library(tidyverse)

## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --

## v ggplot2 3.3.5 v purrr 0.3.4  
## v tibble 3.1.6 v dplyr 1.0.7  
## v tidyr 1.1.4 v stringr 1.4.0  
## v readr 2.1.0 v forcats 0.5.1

## -- Conflicts ------------------------------------------ tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()

library(tidymodels)

## Registered S3 method overwritten by 'tune':  
## method from   
## required\_pkgs.model\_spec parsnip

## -- Attaching packages -------------------------------------- tidymodels 0.1.4 --

## v broom 0.7.10 v rsample 0.1.1   
## v dials 0.0.10 v tune 0.1.6   
## v infer 1.0.0 v workflows 0.2.4   
## v modeldata 0.1.1 v workflowsets 0.1.0   
## v parsnip 0.1.7 v yardstick 0.0.9   
## v recipes 0.1.17

## -- Conflicts ----------------------------------------- tidymodels\_conflicts() --  
## x scales::discard() masks purrr::discard()  
## x dplyr::filter() masks stats::filter()  
## x recipes::fixed() masks stringr::fixed()  
## x dplyr::lag() masks stats::lag()  
## x yardstick::spec() masks readr::spec()  
## x recipes::step() masks stats::step()  
## \* Learn how to get started at https://www.tidymodels.org/start/

library(GGally)

## Registered S3 method overwritten by 'GGally':  
## method from   
## +.gg ggplot2

library(ggcorrplot)

Iowa <- read\_csv("ames\_student (1).csv")

## Rows: 2053 Columns: 81

## -- Column specification --------------------------------------------------------  
## Delimiter: ","  
## chr (47): MS\_SubClass, MS\_Zoning, Street, Alley, Lot\_Shape, Land\_Contour, Ut...  
## dbl (34): Lot\_Frontage, Lot\_Area, Year\_Built, Year\_Remod\_Add, Mas\_Vnr\_Area, ...

##   
## i Use `spec()` to retrieve the full column specification for this data.  
## i Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

View(Iowa)  
summary(Iowa)

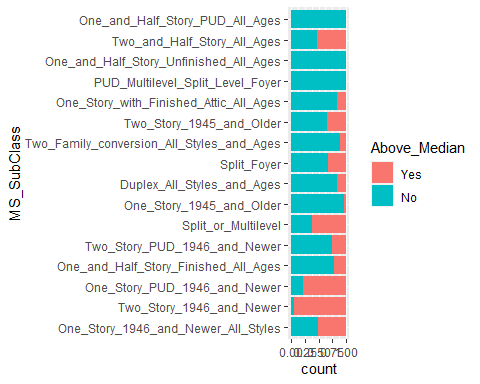
## MS\_SubClass MS\_Zoning Lot\_Frontage Lot\_Area   
## Length:2053 Length:2053 Min. : 0.00 Min. : 1300   
## Class :character Class :character 1st Qu.: 43.00 1st Qu.: 7500   
## Mode :character Mode :character Median : 62.00 Median : 9548   
## Mean : 57.38 Mean : 10258   
## 3rd Qu.: 78.00 3rd Qu.: 11600   
## Max. :313.00 Max. :215245   
## Street Alley Lot\_Shape Land\_Contour   
## Length:2053 Length:2053 Length:2053 Length:2053   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
## Utilities Lot\_Config Land\_Slope Neighborhood   
## Length:2053 Length:2053 Length:2053 Length:2053   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
## Condition\_1 Condition\_2 Bldg\_Type House\_Style   
## Length:2053 Length:2053 Length:2053 Length:2053   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
## Overall\_Qual Overall\_Cond Year\_Built Year\_Remod\_Add  
## Length:2053 Length:2053 Min. :1875 Min. :1950   
## Class :character Class :character 1st Qu.:1953 1st Qu.:1965   
## Mode :character Mode :character Median :1972 Median :1993   
## Mean :1971 Mean :1984   
## 3rd Qu.:2000 3rd Qu.:2004   
## Max. :2010 Max. :2010   
## Roof\_Style Roof\_Matl Exterior\_1st Exterior\_2nd   
## Length:2053 Length:2053 Length:2053 Length:2053   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
## Mas\_Vnr\_Type Mas\_Vnr\_Area Exter\_Qual Exter\_Cond   
## Length:2053 Min. : 0.0 Length:2053 Length:2053   
## Class :character 1st Qu.: 0.0 Class :character Class :character   
## Mode :character Median : 0.0 Mode :character Mode :character   
## Mean : 103.8   
## 3rd Qu.: 164.0   
## Max. :1600.0   
## Foundation Bsmt\_Qual Bsmt\_Cond Bsmt\_Exposure   
## Length:2053 Length:2053 Length:2053 Length:2053   
## Class :character Class :character Class :character Class :character   
## Mode :character Mode :character Mode :character Mode :character   
##   
##   
##   
## BsmtFin\_Type\_1 BsmtFin\_SF\_1 BsmtFin\_Type\_2 BsmtFin\_SF\_2   
## Length:2053 Min. :1.00 Length:2053 Min. : 0.00   
## Class :character 1st Qu.:3.00 Class :character 1st Qu.: 0.00   
## Mode :character Median :3.00 Mode :character Median : 0.00   
## Mean :4.21 Mean : 52.57   
## 3rd Qu.:7.00 3rd Qu.: 0.00   
## Max. :7.00 Max. :1526.00   
## Bsmt\_Unf\_SF Total\_Bsmt\_SF Heating Heating\_QC   
## Min. : 0.0 Min. : 0 Length:2053 Length:2053   
## 1st Qu.: 226.0 1st Qu.: 793 Class :character Class :character   
## Median : 460.0 Median : 988 Mode :character Mode :character   
## Mean : 561.2 Mean :1055   
## 3rd Qu.: 801.0 3rd Qu.:1304   
## Max. :2336.0 Max. :5095   
## Central\_Air Electrical First\_Flr\_SF Second\_Flr\_SF   
## Length:2053 Length:2053 Min. : 432 Min. : 0.0   
## Class :character Class :character 1st Qu.: 882 1st Qu.: 0.0   
## Mode :character Mode :character Median :1088 Median : 0.0   
## Mean :1168 Mean : 326.1   
## 3rd Qu.:1402 3rd Qu.: 701.0   
## Max. :5095 Max. :1862.0   
## Low\_Qual\_Fin\_SF Gr\_Liv\_Area Bsmt\_Full\_Bath Bsmt\_Half\_Bath   
## Min. : 0.000 Min. : 480 Min. :0.0000 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.:1137 1st Qu.:0.0000 1st Qu.:0.00000   
## Median : 0.000 Median :1447 Median :0.0000 Median :0.00000   
## Mean : 4.973 Mean :1499 Mean :0.4301 Mean :0.05796   
## 3rd Qu.: 0.000 3rd Qu.:1737 3rd Qu.:1.0000 3rd Qu.:0.00000   
## Max. :1064.000 Max. :5095 Max. :3.0000 Max. :2.00000   
## Full\_Bath Half\_Bath Bedroom\_AbvGr Kitchen\_AbvGr   
## Min. :0.000 Min. :0.0000 Min. :0.000 Min. :1.000   
## 1st Qu.:1.000 1st Qu.:0.0000 1st Qu.:2.000 1st Qu.:1.000   
## Median :2.000 Median :0.0000 Median :3.000 Median :1.000   
## Mean :1.564 Mean :0.3751 Mean :2.855 Mean :1.047   
## 3rd Qu.:2.000 3rd Qu.:1.0000 3rd Qu.:3.000 3rd Qu.:1.000   
## Max. :4.000 Max. :2.0000 Max. :6.000 Max. :3.000   
## Kitchen\_Qual TotRms\_AbvGrd Functional Fireplaces   
## Length:2053 Min. : 3.000 Length:2053 Min. :0.000   
## Class :character 1st Qu.: 5.000 Class :character 1st Qu.:0.000   
## Mode :character Median : 6.000 Mode :character Median :1.000   
## Mean : 6.442 Mean :0.603   
## 3rd Qu.: 7.000 3rd Qu.:1.000   
## Max. :15.000 Max. :4.000   
## Fireplace\_Qu Garage\_Type Garage\_Finish Garage\_Cars   
## Length:2053 Length:2053 Length:2053 Min. :0.000   
## Class :character Class :character Class :character 1st Qu.:1.000   
## Mode :character Mode :character Mode :character Median :2.000   
## Mean :1.774   
## 3rd Qu.:2.000   
## Max. :5.000   
## Garage\_Area Garage\_Qual Garage\_Cond Paved\_Drive   
## Min. : 0 Length:2053 Length:2053 Length:2053   
## 1st Qu.: 320 Class :character Class :character Class :character   
## Median : 478 Mode :character Mode :character Mode :character   
## Mean : 472   
## 3rd Qu.: 576   
## Max. :1488   
## Wood\_Deck\_SF Open\_Porch\_SF Enclosed\_Porch Three\_season\_porch  
## Min. : 0.00 Min. : 0.00 Min. : 0.00 Min. : 0.000   
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.000   
## Median : 0.00 Median : 27.00 Median : 0.00 Median : 0.000   
## Mean : 93.52 Mean : 48.17 Mean : 23.02 Mean : 2.799   
## 3rd Qu.: 168.00 3rd Qu.: 72.00 3rd Qu.: 0.00 3rd Qu.: 0.000   
## Max. :1424.00 Max. :742.00 Max. :584.00 Max. :407.000   
## Screen\_Porch Pool\_Area Pool\_QC Fence   
## Min. : 0.00 Min. : 0.000 Length:2053 Length:2053   
## 1st Qu.: 0.00 1st Qu.: 0.000 Class :character Class :character   
## Median : 0.00 Median : 0.000 Mode :character Mode :character   
## Mean : 16.68 Mean : 1.339   
## 3rd Qu.: 0.00 3rd Qu.: 0.000   
## Max. :576.00 Max. :800.000   
## Misc\_Feature Misc\_Val Mo\_Sold Year\_Sold   
## Length:2053 Min. : 0.00 Min. : 1.000 Min. :2006   
## Class :character 1st Qu.: 0.00 1st Qu.: 4.000 1st Qu.:2007   
## Mode :character Median : 0.00 Median : 6.000 Median :2008   
## Mean : 60.12 Mean : 6.189 Mean :2008   
## 3rd Qu.: 0.00 3rd Qu.: 8.000 3rd Qu.:2009   
## Max. :17000.00 Max. :12.000 Max. :2010   
## Sale\_Type Sale\_Condition Longitude Latitude   
## Length:2053 Length:2053 Min. :-93.69 Min. :41.99   
## Class :character Class :character 1st Qu.:-93.66 1st Qu.:42.02   
## Mode :character Mode :character Median :-93.64 Median :42.03   
## Mean :-93.64 Mean :42.03   
## 3rd Qu.:-93.62 3rd Qu.:42.05   
## Max. :-93.58 Max. :42.06   
## Above\_Median   
## Length:2053   
## Class :character   
## Mode :character   
##   
##   
##

