.:4.000      1st Qu.: 6.00    1st Qu.:4.000
## Median :4.000      Median :12.00   Median :4.000
## Mean   :3.988      Mean   :12.21    Mean   :4.177
## 3rd Qu.:4.000      3rd Qu.:17.00   3rd Qu.:5.000
## Max.   :5.000      Max.    :25.00   Max.    :5.000
##
##      YEAR_BUILT    YEAR_REGISTERED
## Min.      :1955    Min.       :2017
## 1st Qu.:1965    1st Qu.:2017
## Median :1969    Median :2017
## Mean     :1973    Mean     :2017
## 3rd Qu.:1974    3rd Qu.:2017
## Max.     :2019    Max.     :2019
##
```

```
Evaluation1$PROPERTY_TYPE <- as.character(Evaluation1$PROPERTY_TYPE)
#Changed the property type from factor to character.
str(Evaluation1)
```

```
## 'data.frame':    243 obs. of  33 variables:
## $ X_id          : int   260132 260137 260156 260162 260186 260234 260
246 260263 260264 260293 ...
## $ BALCONY_GUARDS      : num   4 4 4 4 5 5 5 4 4 4 ...
## $ CONFIRMED_STOREYS   : num   33 19 15 6 25 19 17 9 7 12 ...
## $ CONFIRMED_UNITS     : num   319 225 203 75 547 224 146 130 150 83 ...
## $ ELEVATORS           : num    5 4 3 4 4 3 5 3 4 4 ...
## $ ENTRANCE_DOORS_WINDOWS : num   4 4 4 5 4 5 5 4 4 4 ...
## $ ENTRANCE_LOBBY      : num    5 5 3 5 5 3 5 4 4 5 ...
## $ EVALUATION_COMPLETED_ON : Factor w/ 203 levels "", "01/02/2018",...: 67 133 14
5 111 150 91 191 117 100 177 ...
## $ EXTERIOR_CLADDING   : num    3 4 4 4 4 5 5 3 4 4 ...
## $ EXTERIOR_GROUNDS    : num    4 4 4 4 4 4 5 4 4 4 ...
## $ EXTERIOR_WALKWAYS    : num    5 3 4 4 4 4 5 4 4 4 ...
## $ GARBAGE_BIN_STORAGE_AREA : num    4 4 4 5 4 4 5 4 5 4 ...
## $ GARBAGE_CHUTE_ROOMS  : num    4 4 4 5 5 3 3 4 4 4 ...
## $ GRAFFITI            : num    5 5 5 5 5 4 5 5 5 4 ...
## $ INTERIOR_LIGHTING_LEVELS : num    5 3 4 5 4 4 5 3 3 5 ...
## $ INTERIOR_WALL_CEILING_FLOOR: num    5 4 4 4 4 3 4 3 3 4 ...
## $ INTERNAL_GUARDS_HANDRAILS : num    4 4 4 4 3 4 5 4 4 4 ...
## $ LAUNDRY_ROOMS       : num    5 4 4 4 4 4 3 4 4 5 ...
## $ NO_OF_AREAS_EVALUATED : int   20 20 20 20 20 20 20 20 20 20 ...
## $ OTHER_FACILITIES     : num    4 4 5 5 4 4 5 4 3 4 ...
## $ PARKING_AREA         : num    4 3 3 4 4 3 5 3 2 4 ...
## $ PROPERTY_TYPE        : chr   "PRIVATE" "PRIVATE" "TCHC" "SOCIAL HOUSING" .
..
## $ RESULTS_OF_SCORE     : Factor w/ 5 levels "", "Building Audit",...: 5 4 4 5
5 4 5 4 4 5 ...
## $ RSN                  : num   4154010 4154519 4156390 4153054 4154930 ...
## $ SCORE                : num    87 80 79 87 85 78 92 76 76 83 ...
## $ SECURITY              : num    5 5 4 5 5 5 4 5 5 5 ...
## $ SITE_ADDRESS         : Factor w/ 3467 levels "1 ANTRIM CRES ",...: 2654 2
171 1707 2686 2328 2303 2312 2412 3063 2712 ...
## $ STAIRWELLS           : num    4 4 4 4 4 3 4 4 3 4 ...
## $ STORAGE_AREAS_LOCKERS : num    4 4 4 4 5 4 4 4 3 3 ...
## $ WARD                 : int    8 8 22 4 12 5 24 6 6 6 ...
## $ WATER_PEN_EXT_BLDG_ELEMENTS: num    4 4 4 3 4 4 5 3 4 4 ...
## $ YEAR_BUILT            : num   1974 1974 1971 1990 1964 ...
## $ YEAR_REGISTERED      : num   2017 2017 2017 2017 2017 ...
## - attr(*, "na.action")= 'omit' Named int   1 2 3 4 5 6 7 8 10 11 ...
## ..- attr(*, "names")= chr  "1" "2" "3" "4" ...
```

```
#Ensure that the property type was changed.
head(Evaluation1)
```

```
##           X_id BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS ELEVATORS
## 9      260132              4              33              319              5
## 14     260137              4              19              225              4
```

## 33	260156	4	15	203	3
## 39	260162	4	6	75	4
## 63	260186	5	25	547	4
## 111	260234	5	19	224	3
##	ENTRANCE_DOORS_WINDOWS	ENTRANCE_LOBBY	EVALUATION_COMPLETED_ON		
## 9	4	5	03/15/2019		
## 14	4	5	11/20/2019		
## 33	4	3	11/26/2020		
## 39	5	5	11/04/2019		
## 63	4	5	11/28/2019		
## 111	5	3	10/21/2020		
##	EXTERIOR_CLADDING	EXTERIOR_GROUNDS	EXTERIOR_WALKWAYS		
## 9	3	4	5		
## 14	4	4	3		
## 33	4	4	4		
## 39	4	4	4		
## 63	4	4	4		
## 111	5	4	4		
##	GARBAGE_BIN_STORAGE_AREA	GARBAGE_CHUTE_ROOMS	GRAFFITI		
## 9	4	4	5		
## 14	4	4	5		
## 33	4	4	5		
## 39	5	5	5		
## 63	4	5	5		
## 111	4	3	4		
##	INTERIOR_LIGHTING_LEVELS	INTERIOR_WALL_CEILING_FLOOR			
## 9	5	5			
## 14	3	4			
## 33	4	4			
## 39	5	4			
## 63	4	4			
## 111	4	3			
##	INTERNAL_GUARDS_HANDRAILS	LAUNDRY_ROOMS	NO_OF_AREAS_EVALUATED		
## 9	4	5	20		
## 14	4	4	20		
## 33	4	4	20		
## 39	4	4	20		
## 63	3	4	20		
## 111	4	4	20		
##	OTHER_FACILITIES	PARKING_AREA	PROPERTY_TYPE		
## 9	4	4	PRIVATE		
## 14	4	3	PRIVATE		
## 33	5	3	TCHC		
## 39	5	4	SOCIAL HOUSING		
## 63	4	4	PRIVATE		
## 111	4	3	TCHC		
##		RESULTS_OF_SCORE	RSN SCORE SECURITY		
## 9	Evaluation needs to be conducted in 3 years	4154010	87	5	
## 14	Evaluation needs to be conducted in 2 years	4154519	80	5	
## 33	Evaluation needs to be conducted in 2 years	4156390	79	4	


```
## 39 Evaluation needs to be conducted in 3 years 4153054      87      5
## 63 Evaluation needs to be conducted in 3 years 4154930      85      5
## 111 Evaluation needs to be conducted in 2 years 4155913      78      5
##
##          SITE_ADDRESS STAIRWELLS STORAGE_AREAS_LOCKERS WARD
## 9          500  DUPLEX AVE          4          4      8
## 14         3636  BATHURST ST          4          4      8
## 33  2739  VICTORIA PARK AVE          4          4     22
## 39          515  PARKSIDE DR          4          4      4
## 63          400  WALMER RD          4          5     12
## 111         40  FALSTAFF AVE          3          4      5
##
##          WATER_PEN_EXT_BLDG_ELEMENTS YEAR_BUILT YEAR_REGISTERED
## 9                                4      1974      2017
## 14                               4      1974      2017
## 33                               4      1971      2017
## 39                               3      1990      2017
## 63                               4      1964      2017
## 111                              4      1970      2017
```

```
Evaluation1 %>% count(Evaluation1$PROPERTY_TYPE)
```

```
## Evaluation1$PROPERTY_TYPE  n
## 1          PRIVATE 200
## 2      SOCIAL HOUSING  25
## 3          TCHC   18
```

```
#To count how many apartments evaluated were Private, Social Housing, and TCHC
EvalPrivate <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "PRIVATE")
head(EvalPrivate)
```

