homework2

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1 Loading and cleaning

a.

```
ca_pa <- read_csv("~/github/Rcourse_1/data/calif_penn_2011.csv")
```

b.rows and columns

```
dim(ca_pa)
```

```
## [1] 11275    34
```

c.

```
tail(colSums(apply(ca_pa,c(1,2),is.na)))
```

```
##              Bedrooms_4      Bedrooms_5_or_more                   Owners
##                      98                      98                      100
##                 Renters Median_household_income   Mean_household_income
##                     100                     115                      126
```

apply 函数将 is.na() 作用于 ca_pa 的每一个元素，colSums() 统计每一列中为 na 类型的元素个数。

d.e.

```
ca_pa_1<-na.omit(ca_pa)
(delete_nrows = nrow(ca_pa)-nrow(ca_pa_1))
```

```
## [1] 670
```

f.

```
sum(apply(ca_pa,c(1,2),is.na))
```

```
## [1] 3034
```

```
sum(rowSums(apply(ca_pa,c(1,2),is.na))!=F)
```

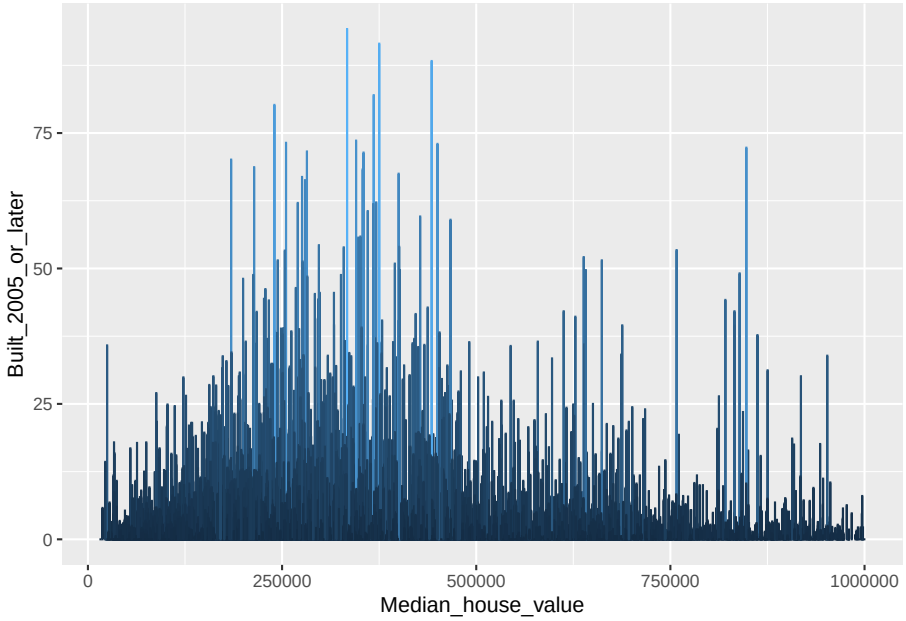
```
## [1] 670
```

c 中统计为每一列中 na 的数量，累加后为 na 元素的数量。由于每一行可以包含多个 na，所以，最终统计至少包含一个 na 的行数为 670, 所以 (c),(e) 相符。

2 This Very New House

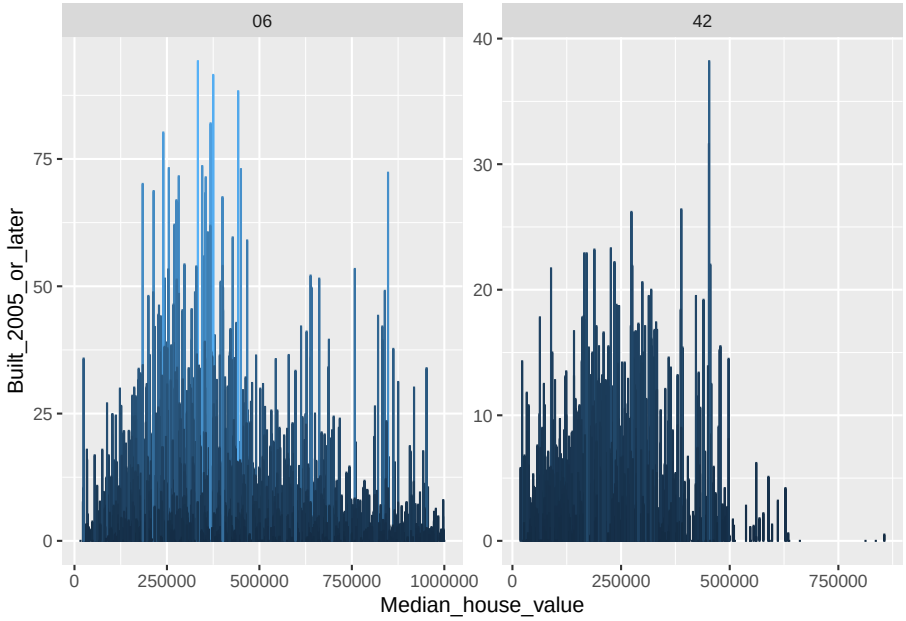
a.

```
ca_pa_1 %>% ggplot(aes(x = Median_house_value,y = Built_2005_or_later,
                       col = Built_2005_or_later)) +
  geom_col(position = "dodge") +
  theme(legend.position = "none")
```



