第一次作业

龙昕

目录

```
#options(repos = c(CRAN = "https://cran.rstudio.com/"))


# install packages
#install.packages('tidyverse')
#install.packages('kableExtra')
#install.packages('lubridate')
#install.packages('scales')
#install.packages('plotly')
```

```r
#install.packages('patchwork')
#install.packages('ggrepel')
#install.packages('rstatix')
#install.packages('showtext')

#load library
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----------------------- tidyverse 2.0.0 --
## v dplyr     1.1.3      v readr     2.1.4
## v forcats   1.0.0      v stringr   1.5.0
## v ggplot2   3.4.2      v tibble    3.2.1
## v lubridate 1.9.3      v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts
```

```r
library(kableExtra)
```

```
##
## 载入程辑包: 'kableExtra'
##
## The following object is masked from 'package:dplyr':
##
##     group_rows
```

```r
library(lubridate)
library(scales)
```

```
##
## 载入程辑包: 'scales'
##
## The following object is masked from 'package:purrr':
```

```
##
##     discard
##
## The following object is masked from 'package:readr':
##
##     col_factor
library(plotly)
```

```
##
## 载入程辑包: 'plotly'
##
## The following object is masked from 'package:ggplot2':
##
##     last_plot
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following object is masked from 'package:graphics':
##
##     layout
library(patchwork)
library(ggrepel)
library(rstatix)
```

```
##
## 载入程辑包: 'rstatix'
##
## The following object is masked from 'package:stats':
##
##     filter
```

```r
library(showtext)
```

```
## 载入需要的程辑包：sysfonts
## 载入需要的程辑包：showtextdb
```

```r
showtext.auto(enable = TRUE)
```

```
## 'showtext.auto()' is now renamed to 'showtext_auto()'
## The old version still works, but consider using the new function in future code
```

1 你的主要发现

1. 靠近地铁的房屋单价比不靠近地铁的房屋单价高

2. 房屋的楼层越高，房屋的单价越贵，但对于超过 50 层的情况则相反

3. 平房的房屋单价最低，板塔结合的房屋单价最高

2 数据介绍

本报告**链家**数据获取方式如下：

报告人在 2023 年 9 月 12 日获取了链家武汉二手房网站数据。

- 链家二手房网站默认显示 100 页，每页 30 套房产，因此本数据包括 3000 套房产信息；

- 数据包括了页面可见部分的文本信息，具体字段及说明见作业说明。

说明：数据仅用于教学；由于不清楚链家数据的展示规则，因此数据可能并不是武汉二手房市场的随机抽样，结论很可能有很大的偏差，甚至可能是错误的。

```r
# 载入数据和预处理
Sys.setlocale(category = "LC_ALL", locale = "en_US.UTF-8")
```

```
## [1] "LC_COLLATE=en_US.UTF-8;LC_CTYPE=en_US.UTF-8;LC_MONETARY=en_US.UTF-8;LC_NUMERIC=
```

```
lj<- read_csv("D:/R/document/git/1st_assignment_eda-xl-whuniversity/data/2023-09-12_cle
```

```
## Warning: One or more parsing issues, call `problems()` on your data frame for detail
## e.g.:
##   dat <- vroom(...)
##   problems(dat)

## Rows: 3000 Columns: 18
## -- Column specification -------------------------------------------------------
## Delimiter: ","
## chr (11): property_name, property_region, directions1, directions2, decorati...
## dbl  (7): price_ttl, price_sqm, bedrooms, livingrooms, building_area, proper...
##
## 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.
```

```
theme_set(theme(text = element_text(family="Songti SC",size = 10))) # 这里 family 设置成
```

3 数据概览

数据表（lj）共包括 property_name, property_region, price_ttl, price_sqm,
bedrooms, livingrooms, building_area, directions1, directions2, deco-
ration, property_t_height, property_height, property_style, followers,
near_subway, if_2y, has_key, vr 等 18 个变量, 共 3000 行。表的前 10 行
示例如下：

```
lj %>%
  head(10) %>%
  kable(caption = " 武汉链家二手房") %>%
  kable_styling()
```