Iowa <- Iowa %>% mutate(MS\_SubClass=as\_factor(MS\_SubClass))  
Iowa <- Iowa %>% mutate(MS\_Zoning=as\_factor(MS\_Zoning))  
Iowa <- Iowa %>% mutate(Street=as\_factor(Street))  
Iowa <- Iowa %>% mutate(Alley=as\_factor(Alley))  
Iowa <- Iowa %>% mutate(Lot\_Shape=as\_factor(Lot\_Shape))  
Iowa <- Iowa %>% mutate(Land\_Contour=as\_factor(Land\_Contour))  
Iowa <- Iowa %>% mutate(Utilities=as\_factor(Utilities))  
Iowa <- Iowa %>% mutate(Lot\_Config=as\_factor(Lot\_Config))  
Iowa <- Iowa %>% mutate(Land\_Slope=as\_factor(Land\_Slope))  
Iowa <- Iowa %>% mutate(Neighborhood=as\_factor(Neighborhood))  
Iowa <- Iowa %>% mutate(Condition\_1=as\_factor(Condition\_1))  
Iowa <- Iowa %>% mutate(Condition\_2=as\_factor(Condition\_2))  
Iowa <- Iowa %>% mutate(Bldg\_Type=as\_factor(Bldg\_Type))  
Iowa <- Iowa %>% mutate(House\_Style=as\_factor(House\_Style))  
Iowa <- Iowa %>% mutate(Overall\_Qual=as\_factor(Overall\_Qual))  
Iowa <- Iowa %>% mutate(Overall\_Cond=as\_factor(Overall\_Cond))  
Iowa <- Iowa %>% mutate(Roof\_Style=as\_factor(Roof\_Style))  
Iowa <- Iowa %>% mutate(Roof\_Matl=as\_factor(Roof\_Matl))  
Iowa <- Iowa %>% mutate(Exterior\_1st=as\_factor(Exterior\_1st))  
Iowa <- Iowa %>% mutate(Exterior\_2nd=as\_factor(Exterior\_2nd))  
Iowa <- Iowa %>% mutate(Mas\_Vnr\_Type=as\_factor(Mas\_Vnr\_Type))  
Iowa <- Iowa %>% mutate(Exter\_Qual=as\_factor(Exter\_Qual))  
Iowa <- Iowa %>% mutate(Exter\_Cond=as\_factor(Exter\_Cond))  
Iowa <- Iowa %>% mutate(Foundation=as\_factor(Foundation))  
Iowa <- Iowa %>% mutate(Bsmt\_Qual=as\_factor(Bsmt\_Qual))  
Iowa <- Iowa %>% mutate(Bsmt\_Cond=as\_factor(Bsmt\_Cond))  
Iowa <- Iowa %>% mutate(Bsmt\_Exposure=as\_factor(Bsmt\_Exposure))  
Iowa <- Iowa %>% mutate(BsmtFin\_Type\_1=as\_factor(BsmtFin\_Type\_1))  
Iowa <- Iowa %>% mutate(BsmtFin\_Type\_2=as\_factor(BsmtFin\_Type\_2))  
Iowa <- Iowa %>% mutate(Heating=as\_factor(Heating))  
Iowa <- Iowa %>% mutate(Heating\_QC=as\_factor(Heating\_QC))  
Iowa <- Iowa %>% mutate(Central\_Air=as\_factor(Central\_Air))  
Iowa <- Iowa %>% mutate(Electrical=as\_factor(Electrical))  
Iowa <- Iowa %>% mutate(Kitchen\_Qual=as\_factor(Kitchen\_Qual))  
Iowa <- Iowa %>% mutate(Funtional=as\_factor(Functional))  
Iowa <- Iowa %>% mutate(Fireplace\_Qu=as\_factor(Fireplace\_Qu))  
Iowa <- Iowa %>% mutate(Garage\_Type=as\_factor(Garage\_Type))  
Iowa <- Iowa %>% mutate(Garage\_Finish=as\_factor(Garage\_Finish))  
Iowa <- Iowa %>% mutate(Garage\_Qual=as\_factor(Garage\_Qual))  
Iowa <- Iowa %>% mutate(Garage\_Cond=as\_factor(Garage\_Cond))  
Iowa <- Iowa %>% mutate(Paved\_Drive=as\_factor(Paved\_Drive))  
Iowa <- Iowa %>% mutate(Pool\_QC=as\_factor(Pool\_QC))  
Iowa <- Iowa %>% mutate(Fence=as\_factor(Fence))  
Iowa <- Iowa %>% mutate(Misc\_Feature=as\_factor(Misc\_Feature))  
Iowa <- Iowa %>% mutate(Sale\_Type=as\_factor(Sale\_Type))  
Iowa <- Iowa %>% mutate(Sale\_Condition=as\_factor(Sale\_Condition))  
Iowa <- Iowa %>% mutate(Above\_Median=as\_factor(Above\_Median))  
Iowa <- Iowa %>% mutate(Functional=as\_factor(Functional))