```
##          X_id BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS ELEVATORS
## 1 260132          4          33          319      5
## 2 260137          4          19          225      4
## 3 260186          5          25          547      4
## 4 260246          5          17          146      5
## 5 260264          4           7          150      4
## 6 260293          4          12           83      4
##
## ENTRANCE_DOORS_WINDOWS ENTRANCE_LOBBY EVALUATION_COMPLETED_ON
## 1          4          5      03/15/2019
## 2          4          5      11/20/2019
## 3          4          5      11/28/2019
## 4          5          5      12/18/2020
## 5          4          4      10/28/2020
## 6          4          5      12/11/2020
##
## EXTERIOR_CLADDING EXTERIOR_GROUNDS EXTERIOR_WALKWAYS GARBAGE_BIN_STORAGE_AREA
## 1          3          4          5          4
## 2          4          4          3          4
## 3          4          4          4          4
## 4          5          5          5          5
```

## 5	4	4	4	5
## 6	4	4	4	4
##	GARBAGE_CHUTE_ROOMS	GRAFFITI	INTERIOR_LIGHTING_LEVELS	
## 1	4	5	5	
## 2	4	5	3	
## 3	5	5	4	
## 4	3	5	5	
## 5	4	5	3	
## 6	4	4	5	
##	INTERIOR_WALL_CEILING_FLOOR	INTERNAL_GUARDS_HANDRAILS	LAUNDRY_ROOMS	
## 1		5	4	5
## 2		4	4	4
## 3		4	3	4
## 4		4	5	3
## 5		3	4	4
## 6		4	4	5
##	NO_OF_AREAS_EVALUATED	OTHER_FACILITIES	PARKING_AREA	PROPERTY_TYPE
## 1	20	4	4	PRIVATE
## 2	20	4	3	PRIVATE
## 3	20	4	4	PRIVATE
## 4	20	5	5	PRIVATE
## 5	20	3	2	PRIVATE
## 6	20	4	4	PRIVATE
##		RESULTS_OF_SCORE	RSN	SCORE SECURITY
## 1	Evaluation needs to be conducted in 3 years	4154010	87	5
## 2	Evaluation needs to be conducted in 2 years	4154519	80	5
## 3	Evaluation needs to be conducted in 3 years	4154930	85	5
## 4	Evaluation needs to be conducted in 3 years	4594874	92	4
## 5	Evaluation needs to be conducted in 2 years	4154619	76	5
## 6	Evaluation needs to be conducted in 3 years	4154696	83	5
##	SITE_ADDRESS	STAIRWELLS	STORAGE_AREAS_LOCKERS	WARD
## 1	500 DUPLEX AVE	4	4	8
## 2	3636 BATHURST ST	4	4	8
## 3	400 WALMER RD	4	5	12
## 4	40 MEADOWGLEN PL	4	4	24
## 5	707-711 FINCH AVE W	3	3	6
## 6	535 SHEPPARD AVE W	4	3	6
##	WATER_PEN_EXT_BLDG_ELEMENTS	YEAR_BUILT	YEAR_REGISTERED	
## 1		4	1974	2017
## 2		4	1974	2017
## 3		4	1964	2017
## 4		5	2019	2019
## 5		4	1964	2017
## 6		4	1965	2017

```
EvalPrivate1 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "PRIVATE" & RESULTS_OF_SCORE == "Evaluation needs to be conducted in 1 year")
count(EvalPrivate1)
```

```
##      n
## 1 1
```

```
EvalPrivate2 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "PRIVATE" & RESULTS_OF_SCORE == "Evaluation needs to be conducted in 2 years")
count(EvalPrivate2)
```

```
##      n
## 1 52
```

```
EvalPrivate3 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "PRIVATE" & RESULTS_OF_SCORE == "Evaluation needs to be conducted in 3 years")
count(EvalPrivate3)
```

```
##      n
## 1 147
```

```
EvalPrivateFull <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "PRIVATE" & RESULTS_OF_SCORE == "Building Audit")
count(EvalPrivateFull)
```

```
##      n
## 1 0
```

```
EvalSocial <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "SOCIAL HOUSING")
head(EvalSocial)
```

```
##      X_id BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS ELEVATORS
## 1 260162          4          6          75          4
## 2 260263          4          9         130          3
## 3 260593          4          5         177          3
## 4 260645          5          4          53          5
## 5 260742          5          4          70          3
## 6 261029          4          3          63          4
##      ENTRANCE_DOORS_WINDOWS ENTRANCE_LOBBY EVALUATION_COMPLETED_ON
## 1          5          5         11/04/2019
## 2          4          4         11/07/2019
## 3          4          3         12/04/2019
## 4          5          5         11/06/2019
## 5          4          5         11/05/2019
## 6          5          5         10/29/2019
##      EXTERIOR_CLADDING EXTERIOR_GROUNDS EXTERIOR_WALKWAYS GARBAGE_BIN_STORAGE_AREA
## 1          4          4          4          5
## 2          3          4          4          4
```

## 3	4	4	3	4
## 4	5	4	5	4
## 5	4	4	4	4
## 6	4	4	3	5
##	GARBAGE_CHUTE_ROOMS	GRAFFITI	INTERIOR_LIGHTING_LEVELS	
## 1	5	5	5	
## 2	4	5	3	
## 3	3	5	4	
## 4	4	5	5	
## 5	5	5	4	
## 6	5	5	4	
##	INTERIOR_WALL_CEILING_FLOOR	INTERNAL_GUARDS_HANDRAILS	LAUNDRY_ROOMS	
## 1		4	4	4
## 2		3	4	4
## 3		3	4	3
## 4		4	5	5
## 5		4	5	5
## 6		3	4	5
##	NO_OF_AREAS_EVALUATED	OTHER_FACILITIES	PARKING_AREA	PROPERTY_TYPE
## 1	20	5	4	SOCIAL HOUSING
## 2	20	4	3	SOCIAL HOUSING
## 3	20	4	4	SOCIAL HOUSING
## 4	20	5	4	SOCIAL HOUSING
## 5	20	5	4	SOCIAL HOUSING
## 6	20	5	4	SOCIAL HOUSING
##		RESULTS_OF_SCORE	RSN	SCORE SECURITY
## 1	Evaluation needs to be conducted in 3 years		4153054	87 5
## 2	Evaluation needs to be conducted in 2 years		4154607	76 5
## 3	Evaluation needs to be conducted in 2 years		4153633	74 5
## 4	Evaluation needs to be conducted in 3 years		4156140	95 5
## 5	Evaluation needs to be conducted in 3 years		4154772	88 5
## 6	Evaluation needs to be conducted in 3 years		4155222	87 5
##	SITE_ADDRESS	STAIRWELLS	STORAGE_AREAS_LOCKERS	WARD
## 1	515 PARKSIDE DR	4	4	4
## 2	4266 BATHURST ST	4	4	6
## 3	1070 QUEEN ST E	3	3	14
## 4	45 CUMMER AVE	5	5	18
## 5	7 THE DONWAY E	3	5	16
## 6	773 THE QUEENSWAY	4	4	3
##	WATER_PEN_EXT_BLDG_ELEMENTS	YEAR_BUILT	YEAR_REGISTERED	
## 1		3	1990	2017
## 2		3	1983	2017
## 3		4	1993	2017
## 4		5	1996	2017
## 5		5	1989	2017
## 6		5	1993	2017

```
EvalSocial1 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "SOCIAL HOUSING" & RESULTS_
OF_SCORE == "Evaluation needs to be conducted in 1 year")
count(EvalSocial1)
```

```
##      n
## 1 1
```

```
EvalSocial2 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "SOCIAL HOUSING" & RESULTS_
OF_SCORE == "Evaluation needs to be conducted in 2 years")
count(EvalSocial2)
```

```
##      n
## 1 9
```

```
EvalSocial3 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "SOCIAL HOUSING" & RESULTS_
OF_SCORE == "Evaluation needs to be conducted in 3 years")
count(EvalSocial3)
```

```
##      n
## 1 15
```

```
EvalSocialFull <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "SOCIAL HOUSING" & RESUL
TS_OF_SCORE == "Building Audit")
count(EvalSocialFull)
```

```
##      n
## 1 0
```

```
EvalTCHC <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "TCHC")
head(EvalTCHC)
```

```
##      X_id BALCONY_GUARDS CONFIRMED_STOREYS CONFIRMED_UNITS ELEVATORS
## 1 260156          4          15          203          3
## 2 260234          5          19          224          3
## 3 260303          2          24          447          3
## 4 260430          3          12          162          4
## 5 260619          3          18          176          3
## 6 260794          4          15          201          4
##      ENTRANCE_DOORS_WINDOWS ENTRANCE_LOBBY EVALUATION_COMPLETED_ON
## 1          4          3          11/26/2020
## 2          5          3          10/21/2020
## 3          3          4          12/05/2019
## 4          4          3          10/28/2019
```

## 5	3	3	10/15/2020	
## 6	4	4	11/26/2020	
##	EXTERIOR_CLADDING	EXTERIOR_GROUNDS	EXTERIOR_WALKWAYS	GARBAGE_BIN_STORAGE_AREA
## 1	4	4	4	4
## 2	5	4	4	4
## 3	3	4	4	3
## 4	4	3	4	3
## 5	3	4	3	3
## 6	4	4	4	4
##	GARBAGE_CHUTE_ROOMS	GRAFFITI	INTERIOR_LIGHTING_LEVELS	
## 1	4	5	4	
## 2	3	4	4	
## 3	3	5	3	
## 4	2	5	4	
## 5	3	5	4	
## 6	4	5	4	
##	INTERIOR_WALL_CEILING_FLOOR	INTERNAL_GUARDS_HANDRAILS	LAUNDRY_ROOMS	
## 1		4	4	4
## 2		3	4	4
## 3		2	4	4
## 4		2	4	3
## 5		4	3	4
## 6		4	4	4
##	NO_OF_AREAS_EVALUATED	OTHER_FACILITIES	PARKING_AREA	PROPERTY_TYPE
## 1	20	5	3	TCHC
## 2	20	4	3	TCHC
## 3	20	3	3	TCHC
## 4	20	4	4	TCHC
## 5	20	3	4	TCHC
## 6	20	5	4	TCHC
##		RESULTS_OF_SCORE	RSN	SCORE SECURITY
## 1	Evaluation needs to be conducted in 2 years		4156390	79 4
## 2	Evaluation needs to be conducted in 2 years		4155913	78 5
## 3	Evaluation needs to be conducted in 2 years		4155587	68 5
## 4	Evaluation needs to be conducted in 2 years		4155705	68 4
## 5	Evaluation needs to be conducted in 2 years		4154259	70 4
## 6	Evaluation needs to be conducted in 3 years		4155942	82 4
##	SITE_ADDRESS	STAIRWELLS	STORAGE_AREAS_LOCKERS	WARD
## 1	2739 VICTORIA PARK AVE	4	4	22
## 2	40 FALSTAFF AVE	3	4	5
## 3	100 HIGH PARK AVE	3	3	4
## 4	2067 ISLINGTON AVE	2	2	1
## 5	3101 WESTON RD	3	3	7
## 6	2743 VICTORIA PARK AVE	4	4	22
##	WATER_PEN_EXT_BLDG_ELEMENTS	YEAR_BUILT	YEAR_REGISTERED	
## 1		4 1971	2017	
## 2		4 1970	2017	
## 3		4 1969	2017	
## 4		4 1973	2017	
## 5		5 1984	2017	