各变量的简短信息：

表 1: 武汉链家二手房

property_name	property_region	price_ttl	price_sqm	bedrooms	livingrooms	building_a
南湖名都 A 区	南湖沃尔玛	237.0	18709	3	1	126
万科紫悦湾	光谷东	127.0	14613	3	2	86
东立国际	二七	75.0	15968	1	1	46
新都汇	光谷广场	188.0	15702	3	2	119
保利城一期	团结大道	182.0	17509	3	2	103
加州橘郡	庙山	122.0	10376	3	2	117
省建筑五公司西区	光谷广场	99.0	12346	2	1	80
保利上城东区	白沙洲	193.8	16336	3	2	118
石化大院	中南丁字桥	325.0	32631	4	1	99
阳光花园	杨汊湖	192.0	17403	3	2	110

```r
glimpse(lj)
```

```
## Rows: 3,000
## Columns: 18
## $ property_name     <chr> "南湖名都A区", "万科紫悦湾", "东立国际", "新都汇", "~
## $ property_region   <chr> "南湖沃尔玛", "光谷东", "二七", "光谷广场", "团结大~
## $ price_ttl         <dbl> 237.0, 127.0, 75.0, 188.0, 182.0, 122.0, 99.0, 193.8~
## $ price_sqm         <dbl> 18709, 14613, 15968, 15702, 17509, 10376, 12346, 163~
## $ bedrooms          <dbl> 3, 3, 1, 3, 3, 3, 2, 3, 4, 3, 5, 3, 4, 3, 3, 2, 3, 4~
## $ livingrooms       <dbl> 1, 2, 1, 2, 2, 2, 1, 2, 1, 2, 2, 2, 2, 1, 2, 2, 2, 2~
## $ building_area     <dbl> 126.68, 86.91, 46.97, 119.73, 103.95, 117.59, 80.19,~
## $ directions1       <chr> "南", "南", "南", "北", "东南", "南", "南", "南", "~
## $ directions2       <chr> "北", NA, NA, "东", NA, "北", NA, "北", "北", "北", ~
## $ decoration        <chr> "精装", "精装", "简装", "精装", "简装", "精装", "简~
## $ property_t_height <dbl> 17, 28, 18, 32, 34, 34, 7, 34, 5, 7, 25, 32, 8, 31, ~
## $ property_height   <chr> "中", "中", "低", "高", "中", "低", "低", "中", "低"~
## $ property_style    <chr> "塔楼", "板楼", "塔楼", "塔楼", "板塔结合", "板楼", ~
## $ followers         <dbl> 3, 1, 3, 2, 3, 1, 0, 0, 2, 0, 0, 0, 10, 0, 0, 1, 0, ~
## $ near_subway       <chr> "近地铁", NA, "近地铁", "近地铁", NA, NA, "近地铁", ~
```

```
## $ if_2y         <chr> NA, "房本满两年", NA, "房本满两年", "房本满两年", "~
## $ has_key       <chr> "随时看房", "随时看房", "随时看房", "随时看房", "随~
## $ vr            <chr> NA, "VR看装修", NA, NA, "VR看装修", NA, "VR看装修", ~
```

各变量的简短统计：

```
summary(lj)
```

```
##  property_name      property_region     price_ttl          price_sqm
##  Length:3000        Length:3000         Min.   :  10.6    Min.   : 1771
##  Class :character   Class :character    1st Qu.:  95.0    1st Qu.:10799
##  Mode  :character   Mode  :character    Median : 137.0    Median :14404
##                                         Mean   : 155.9    Mean   :15148
##                                         3rd Qu.: 188.0    3rd Qu.:18211
##                                         Max.   :1380.0    Max.   :44656
##     bedrooms        livingrooms      building_area     directions1
##  Min.   :1.000    Min.   :0.000    Min.   : 22.77    Length:3000
##  1st Qu.:2.000    1st Qu.:1.000    1st Qu.: 84.92    Class :character
##  Median :3.000    Median :2.000    Median : 95.55    Mode  :character
##  Mean   :2.695    Mean   :1.709    Mean   :100.87
##  3rd Qu.:3.000    3rd Qu.:2.000    3rd Qu.:117.68
##  Max.   :7.000    Max.   :4.000    Max.   :588.66
##  directions2        decoration       property_t_height property_height
##  Length:3000        Length:3000      Min.   : 2.00     Length:3000
##  Class :character   Class :character 1st Qu.:11.00     Class :character
##  Mode  :character   Mode  :character Median :27.00     Mode  :character
##                                      Mean   :24.22
##                                      3rd Qu.:33.00
##                                      Max.   :62.00
##  property_style      followers       near_subway          if_2y
##  Length:3000        Min.   : 0.000   Length:3000        Length:3000
##  Class :character   1st Qu.: 1.000   Class :character   Class :character
##  Mode  :character   Median : 3.000   Mode  :character   Mode  :character
##                     Mean   : 6.614
##                     3rd Qu.: 6.000
```

```
##                             Max.   :262.000
##    has_key              vr
##  Length:3000        Length:3000
##  Class :character    Class :character
##  Mode  :character    Mode  :character
##
##
##
```