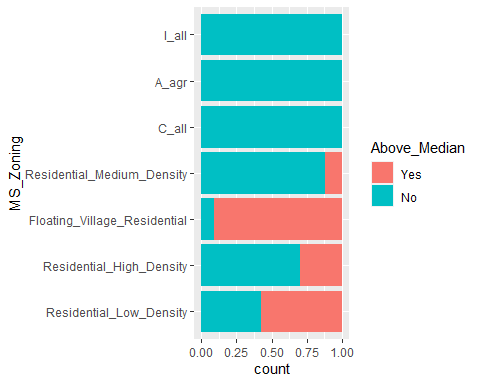
summary(Iowa)

## MS\_SubClass MS\_Zoning   
## One\_Story\_1946\_and\_Newer\_All\_Styles :772 Residential\_Low\_Density :1600   
## Two\_Story\_1946\_and\_Newer :383 Residential\_High\_Density : 20   
## One\_and\_Half\_Story\_Finished\_All\_Ages:204 Floating\_Village\_Residential: 87   
## One\_Story\_PUD\_1946\_and\_Newer :129 Residential\_Medium\_Density : 326   
## One\_Story\_1945\_and\_Older : 98 C\_all : 17   
## Two\_Story\_1945\_and\_Older : 95 A\_agr : 2   
## (Other) :372 I\_all : 1   
## Lot\_Frontage Lot\_Area Street Alley   
## Min. : 0.00 Min. : 1300 Pave:2046 No\_Alley\_Access:1914   
## 1st Qu.: 43.00 1st Qu.: 7500 Grvl: 7 Paved : 45   
## Median : 62.00 Median : 9548 Gravel : 94   
## Mean : 57.38 Mean : 10258   
## 3rd Qu.: 78.00 3rd Qu.: 11600   
## Max. :313.00 Max. :215245   
##   
## Lot\_Shape Land\_Contour Utilities Lot\_Config   
## Slightly\_Irregular : 714 Lvl:1833 AllPub:2052 Corner : 359   
## Regular :1275 HLS: 94 NoSewr: 1 Inside :1495   
## Moderately\_Irregular: 53 Bnk: 81 CulDSac: 135   
## Irregular : 11 Low: 45 FR2 : 56   
## FR3 : 8   
##   
##   
## Land\_Slope Neighborhood Condition\_1 Condition\_2 Bldg\_Type   
## Gtl:1951 North\_Ames : 327 Norm :1771 Norm :2027 OneFam :1706   
## Mod: 89 College\_Creek: 183 Feedr : 113 Feedr : 12 TwnhsE : 157   
## Sev: 13 Old\_Town : 181 Artery : 67 PosA : 4 Twnhs : 67   
## Edwards : 129 RRAn : 35 Artery : 4 Duplex : 76   
## Somerset : 119 PosN : 24 PosN : 3 TwoFmCon: 47   
## Gilbert : 109 RRAe : 19 RRNn : 1   
## (Other) :1005 (Other): 24 (Other): 2   
## House\_Style Overall\_Qual Overall\_Cond   
## One\_Story :1052 Average :587 Average :1143   
## Two\_Story : 590 Above\_Average:518 Above\_Average: 376   
## One\_and\_Half\_Fin: 225 Good :411 Good : 286   
## SLvl : 90 Very\_Good :237 Very\_Good : 98   
## SFoyer : 56 Below\_Average:169 Below\_Average: 73   
## Two\_and\_Half\_Unf: 19 Excellent : 70 Fair : 35   
## (Other) : 21 (Other) : 61 (Other) : 42   
## Year\_Built Year\_Remod\_Add Roof\_Style Roof\_Matl Exterior\_1st  
## Min. :1875 Min. :1950 Hip : 404 CompShg:2023 VinylSd:705   
## 1st Qu.:1953 1st Qu.:1965 Gable :1607 WdShake: 8 MetalSd:319   
## Median :1972 Median :1993 Mansard: 9 Tar&Grv: 17 Wd Sdng:313   
## Mean :1971 Mean :1984 Gambrel: 14 WdShngl: 3 HdBoard:303   
## 3rd Qu.:2000 3rd Qu.:2004 Shed : 5 Roll : 1 Plywood:151   
## Max. :2010 Max. :2010 Flat : 14 Metal : 1 CemntBd: 90   
## (Other):172   
## Exterior\_2nd Mas\_Vnr\_Type Mas\_Vnr\_Area Exter\_Qual   
## VinylSd:699 Stone : 166 Min. : 0.0 Typical :1272   
## MetalSd:317 None :1231 1st Qu.: 0.0 Good : 682   
## Wd Sdng:302 BrkFace: 638 Median : 0.0 Excellent: 78   
## HdBoard:277 BrkCmn : 17 Mean : 103.8 Fair : 21   
## Plywood:190 CBlock : 1 3rd Qu.: 164.0   
## CmentBd: 90 Max. :1600.0   
## (Other):178   
## Exter\_Cond Foundation Bsmt\_Qual Bsmt\_Cond   
## Typical :1787 CBlock:880 Typical :911 Good : 80   
## Good : 213 PConc :911 Good :849 Typical :1833   
## Fair : 43 Wood : 4 Excellent :178 Poor : 4   
## Excellent: 9 BrkTil:216 No\_Basement: 57 No\_Basement: 57   
## Poor : 1 Slab : 36 Fair : 57 Fair : 76   
## Stone : 6 Poor : 1 Excellent : 3   
##   
## Bsmt\_Exposure BsmtFin\_Type\_1 BsmtFin\_SF\_1 BsmtFin\_Type\_2  
## Gd : 199 BLQ :196 Min. :1.00 Unf :1740   
## No :1331 Rec :216 1st Qu.:3.00 LwQ : 64   
## Av : 284 ALQ :298 Median :3.00 BLQ : 47   
## Mn : 179 GLQ :578 Mean :4.21 Rec : 79   
## No\_Basement: 60 Unf :602 3rd Qu.:7.00 GLQ : 23   
## LwQ :106 Max. :7.00 No\_Basement: 58   
## No\_Basement: 57 ALQ : 42   
## BsmtFin\_SF\_2 Bsmt\_Unf\_SF Total\_Bsmt\_SF Heating   
## Min. : 0.00 Min. : 0.0 Min. : 0 GasA :2019   
## 1st Qu.: 0.00 1st Qu.: 226.0 1st Qu.: 793 GasW : 21   
## Median : 0.00 Median : 460.0 Median : 988 Grav : 6   
## Mean : 52.57 Mean : 561.2 Mean :1055 Wall : 5   
## 3rd Qu.: 0.00 3rd Qu.: 801.0 3rd Qu.:1304 Floor: 1   
## Max. :1526.00 Max. :2336.0 Max. :5095 OthW : 1   
##   
## Heating\_QC Central\_Air Electrical First\_Flr\_SF Second\_Flr\_SF   
## Fair : 61 