```
## 6
```

```
4
```

```
1971
```

```
2017
```

```
EvalTCHC1 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "TCHC" & RESULTS_OF_SCORE ==  
"Evaluation needs to be conducted in 1 year")  
count(EvalTCHC1)
```

```
##      n  
## 1 1
```

```
EvalTCHC2 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "TCHC" & RESULTS_OF_SCORE ==  
"Evaluation needs to be conducted in 2 years")  
count(EvalTCHC2)
```

```
##      n  
## 1 8
```

```
EvalTCHC3 <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "TCHC" & RESULTS_OF_SCORE ==  
"Evaluation needs to be conducted in 3 years")  
count(EvalTCHC3)
```

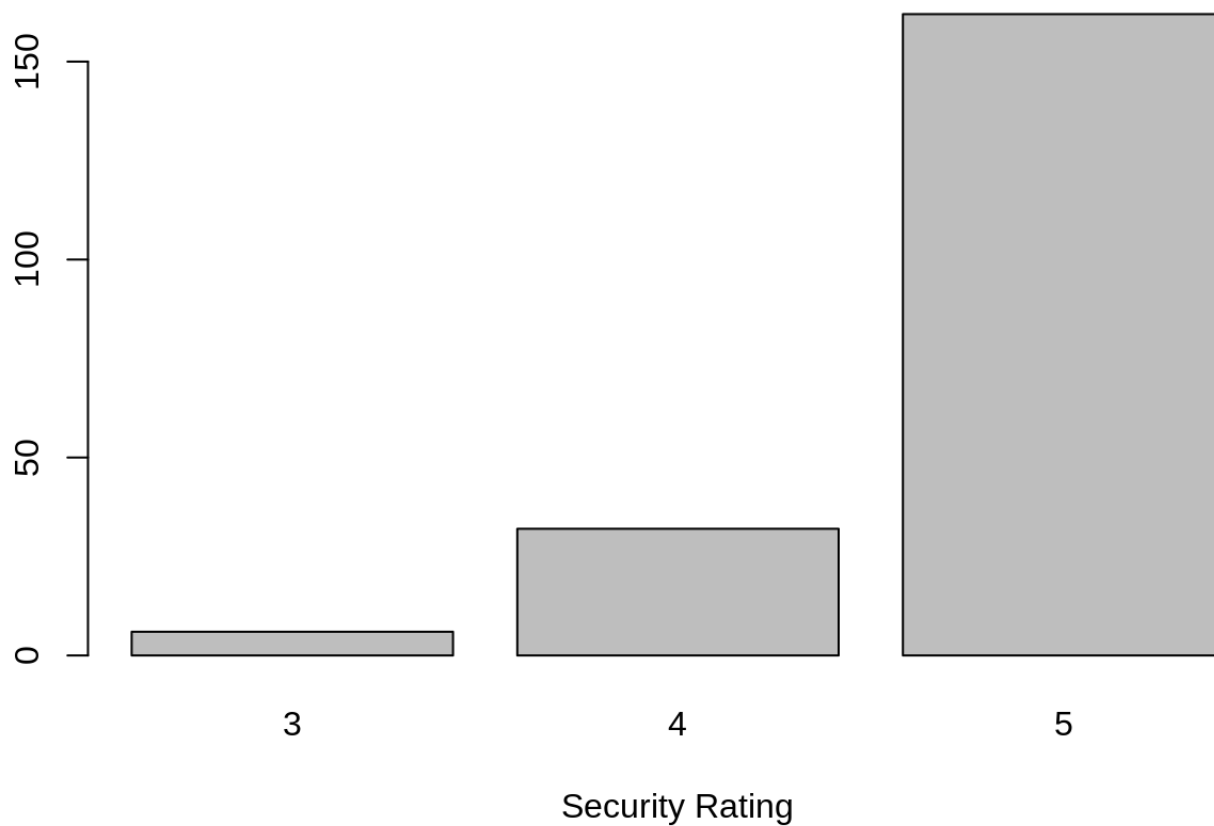
```
##      n  
## 1 9
```

```
EvalTCHCFull <- dplyr::filter(Evaluation1,PROPERTY_TYPE == "TCHC" & RESULTS_OF_SCORE  
== "Building Audit")  
count(EvalTCHCFull)
```