b.

```
ca_pa_1 %>% ggplot(aes(x = Median_house_value,y = Built_2005_or_later,
                       col = Built_2005_or_later))+
  geom_col(position = "dodge") +
  facet_wrap(~STATEFP,scales = "free")+
  theme(legend.position = "none")
```



3 Nobody Home

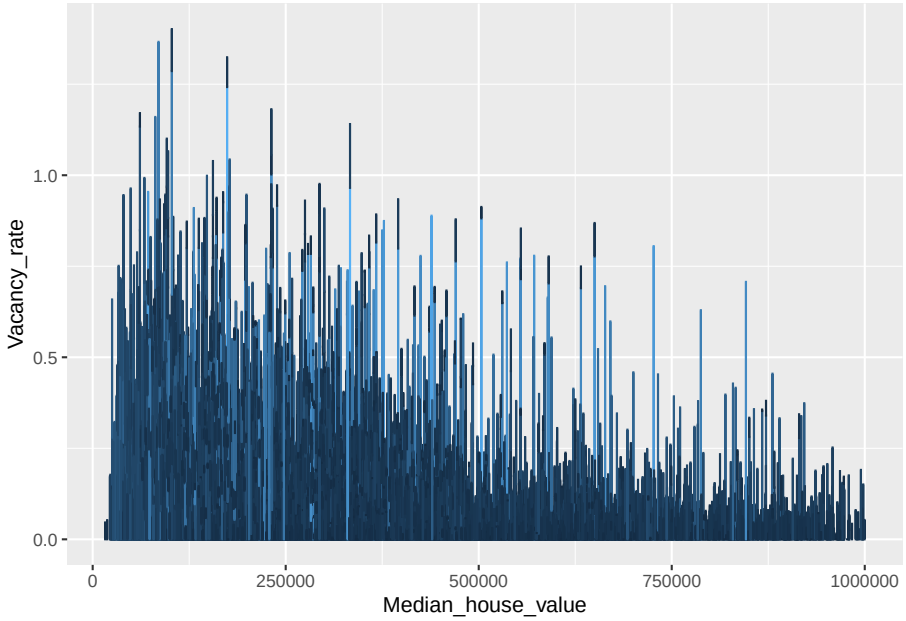
a.

```
ca_pa_2 <- ca_pa_1 %>% mutate(Vacancy_rate = Vacant_units/Total_units)
summary(ca_pa_2$Vacancy_rate)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.00000 0.03846 0.06767 0.08889 0.10921 0.96531
```

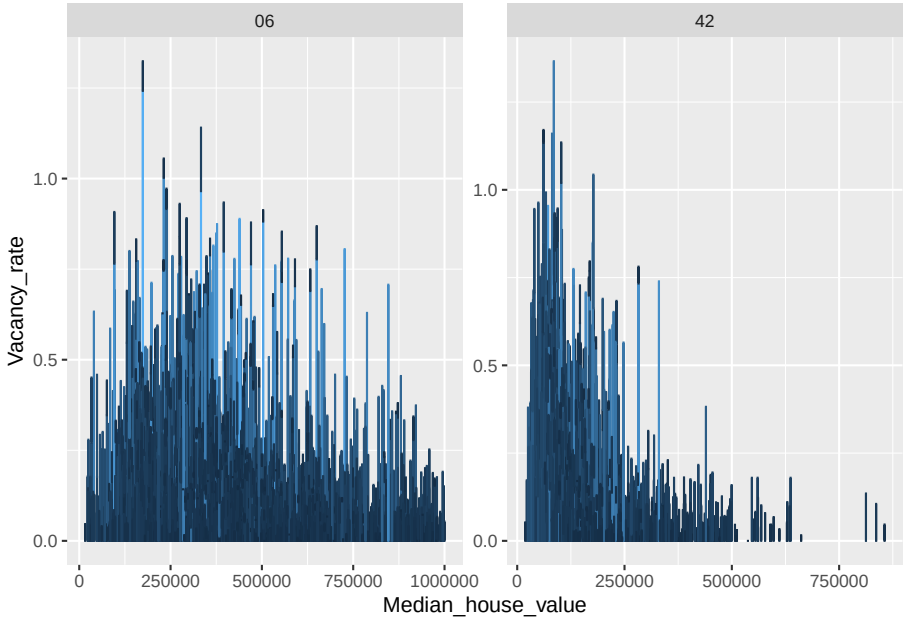
b.

```
ca_pa_2 %>% ggplot(aes(x = Median_house_value,y = Vacancy_rate,
                       col = Vacancy_rate)) +
  geom_col() +
  theme(legend.position = "none")
```