Y:1916 SBrkr :1887 Min. : 432 Min. : 0.0   
## Typical : 618 N: 137 FuseA : 126 1st Qu.: 882 1st Qu.: 0.0   
## Excellent:1040 FuseF : 33 Median :1088 Median : 0.0   
## Good : 333 FuseP : 6 Mean :1168 Mean : 326.1   
## Poor : 1 Unknown: 1 3rd Qu.:1402 3rd Qu.: 701.0   
## Max. :5095 Max. :1862.0   
##   
## Low\_Qual\_Fin\_SF Gr\_Liv\_Area Bsmt\_Full\_Bath Bsmt\_Half\_Bath   
## Min. : 0.000 Min. : 480 Min. :0.0000 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.:1137 1st Qu.:0.0000 1st Qu.:0.00000   
## Median : 0.000 Median :1447 Median :0.0000 Median :0.00000   
## Mean : 4.973 Mean :1499 Mean :0.4301 Mean :0.05796   
## 3rd Qu.: 0.000 3rd Qu.:1737 3rd Qu.:1.0000 3rd Qu.:0.00000   
## Max. :1064.000 Max. :5095 Max. :3.0000 Max. :2.00000   
##   
## Full\_Bath Half\_Bath Bedroom\_AbvGr Kitchen\_AbvGr   
## Min. :0.000 Min. :0.0000 Min. :0.000 Min. :1.000   
## 1st Qu.:1.000 1st Qu.:0.0000 1st Qu.:2.000 1st Qu.:1.000   
## Median :2.000 Median :0.0000 Median :3.000 Median :1.000   
## Mean :1.564 Mean :0.3751 Mean :2.855 Mean :1.047   
## 3rd Qu.:2.000 3rd Qu.:1.0000 3rd Qu.:3.000 3rd Qu.:1.000   
## Max. :4.000 Max. :2.0000 Max. :6.000 Max. :3.000   
##   
## Kitchen\_Qual TotRms\_AbvGrd Functional Fireplaces   
## Typical :1070 Min. : 3.000 Typ :1896 Min. :0.000   
## Good : 790 1st Qu.: 5.000 Min2 : 54 1st Qu.:0.000   
## Excellent: 142 Median : 6.000 Min1 : 51 Median :1.000   
## Fair : 50 Mean : 6.442 Mod : 27 Mean :0.603   
## Poor : 1 3rd Qu.: 7.000 Maj1 : 15 3rd Qu.:1.000   
## Max. :15.000 Maj2 : 6 Max. :4.000   
## (Other): 4   
## Fireplace\_Qu Garage\_Type Garage\_Finish Garage\_Cars   
## Good :538 Attchd :1204 Fin :509 Min. :0.000   
## No\_Fireplace:993 BuiltIn : 127 Unf :872 1st Qu.:1.000   
## Typical :409 Basment : 29 RFn :563 Median :2.000   
## Poor : 36 Detchd : 549 No\_Garage:109 Mean :1.774   
## Excellent : 21 No\_Garage : 108 3rd Qu.:2.000   
## Fair : 56 CarPort : 15 Max. :5.000   
## More\_Than\_Two\_Types: 21   
## Garage\_Area Garage\_Qual Garage\_Cond Paved\_Drive   
## Min. : 0 Typical :1839 Typical :1872 Partial\_Pavement: 42   
## 1st Qu.: 320 No\_Garage: 109 No\_Garage: 109 Paved :1848   
## Median : 478 Fair : 85 Fair : 53 Dirt\_Gravel : 163   
## Mean : 472 Good : 16 Excellent: 1   
## 3rd Qu.: 576 Excellent: 2 Poor : 8   
## Max. :1488 Poor : 2 Good : 10   
##   
## Wood\_Deck\_SF Open\_Porch\_SF Enclosed\_Porch Three\_season\_porch  
## Min. : 0.00 Min. : 0.00 Min. : 0.00 Min. : 0.000   
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.000   
## Median : 0.00 Median : 27.00 Median : 0.00 Median : 0.000   
## Mean : 93.52 Mean : 48.17 Mean : 23.02 Mean : 2.799   
## 3rd Qu.: 168.00 3rd Qu.: 72.00 3rd Qu.: 0.00 3rd Qu.: 0.000   
## Max. :1424.00 Max. :742.00 Max. :584.00 Max. :407.000   
##   
## Screen\_Porch Pool\_Area Pool\_QC Fence   
## Min. : 0.00 Min. : 0.000 No\_Pool :2047 No\_Fence :1661   
## 1st Qu.: 0.00 1st Qu.: 0.000 Excellent: 2 Minimum\_Privacy : 225   
## Median : 0.00 Median : 0.000 Typical : 2 Good\_Privacy : 81   
## Mean : 16.68 Mean : 1.339 Fair : 1 Good\_Wood : 77   
## 3rd Qu.: 0.00 3rd Qu.: 0.000 Good : 1 Minimum\_Wood\_Wire: 9   
## Max. :576.00 Max. :800.000   
##   
## Misc\_Feature Misc\_Val Mo\_Sold Year\_Sold Sale\_Type   
## None:1978 Min. : 0.00 Min. : 1.000 Min. :2006 WD :1789   
## Gar2: 5 1st Qu.: 0.00 1st Qu.: 4.000 1st Qu.:2007 New : 163   
## Shed: 66 Median : 0.00 Median : 6.000 Median :2008 COD : 54   
## Othr: 3 Mean : 60.12 Mean : 6.189 Mean :2008 ConLD : 16   
## Elev: 1 3rd Qu.: 0.00 3rd Qu.: 8.000 3rd Qu.:2009 ConLI : 8   
## Max. :17000.00 Max. :12.000 Max. :2010 CWD : 8   
## (Other): 15   
## Sale\_Condition Longitude Latitude Above\_Median Funtional   
## Normal :1712 Min. :-93.69 Min. :41.99 Yes:1043 Typ :1896   
## Partial: 169 1st Qu.:-93.66 1st Qu.:42.02 No :1010 Min2 : 54   
## Family : 30 Median :-93.64 Median :42.03 Min1 : 51   
## Abnorml: 121 Mean :-93.64 Mean :42.03 Mod : 27   
## Alloca : 16 3rd Qu.:-93.62 3rd Qu.:42.05 Maj1 : 15   
## AdjLand: 5 Max. :-93.58 Max. :42.06 Maj2 : 6   
## (Other): 4