```
##      n  
## 1 0
```

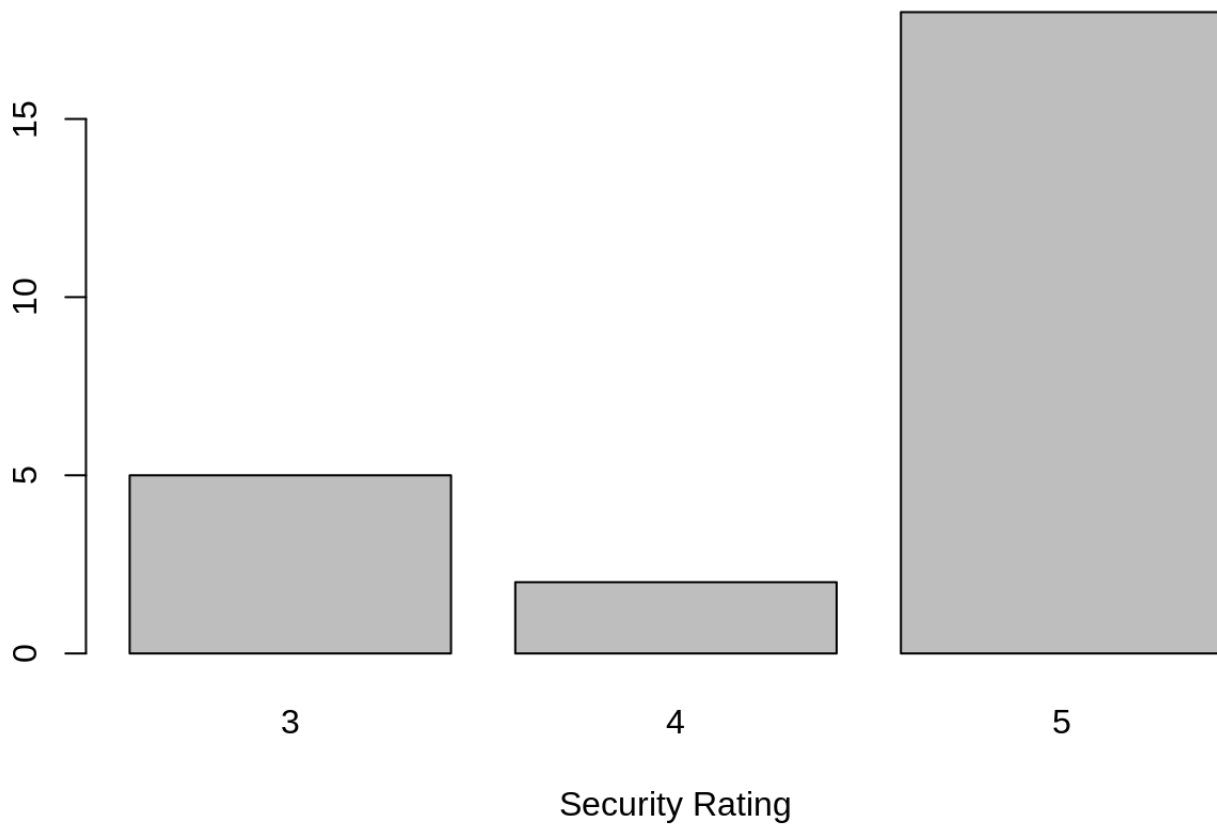
```
# Counts how many out of each property type has a result of Evaluation needed in 1 ye  
ar, Evaluation needed in 2 years, and Full audit needed.  
countPrivate <- table(EvalPrivate$SECURITY)  
barplot(countPrivate, main="Private Apartments' Security Rating", xlab="Security Rati  
ng")
```

Private Apartments' Security Rating



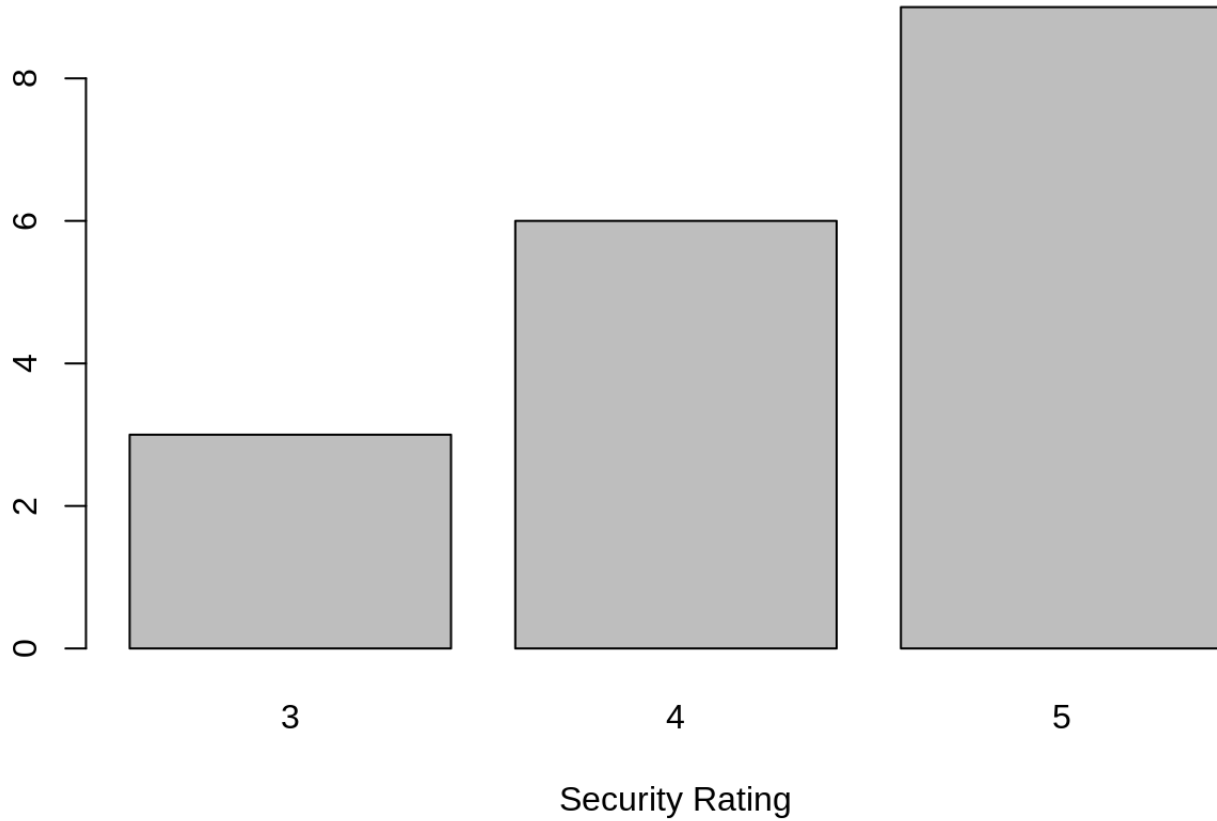
```
countSocial <- table(EvalSocial$SECURITY)
barplot(countSocial, main="Social Apartments' Security Rating", xlab="Security Rating")
```


Social Apartments' Security Rating



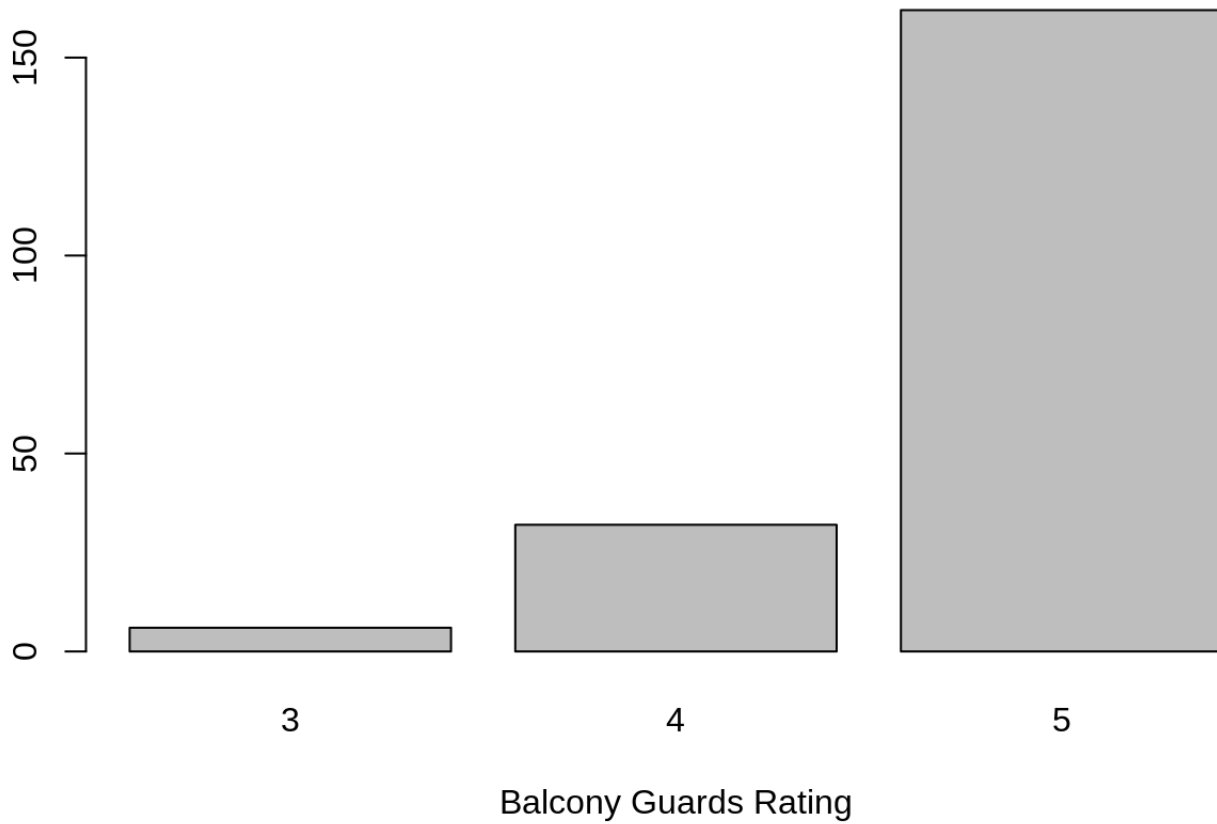
```
countTCHC <- table(EvalTCHC$SECURITY)
barplot(countTCHC, main="TCHC Apartments' Security Rating", xlab="Security Rating")
```

TCHC Apartments' Security Rating



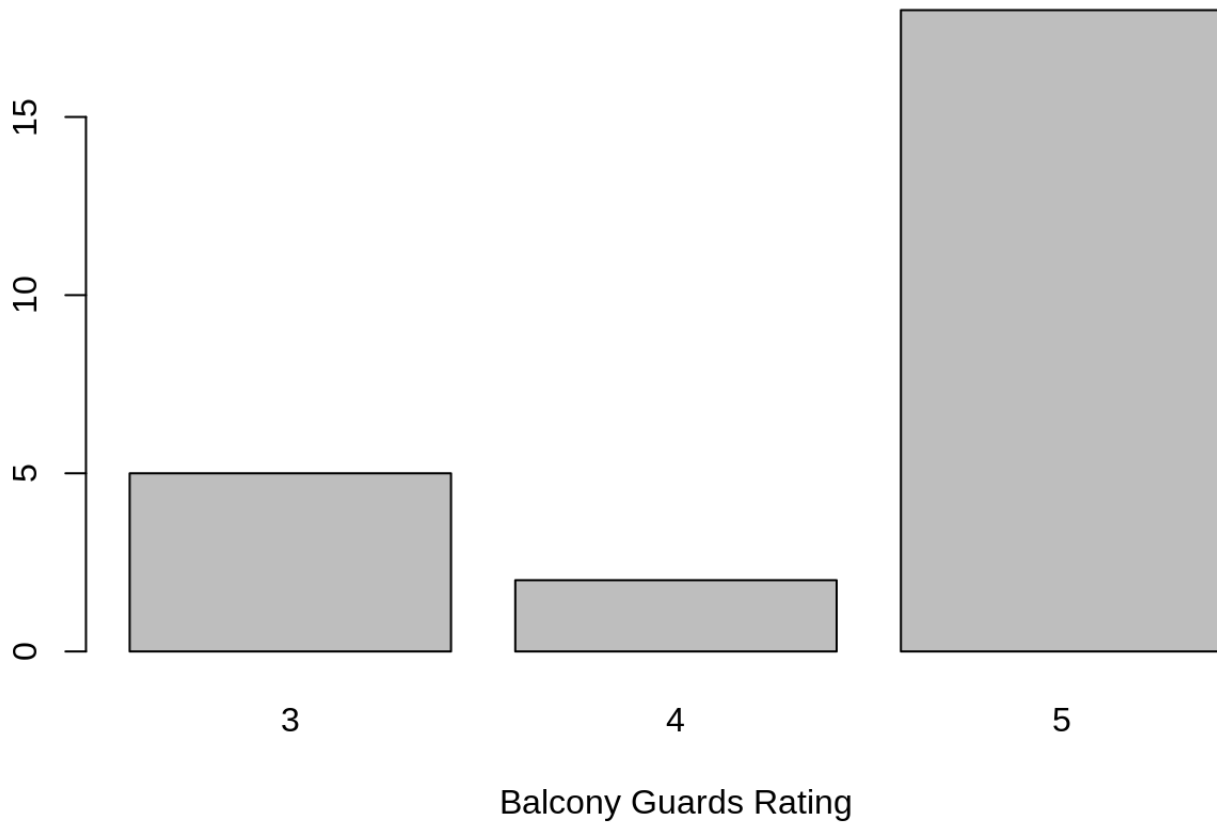
```
countPrivate1 <- table(EvalPrivate$BALCONY_GUARDS)
barplot(countPrivate, main="Private Apartments' Balcony Guards Rating", xlab="Balcony
Guards Rating")
```

Private Apartments' Balcony Guards Rating



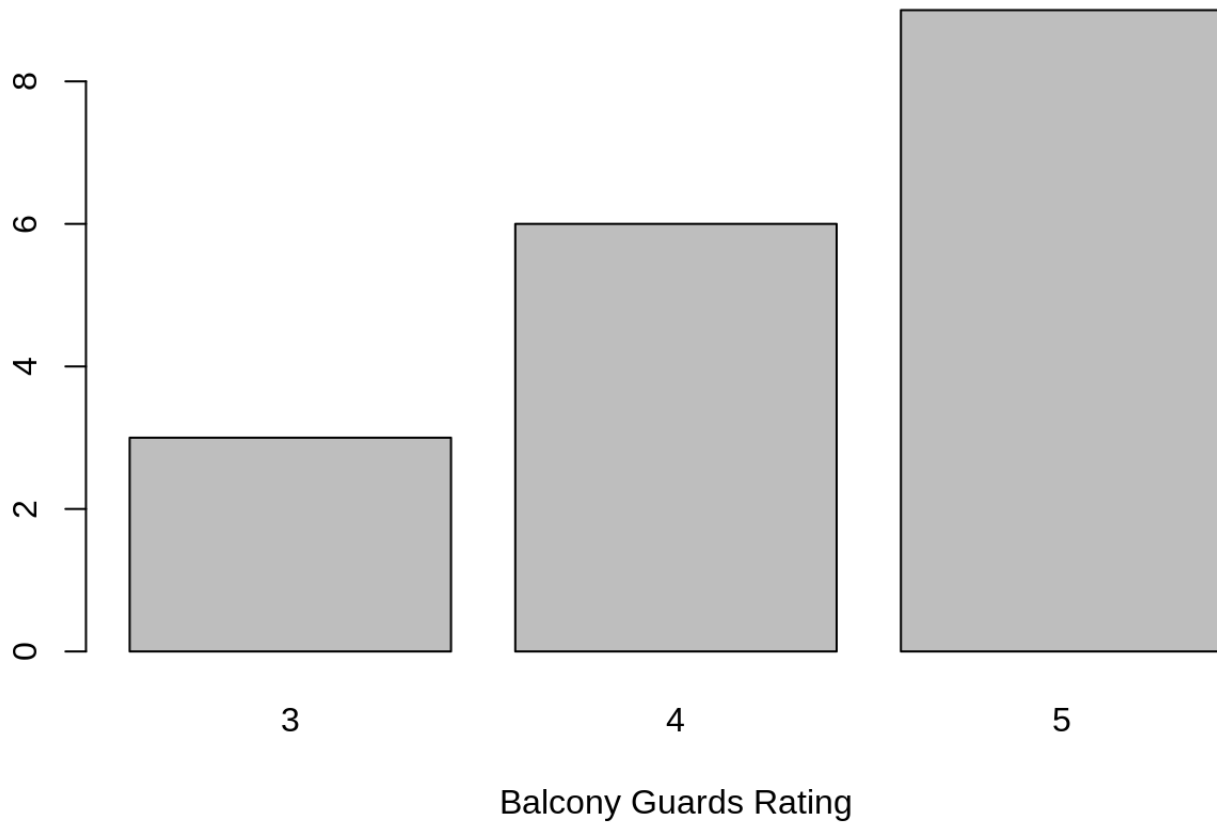
```
countSocial1 <- table(EvalSocial$BALCONY_GUARDS)
barplot(countSocial, main="Social Apartments' Balcony Guards Rating", xlab="Balcony G
uards Rating")
```

Social Apartments' Balcony Guards Rating



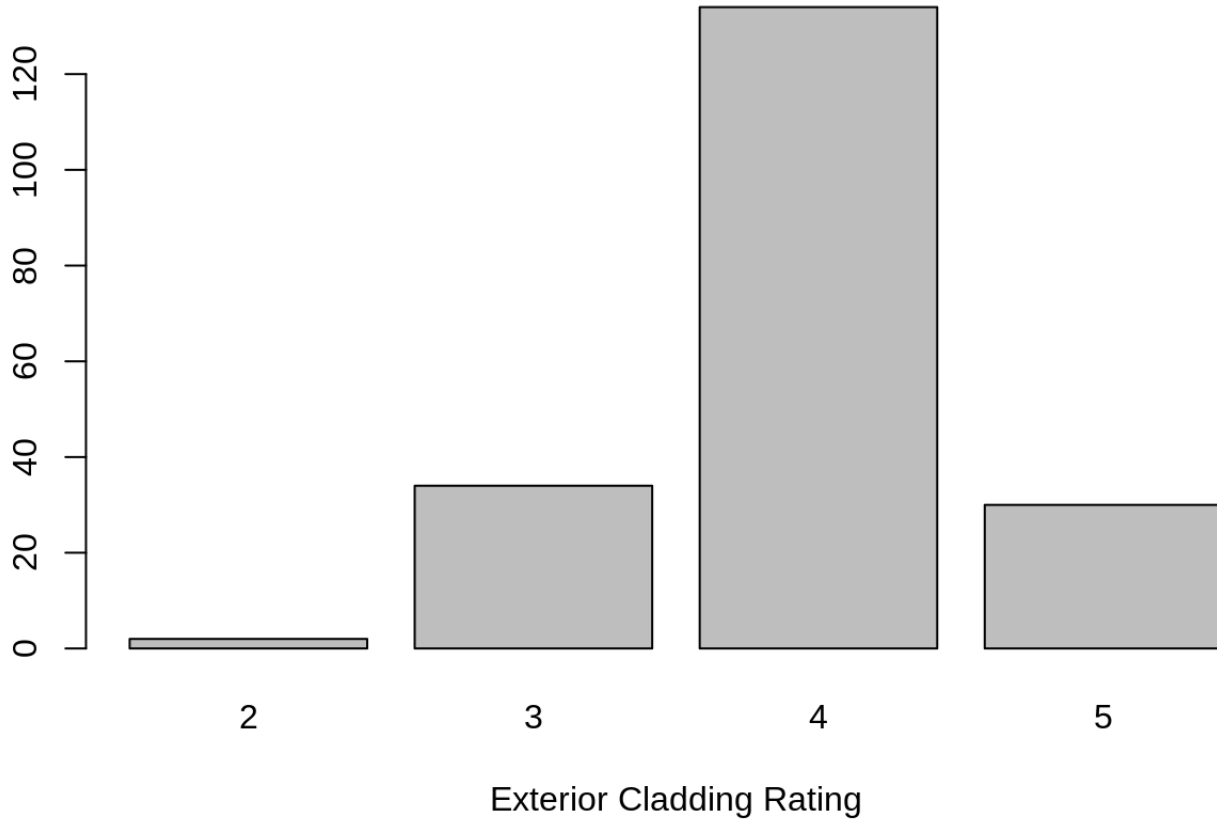
```
countTCHC1 <- table(EvalTCHC$BALCONY_GUARDS)