c.

```
ca_pa_2 %>% ggplot(aes(x = Median_house_value,y = Vacancy_rate,
                       col = Vacancy_rate)) +
  geom_col() +
  theme(legend.position = "none") +
  facet_wrap(~STATEFP,scales = "free")
```



可以看出，加州各个价位的房子都有空闲，而宾州的空房子主要集中在较低价位。此外，结合房屋建造的时间，说明可能宾州新建的房屋空闲概率较大。

4 COUNTYFP

a. 前一个循环用于找出 ca_pa 中为于加州 Alameda County 的数据下标，后一个循环根据以上下标提取出相应 Median_house_value 这一列的数据, 最后求中位数。

b.

```
median((ca_pa_1 %>% filter(STATEFP == "06",COUNTYFP=="001"))$Median_house_value)
```

```
## [1] 474050
```

c.

```
mean((ca_pa_1 %>% filter(STATEFP == "06",COUNTYFP=="001"))$Built_2005_or_later )
```

```
## [1] 2.820468
```

```
mean((ca_pa_1 %>% filter(STATEFP == "06",COUNTYFP=="085"))$Built_2005_or_later )
```

```
## [1] 3.200319
```

```
mean((ca_pa_1 %>% filter(STATEFP == "42",COUNTYFP=="003"))$Built_2005_or_later )
```

```
## [1] 1.474219
```

d.

```
#(i)
cor(ca_pa_1$Median_house_value,ca_pa_1$Built_2005_or_later)
```

```
## [1] -0.01893186
```

```
#(ii)
ca_pa_Cali <- ca_pa_1 %>% filter(STATEFP=="06")
cor(ca_pa_Cali$Median_house_value,ca_pa_Cali$Built_2005_or_later)
```

```
## [1] -0.1153604
```

```
#(iii)
ca_pa_Penn <- ca_pa_1 %>% filter(STATEFP=="42")
cor(ca_pa_Cali$Median_house_value,ca_pa_Cali$Built_2005_or_later)
```

```
## [1] -0.1153604
```

```
#(iv)
ca_pa_Alam <- ca_pa_Cali %>% filter(COUNTYFP == "001")
cor(ca_pa_Alam$Median_house_value,ca_pa_Alam$Built_2005_or_later)
```

```
## [1] 0.01303543
```

```
#(v)
ca_pa_Sant <- ca_pa_Cali %>% filter(COUNTYFP == "085")
cor(ca_pa_Sant$Median_house_value,ca_pa_Sant$Built_2005_or_later)
```

```
## [1] -0.1726203
```