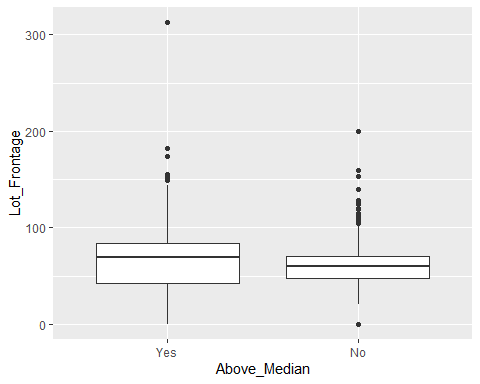
ggplot(Iowa, aes(x=MS\_SubClass, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



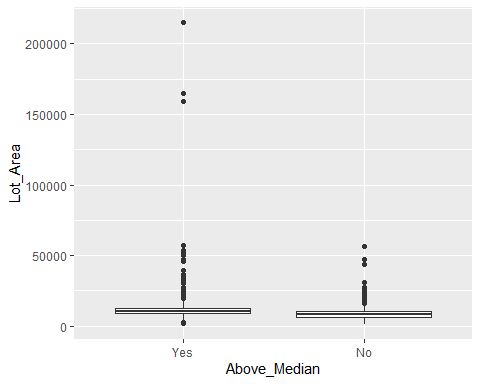
ggplot(Iowa, aes(x=MS\_Zoning, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



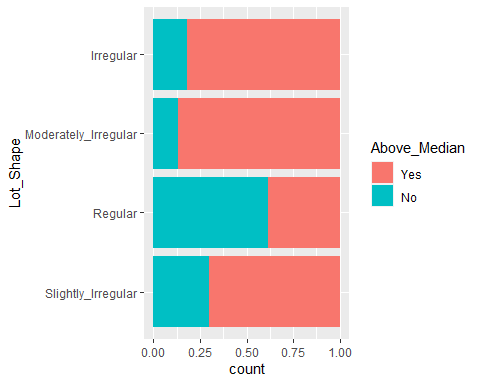
ggplot(Iowa, aes(x=Above\_Median, y=Lot\_Frontage))+geom\_boxplot()



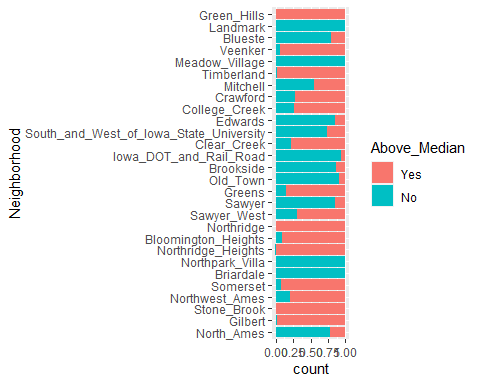
ggplot(Iowa, aes(x=Above\_Median, y=Lot\_Area))+geom\_boxplot()



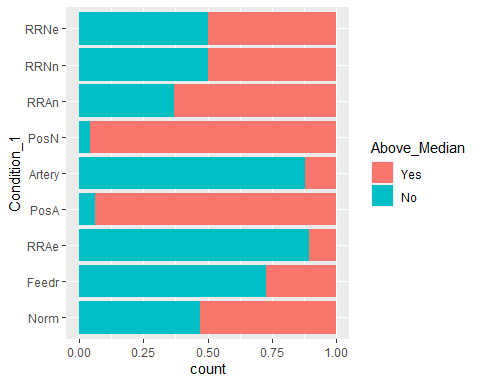
ggplot(Iowa, aes(x=Lot\_Shape, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



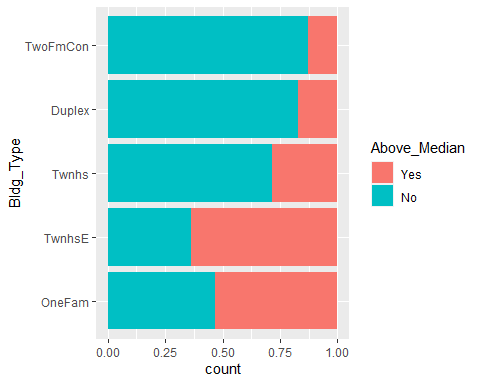
ggplot(Iowa, aes(x=Neighborhood, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



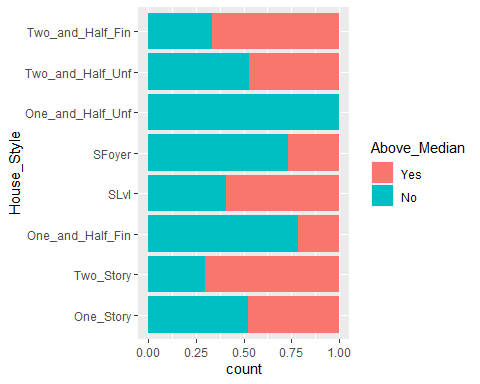
ggplot(Iowa, aes(x=Condition\_1, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



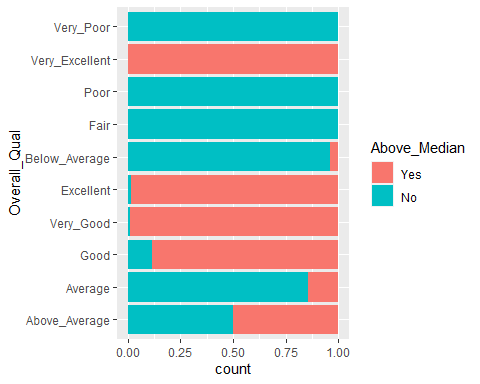
ggplot(Iowa, aes(x=Bldg\_Type, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



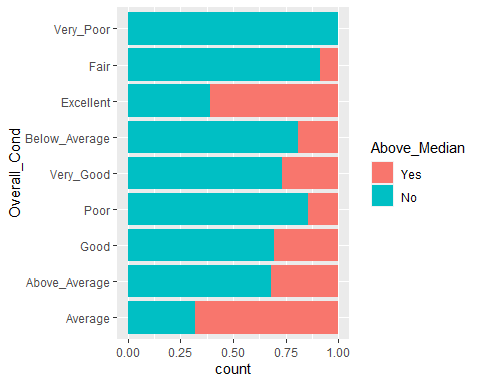
ggplot(Iowa, aes(x=House\_Style, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



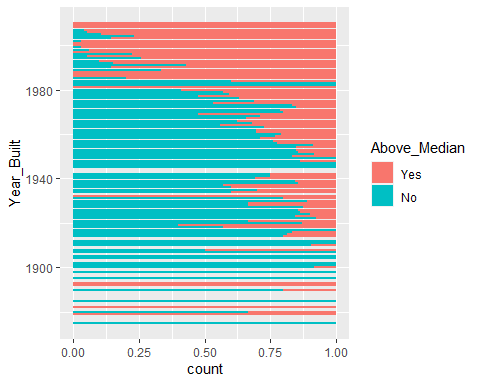
ggplot(Iowa, aes(x=Overall\_Qual, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