barplot(countTCHC, main="TCHC Apartments' Balcony Guards Rating", xlab="Balcony Guards Rating")
```

TCHC Apartments' Balcony Guards Rating



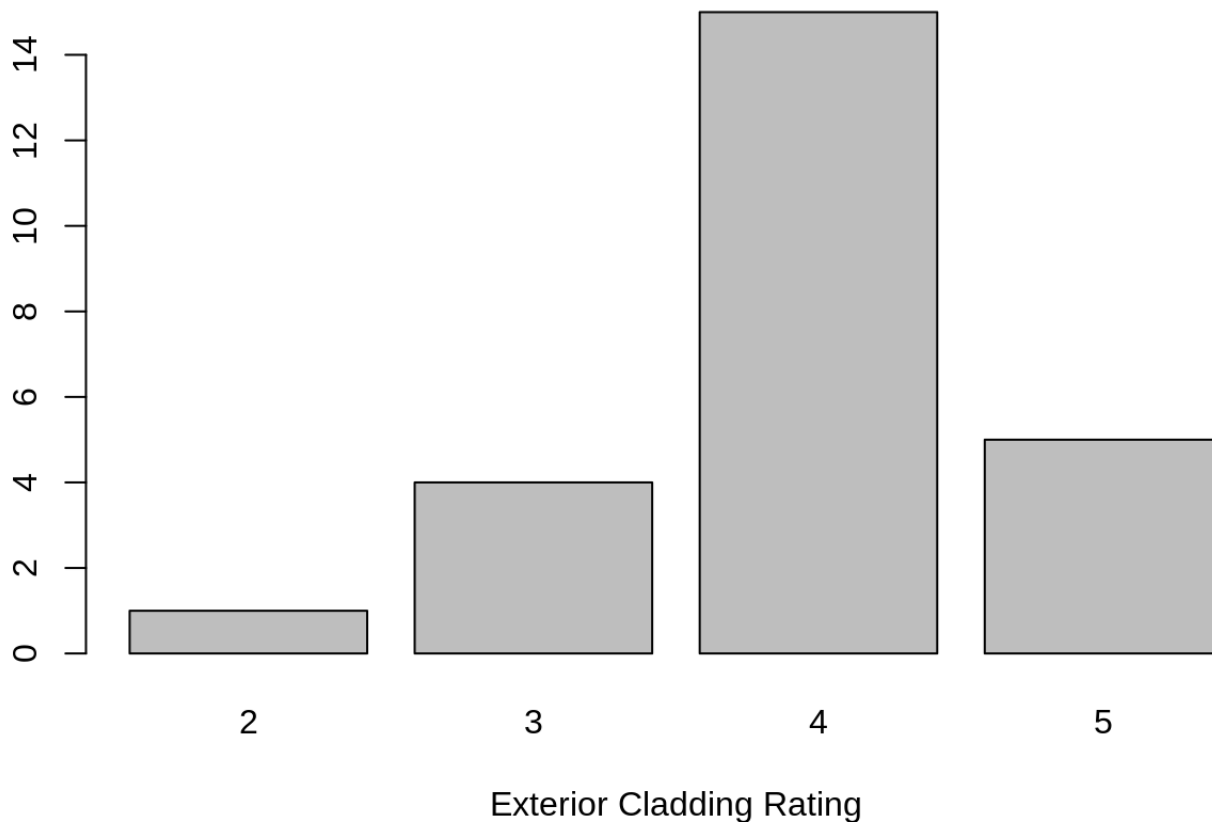
```
countPrivate2 <- table(EvalPrivate$EXTERIOR_CLADDING)
barplot(countPrivate2, main="Private Apartments' Exterior Cladding Rating", xlab="Exterior Cladding Rating")
```

Private Apartments' Exterior Cladding Rating



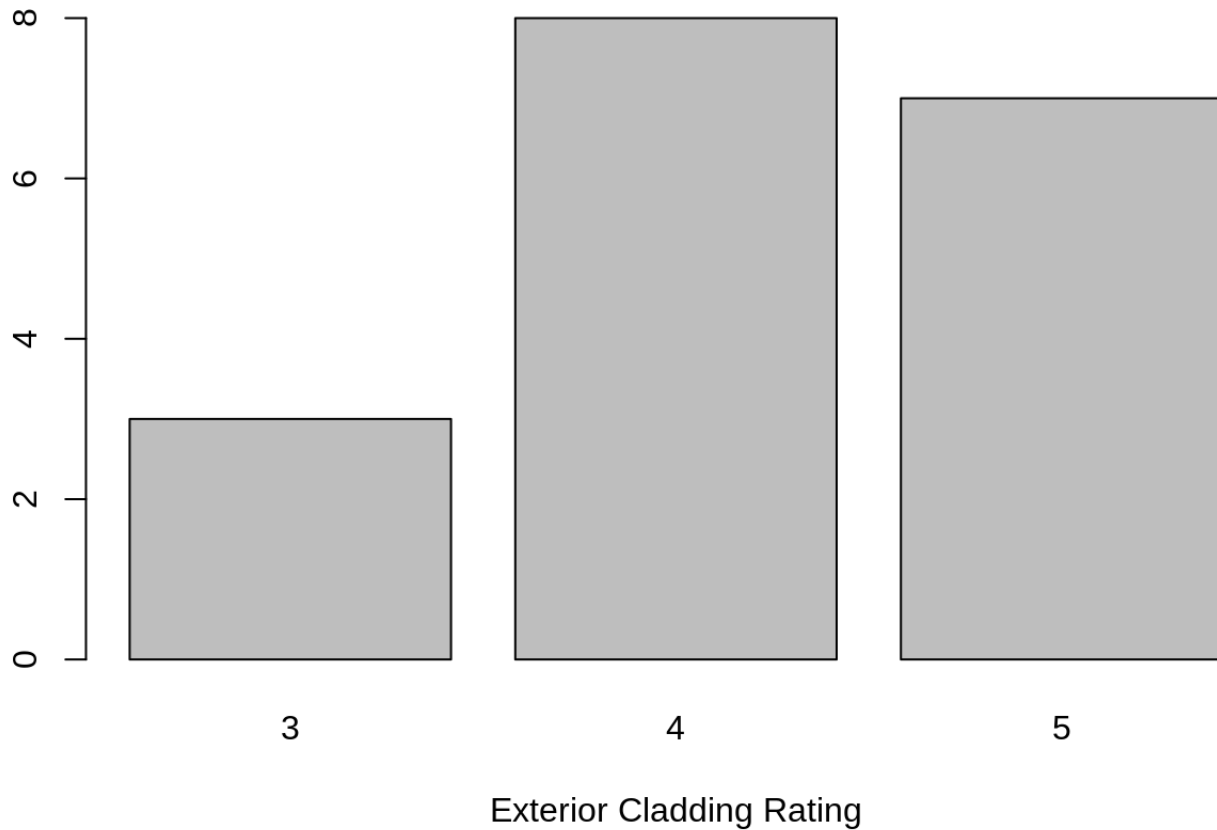
```
countSocial2 <- table(EvalSocial$EXTERIOR_CLADDING)
barplot(countSocial2, main="Social Apartments' Exterior Cladding Rating", xlab="Exterior Cladding Rating")
```

Social Apartments' Exterior Cladding Rating



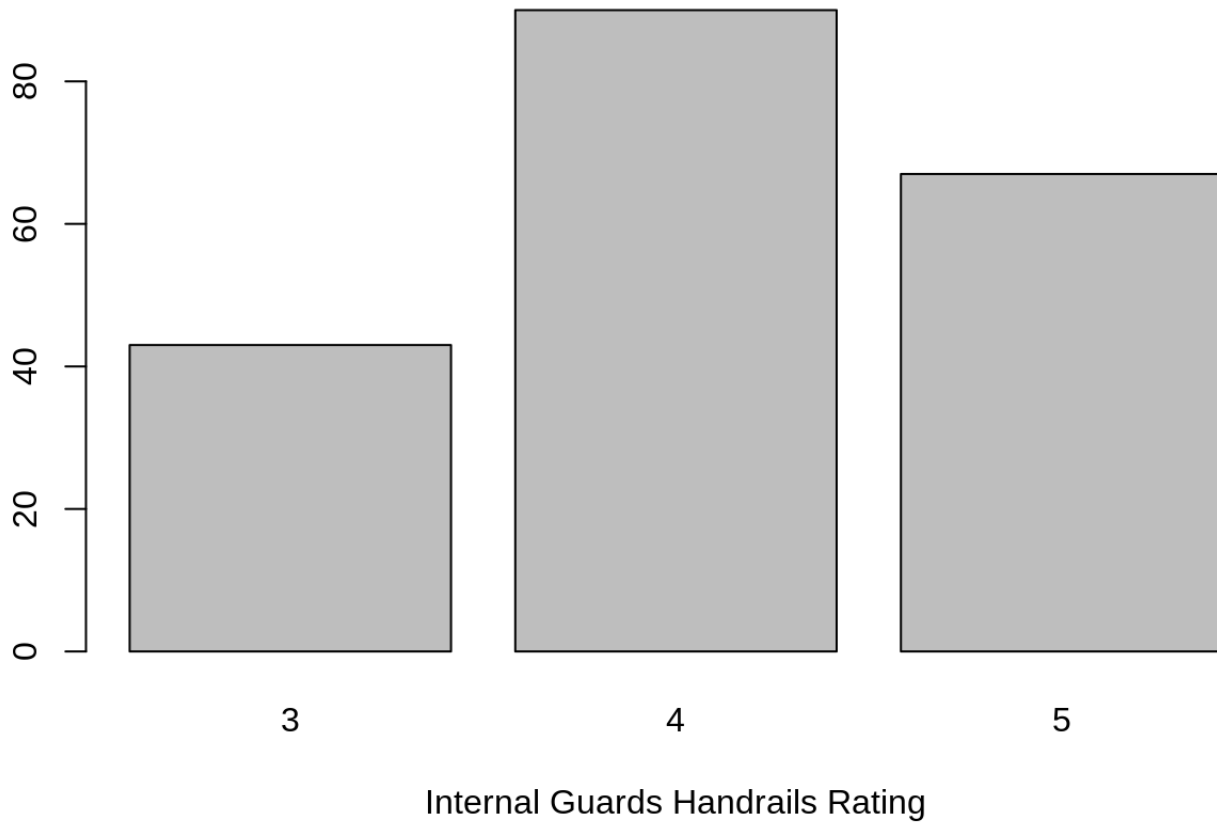
```
countTCHC2 <- table(EvalTCHC$EXTERIOR_CLADDING)
barplot(countTCHC2, main="TCHC Apartments' Exterior Cladding Rating", xlab="Exterior
Cladding Rating")
```

TCHC Apartments' Exterior Cladding Rating



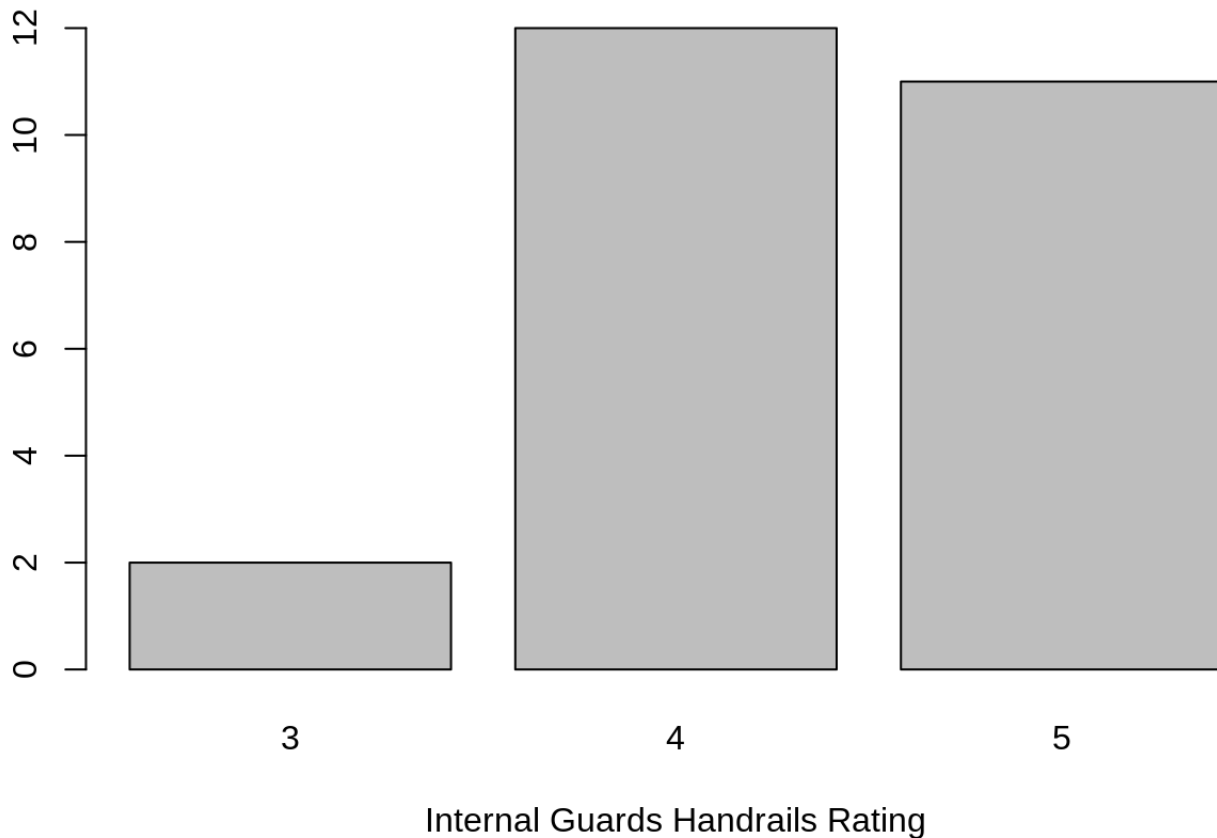
```
countPrivate3 <- table(EvalPrivate$INTERNAL_GUARDS_HANDRAILS)
barplot(countPrivate3, main="Private Apartments' Internal Guards Handrails Rating", x
lab="Internal Guards Handrails Rating")
```


Private Apartments' Internal Guards Handrails Rating



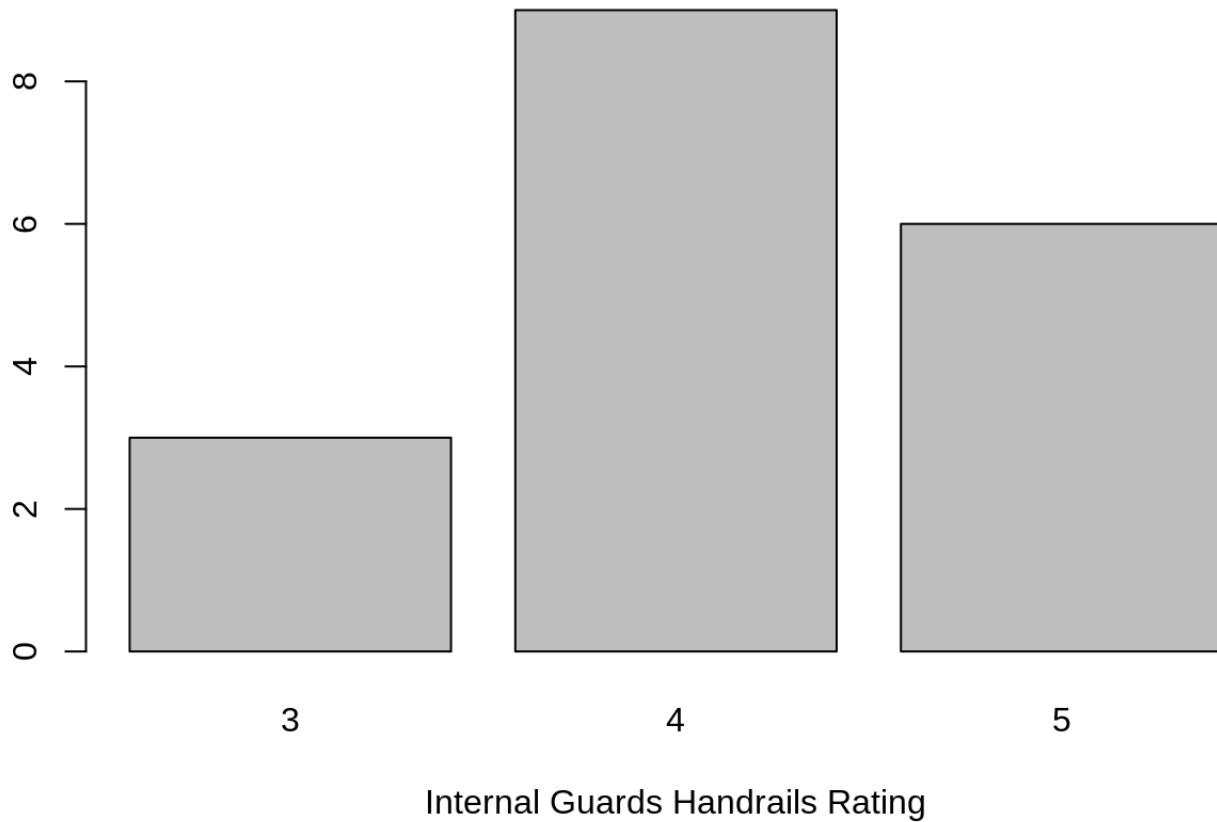
```
countSocial3 <- table(EvalSocial$INTERNAL_GUARDS_HANDRAILS)
barplot(countSocial3, main="Social Apartments' Internal Guards Handrails Rating", xlab="Internal Guards Handrails Rating")
```

Social Apartments' Internal Guards Handrails Rating