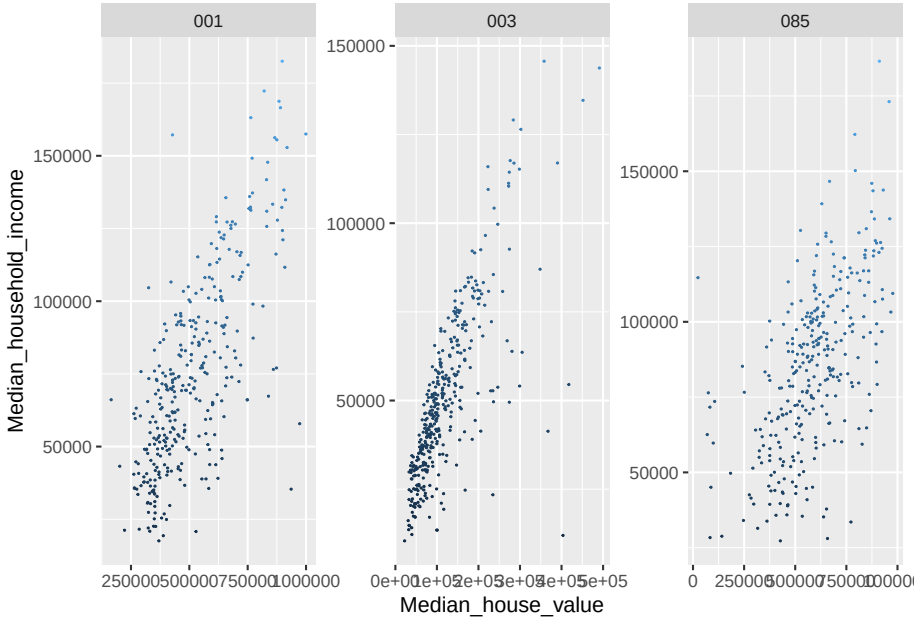
```
#(vi)
ca_pa_Alle <- ca_pa_Penn %>% filter(COUNTYFP == "003")
cor(ca_pa_Alle$Median_house_value,ca_pa_Alle$Built_2005_or_later)
```

```
## [1] 0.1939652
```

e.

```
temp<-full_join(ca_pa_Alam,ca_pa_Sant)
ca_pa_3county <- ca_pa_3county<-full_join(temp,ca_pa_Alle)
```

```
ca_pa_3county %>% ggplot(aes(x = Median_house_value,y = Median_household_income,
                             col = Median_household_income)) +
  geom_point(size = 0.1) +
  theme(legend.position = "none") +
  facet_wrap(~COUNTYFP,scales = "free")
```



5 MB.Ch 1.11.

```
gender <- factor(c(rep("female", 91), rep("male", 92)))
table(gender)
```

```
## gender
## female   male
##     91     92
```

```
gender <- factor(gender, levels=c("male", "female"))
table(gender)
```

```
## gender
##   male female
##     92     91
```

```
gender <- factor(gender, levels=c("Male", "female"))
# Note the mistake: "Male" should be "male"
table(gender)
```

```
## gender
##   Male female
##      0     91
```

```
table(gender, exclude=NULL)
```

```
## gender
##   Male female   <NA>
##      0     91     92
```

```
rm(gender)
```

首先建立一个 factor 类型的数据 gender，其中前 91 个为 “female” 后 92 个为 “male”。之后重新设置 levels, 若能在 gender 内找到，就正常返回，若有设定外的 levels 则将其返回为 NA。默认下 table 不显示 NA 的值，有关 NA 的输出由参数 useNA 控制。最后一个操作中 exclude=NULL 参数表示不排除任何数据，但却将 useNA 默认为 “ifany”，若 NA 个数为正，此时就会输出一个 levels。

6 MB.Ch 1.12.

```
exceed <- function(x,cutoff){
  sum(x>cutoff)/length(x)
}
exceed(1:100,60)
```

```
## [1] 0.4
```

```
exceed(1:100,0)
```

```
## [1] 1
```

```
exceed(1:100,19.5)
```

```
## [1] 0.81
```

7 MB.Ch.1.18.

```
cbind(Treatment = unstack(Rabbit, Treatment ~ Animal)[,1],
      Dose = unstack(Rabbit, Dose ~ Animal)[,1],
      unstack(Rabbit, BPchange ~ Animal))
```

```
##    Treatment   Dose    R1    R2    R3    R4   R5
## 1    Control   6.25  0.50  1.00  0.75  1.25  1.5
## 2    Control  12.50  4.50  1.25  3.00  1.50  1.5
## 3    Control  25.00 10.00  4.00  3.00  6.00  5.0
## 4    Control  50.00 26.00 12.00 14.00 19.00 16.0
## 5    Control 100.00 37.00 27.00 22.00 33.00 20.0
## 6    Control 200.00 32.00 29.00 24.00 33.00 18.0
## 7        MDL   6.25  1.25  1.40  0.75  2.60  2.4
## 8        MDL  12.50  0.75  1.70  2.30  1.20  2.5
## 9        MDL  25.00  4.00  1.00  3.00  2.00  1.5
## 10       MDL  50.00  9.00  2.00  5.00  3.00  2.0
## 11       MDL 100.00 25.00 15.00 26.00 11.00  9.0
## 12       MDL 200.00 37.00 28.00 25.00 22.00 19.0
```