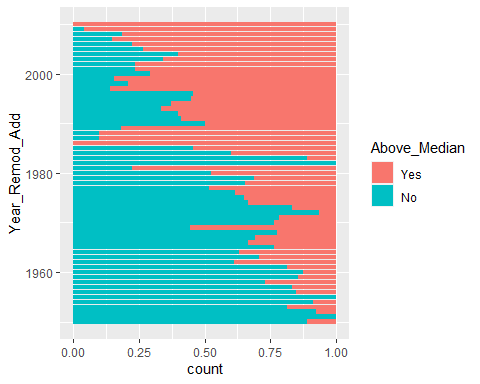
ggplot(Iowa, aes(x=Overall\_Cond, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



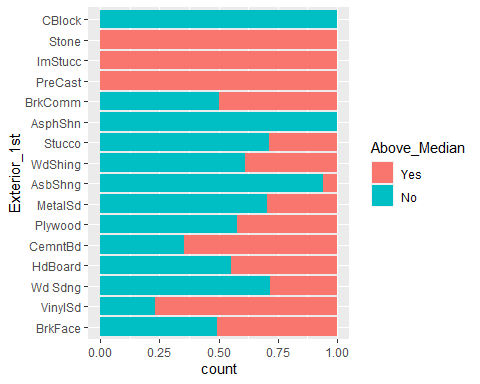
ggplot(Iowa, aes(x=Year\_Built, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



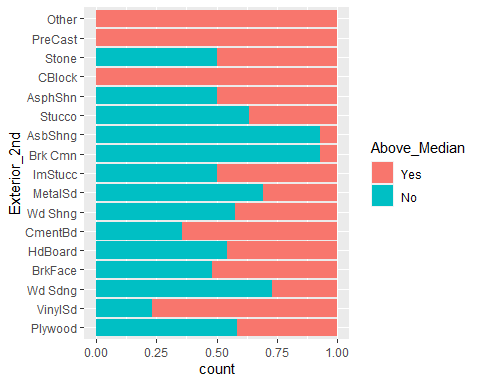
ggplot(Iowa, aes(x=Year\_Remod\_Add, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



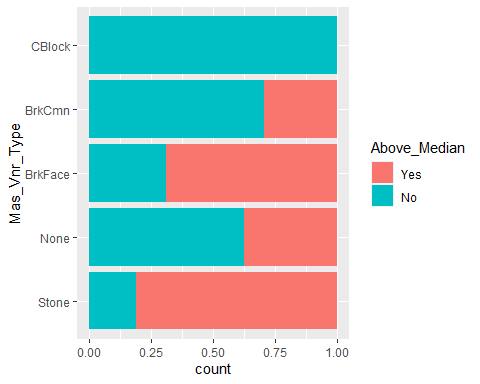
ggplot(Iowa, aes(x=Exterior\_1st, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



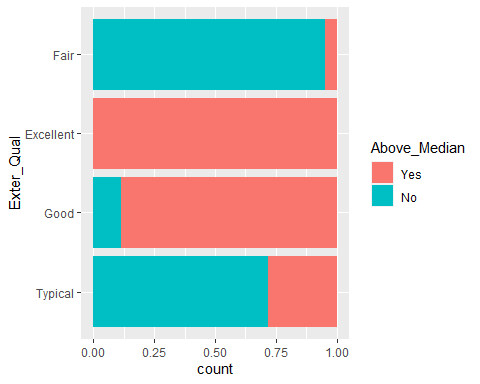
ggplot(Iowa, aes(x=Exterior\_2nd, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



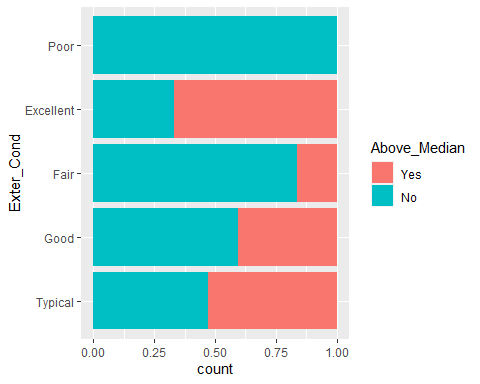
ggplot(Iowa, aes(x=Mas\_Vnr\_Type, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



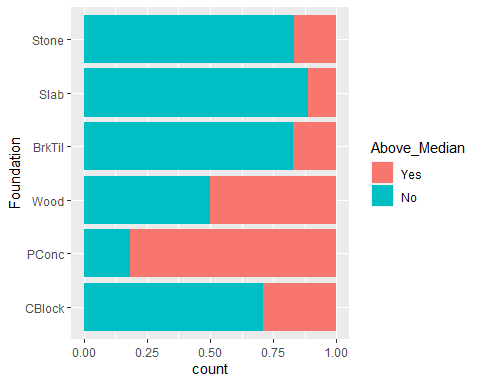
ggplot(Iowa, aes(x=Exter\_Qual, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



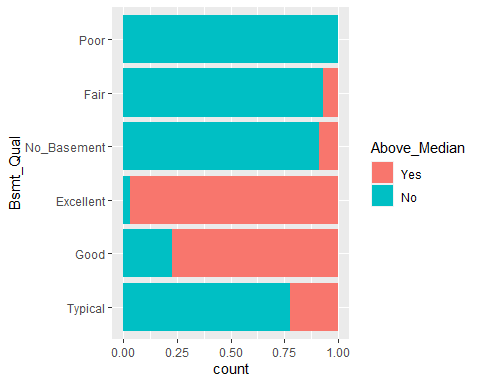
ggplot(Iowa, aes(x=Exter\_Cond, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



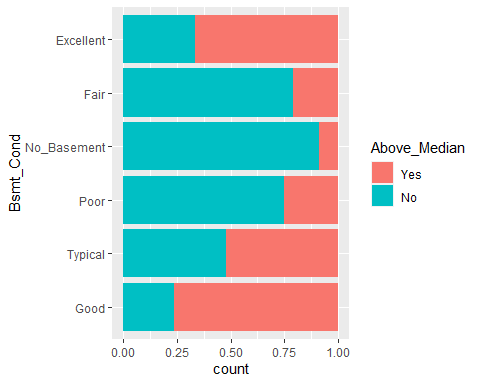
ggplot(Iowa, aes(x=Foundation, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



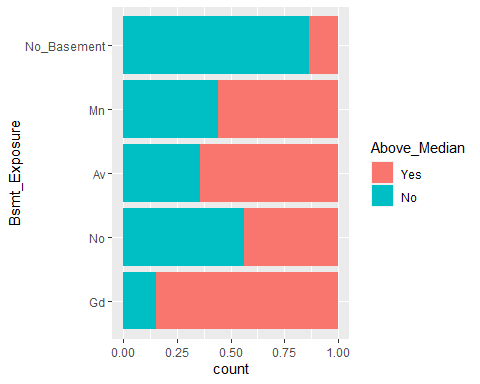
ggplot(Iowa, aes(x=Bsmt\_Qual, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