```
countTCHC3 <- table(EvalTCHC$INTERNAL_GUARDS_HANDRAILS)
barplot(countTCHC3, main="TCHC Apartments' Internal Guards Handrails Rating", xlab="I
nternal Guards Handrails Rating")
```

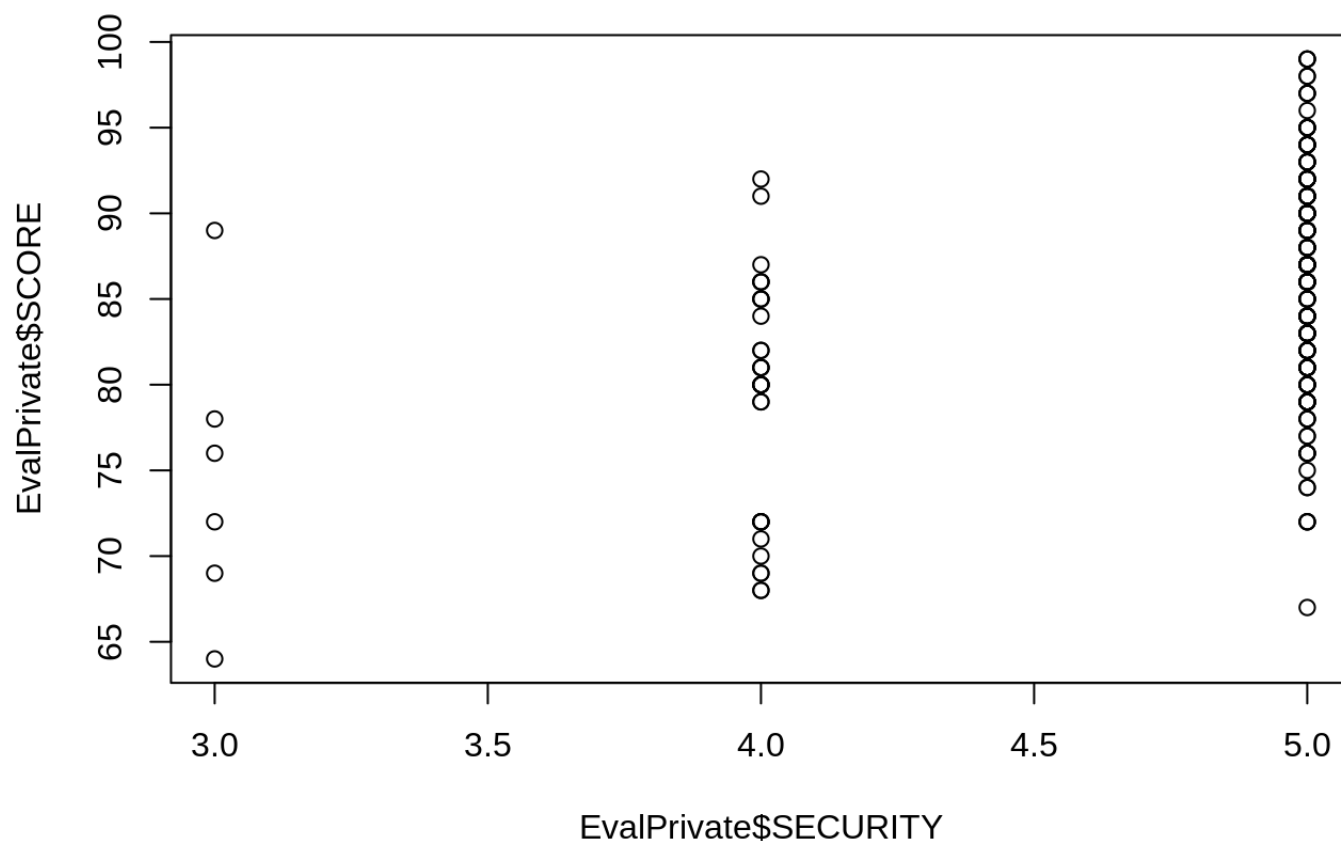
TCHC Apartments' Internal Guards Handrails Rating



#Plots comparing security with each property type, as well as comparing each property type with safety measures.
`hetcor(EvalPrivate$SECURITY, EvalPrivate$SCORE)`