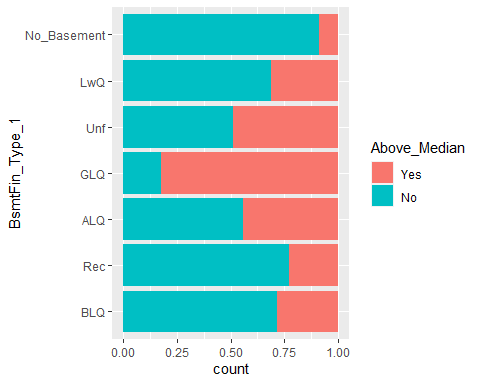
ggplot(Iowa, aes(x=Bsmt\_Cond, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



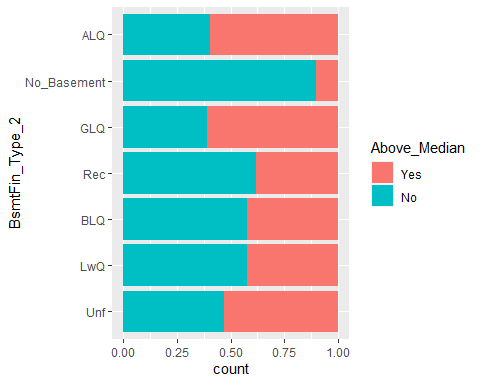
ggplot(Iowa, aes(x=Bsmt\_Exposure, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



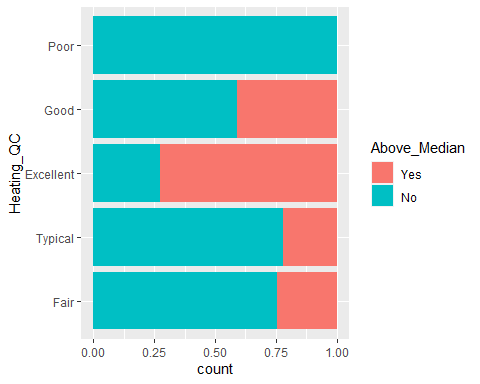
ggplot(Iowa, aes(x=BsmtFin\_Type\_1, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



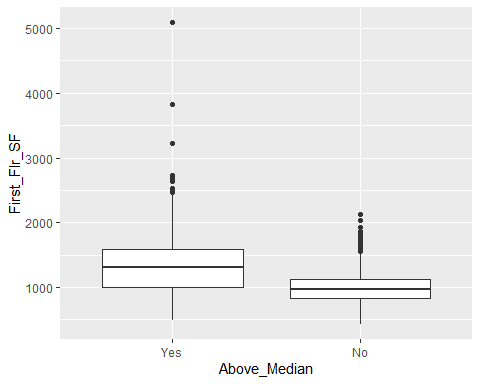
ggplot(Iowa, aes(x=BsmtFin\_Type\_2, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



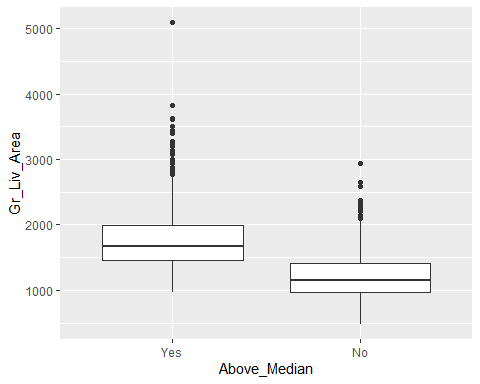
ggplot(Iowa, aes(x=Heating\_QC, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



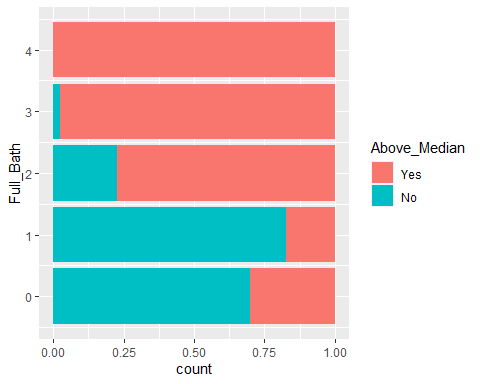
ggplot(Iowa, aes(x=Above\_Median, y=First\_Flr\_SF))+geom\_boxplot()



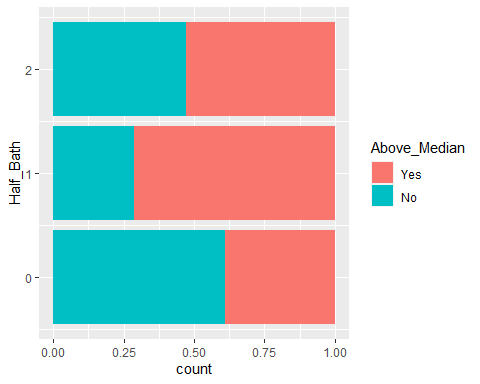
ggplot(Iowa, aes(x=Above\_Median, y=Gr\_Liv\_Area))+geom\_boxplot()



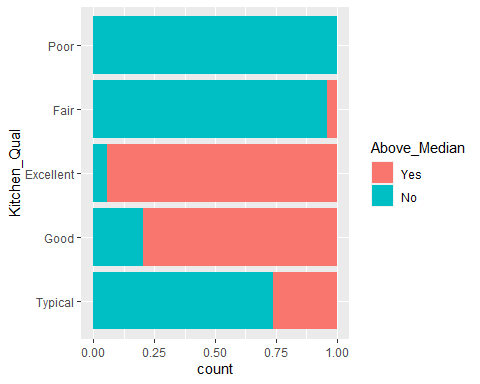
ggplot(Iowa, aes(x=Full\_Bath, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



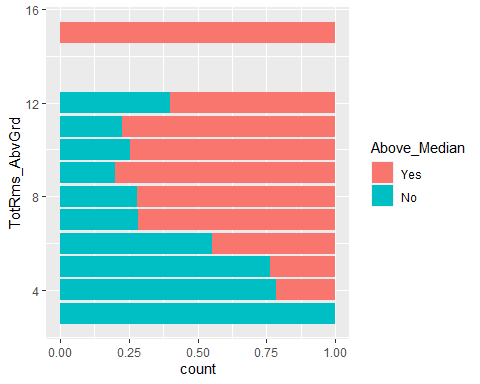
ggplot(Iowa, aes(x=Half\_Bath, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



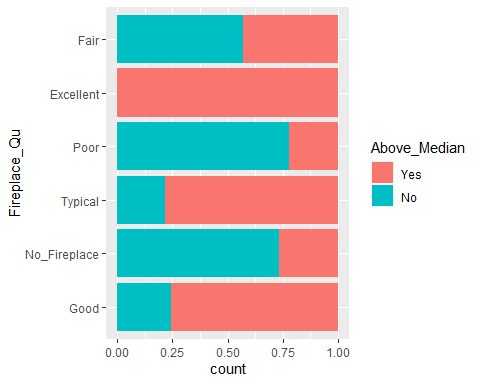
ggplot(Iowa, aes(x=Kitchen\_Qual, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