```
##
## Two-Step Estimates
##
## Correlations/Type of Correlation:
##               EvalPrivate$SECURITY EvalPrivate.SCORE
## EvalPrivate$SECURITY              1          Pearson
## EvalPrivate.SCORE                0.4333              1
##
## Standard Errors:
## EvalPrivate$SECURITY      EvalPrivate.SCORE
##                          0.05763
## Levels:  0.05763
##
## n = 200
##
## P-values for Tests of Bivariate Normality:
## EvalPrivate$SECURITY      EvalPrivate.SCORE
##                          3.849e-69
## Levels:  3.849e-69
```

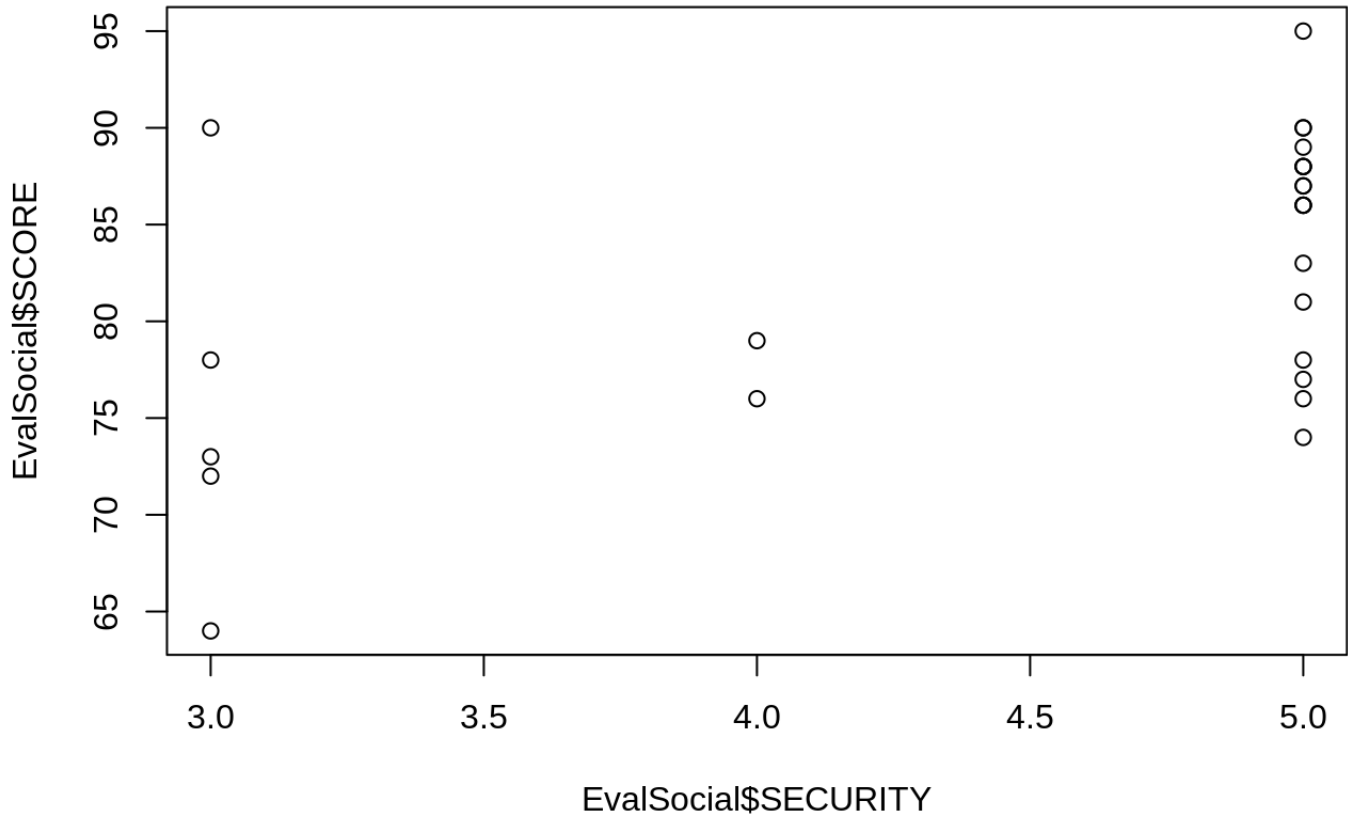
```
plot(EvalPrivate$SECURITY, EvalPrivate$SCORE)
```



```
hetcor(EvalSocial$SECURITY, EvalSocial$SCORE)
```

```
##
## Two-Step Estimates
##
## Correlations/Type of Correlation:
##              EvalSocial$SECURITY EvalSocial.SCORE
## EvalSocial$SECURITY              1          Pearson
## EvalSocial.SCORE              0.5483              1
##
## Standard Errors:
## EvalSocial$SECURITY      EvalSocial.SCORE
##                          0.1402
## Levels:  0.1402
##
## n = 25
##
## P-values for Tests of Bivariate Normality:
## EvalSocial$SECURITY      EvalSocial.SCORE
##                          0.0003656
## Levels:  0.0003656
```

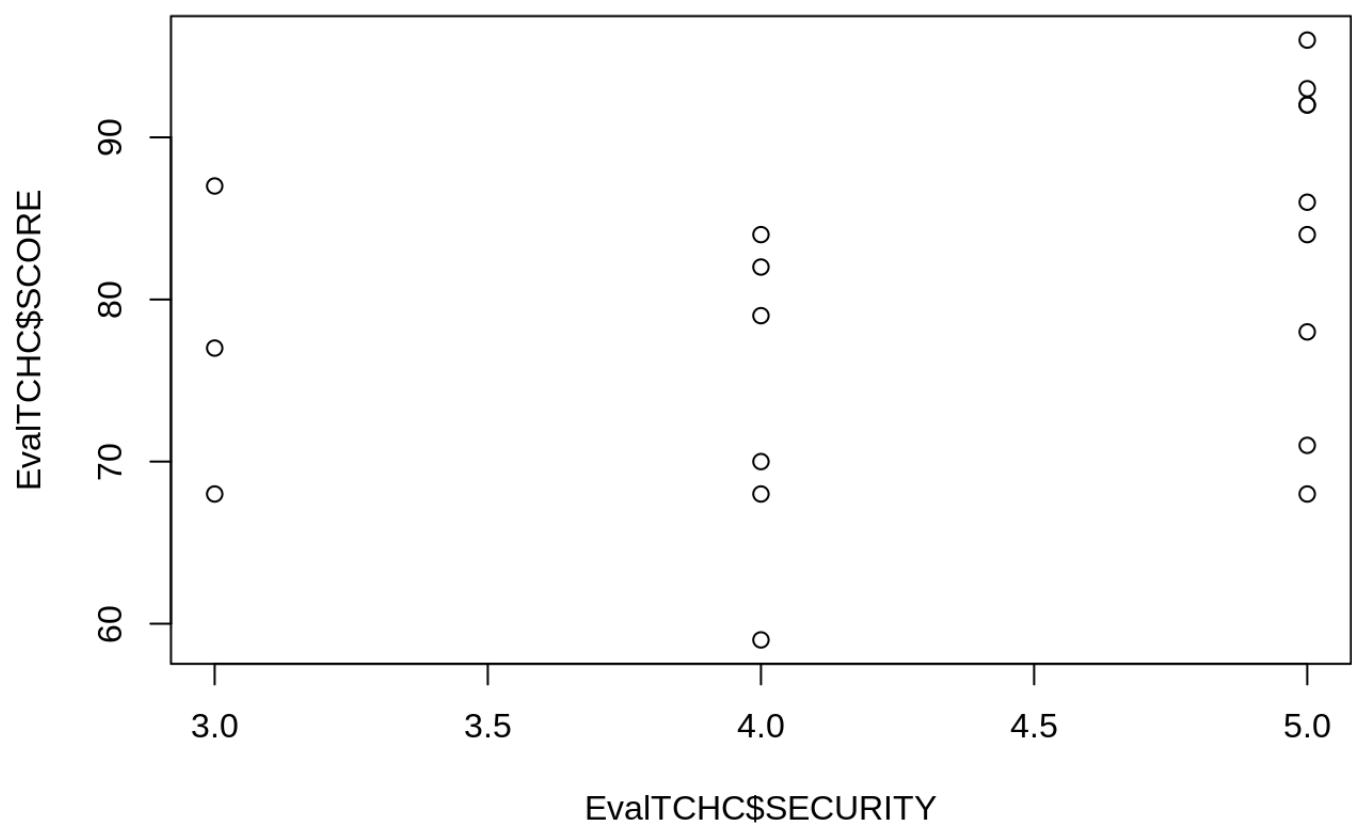
```
plot(EvalSocial$SECURITY, EvalSocial$SCORE)
```



```
hetcor(EvalTCHC$SECURITY, EvalTCHC$SCORE)
```

```
##
## Two-Step Estimates
##
## Correlations/Type of Correlation:
##           EvalTCHC$SECURITY EvalTCHC.SCORE
## EvalTCHC$SECURITY           1          Pearson
## EvalTCHC.SCORE              0.3627          1
##
## Standard Errors:
## EvalTCHC$SECURITY    EvalTCHC.SCORE
##                      0.2021
## Levels:  0.2021
##
## n = 18
##
## P-values for Tests of Bivariate Normality:
## EvalTCHC$SECURITY    EvalTCHC.SCORE
##                      0.1149
## Levels:  0.1149
```

```
plot(EvalTCHC$SECURITY, EvalTCHC$SCORE)
```



#Determined the correlation using a heterogeneous correlation matrix as a numeric value and factor were used.