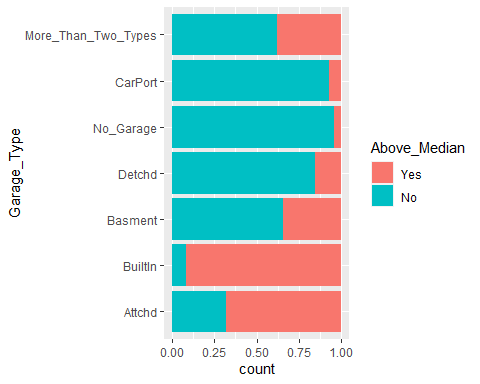
ggplot(Iowa, aes(x=TotRms\_AbvGrd, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



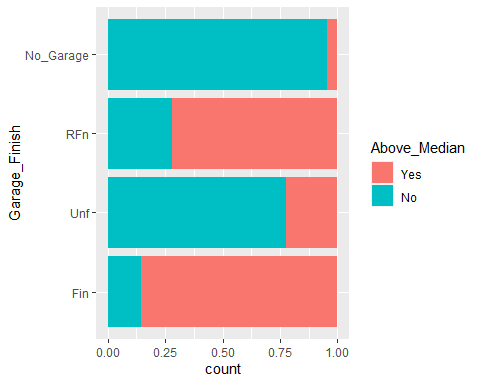
ggplot(Iowa, aes(x=Fireplace\_Qu, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



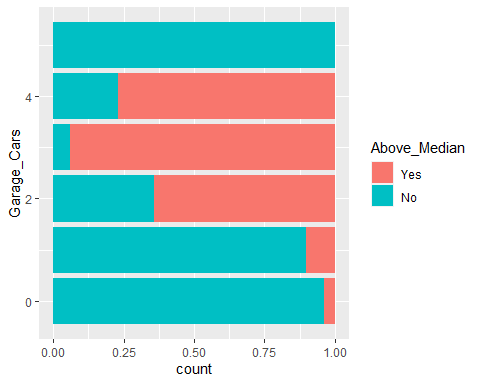
ggplot(Iowa, aes(x=Garage\_Type, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



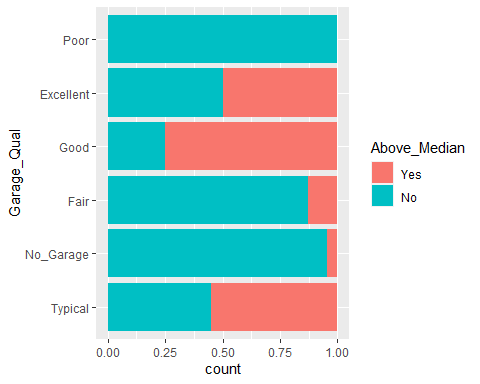
ggplot(Iowa, aes(x=Garage\_Finish, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



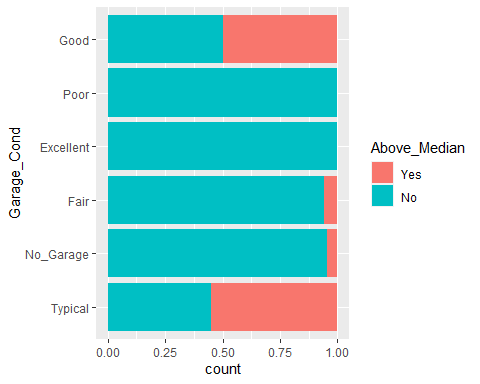
ggplot(Iowa, aes(x=Garage\_Cars, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



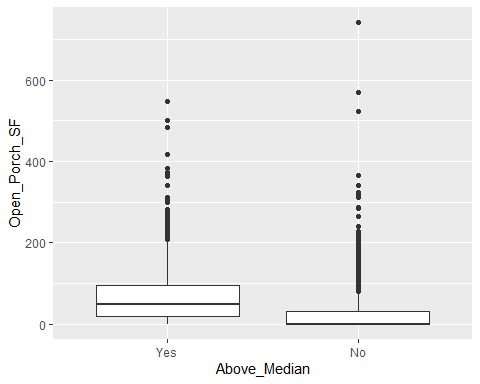
ggplot(Iowa, aes(x=Garage\_Qual, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



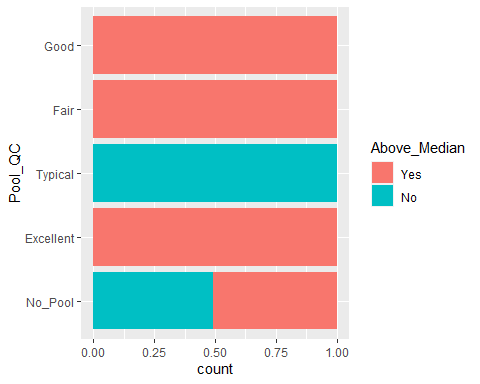
ggplot(Iowa, aes(x=Garage\_Cond, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



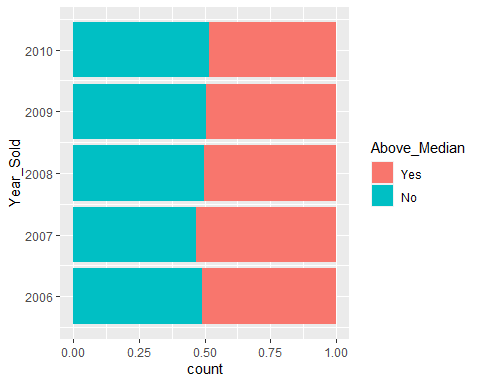
ggplot(Iowa, aes(x=Above\_Median, y=Open\_Porch\_SF))+geom\_boxplot()



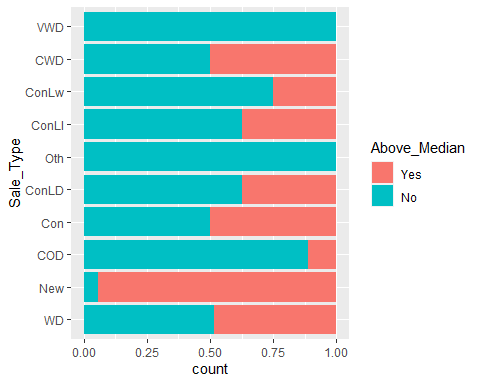
ggplot(Iowa, aes(x=Pool\_QC, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



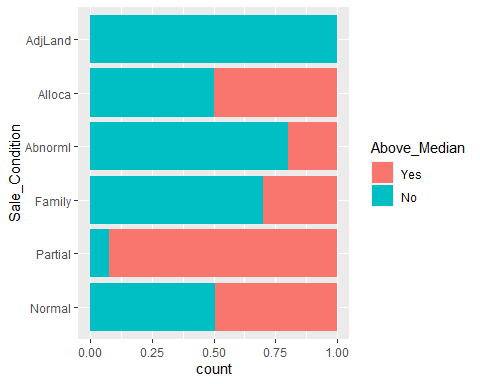
ggplot(Iowa, aes(x=Year\_Sold, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



ggplot(Iowa, aes(x=Sale\_Type, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



ggplot(Iowa, aes(x=Sale\_Condition, fill=Above\_Median))+geom\_bar(position="fill")+coord\_flip()



ggplot(Iowa, aes(x=Above\_Median, y=First\_Flr\_SF))+geom\_boxplot()