可以看到：

- 房屋总价的均值为 155.9 万元

- 最贵的房屋总价为 1380 万元

- 最贵的房屋单价为 44656 元每平方米

4 探索性分析

4.1 变量房屋总价的数值描述与图形

```
lj %>%
  ggplot(aes(price_ttl)) +
  geom_boxplot()
```

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```


发现：

- 绝大部分房屋总价都在 500w 之内
- 只有极少数房屋总价超过 1000w

4.2   变量房间数的数值描述与图形

```
lj %>%
  count(bedrooms) %>%
  ggplot(aes(bedrooms,n)) +
  geom_line()
```

```
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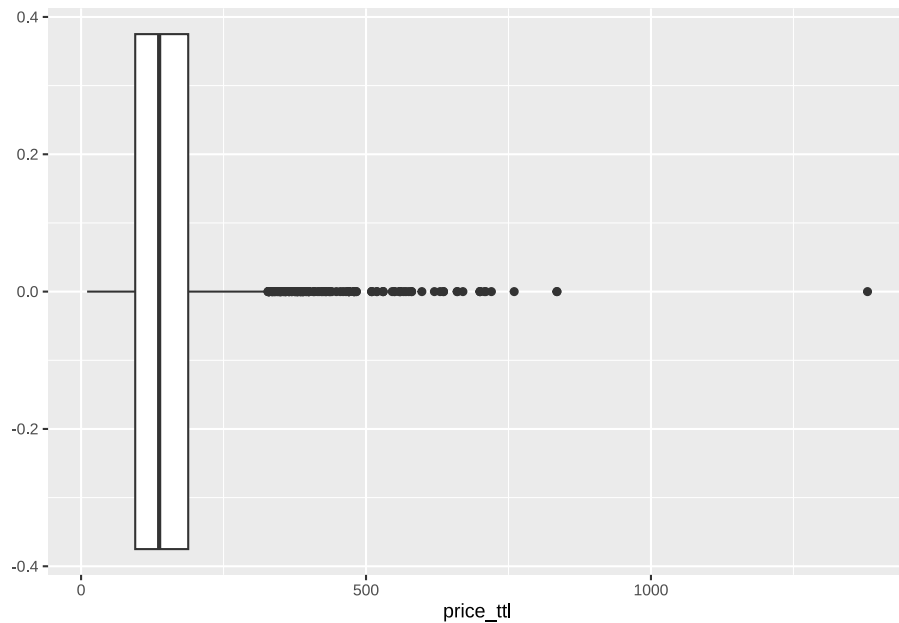
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```
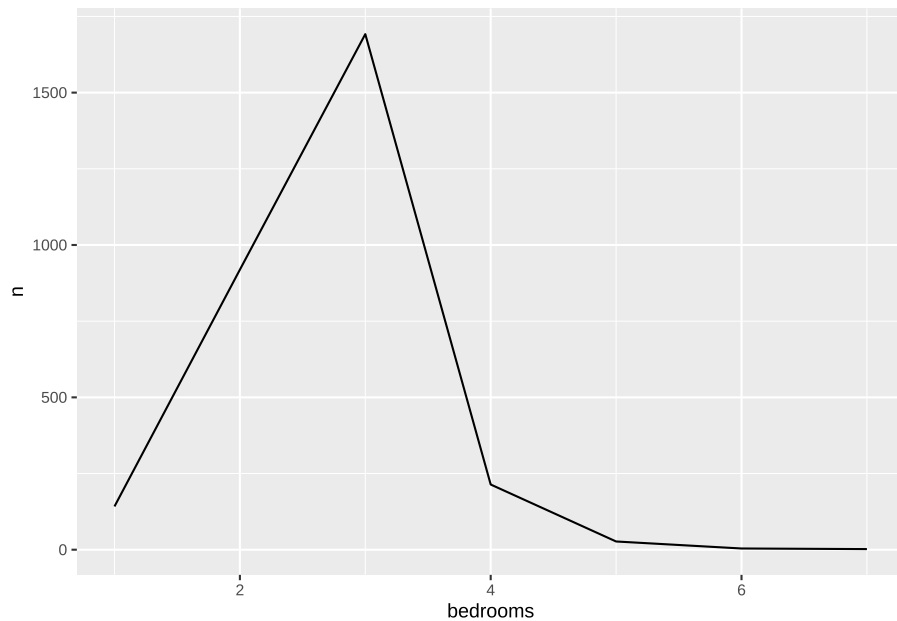
```
## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
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```


发现：

- 三间卧室的房子在售的数量最多

- 在售的房子最多有 7 间卧室

4.3 变量单价，朝向与面积的数值描述与图形

```
lj %>%
  ggplot(aes(building_area, price_sqm, color = directions1)) +
  geom_point() +
  geom_smooth()
```

```
## `geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
```

```
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## font family 'Songti SC' not found, will use 'sans' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## family 'Songti SC' not found, will use 'sans' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## font family 'Songti SC' not found, will use 'sans' instead
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## family 'Songti SC' not found, will use 'wqy-microhei' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## family 'Songti SC' not found, will use 'sans' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## family 'Songti SC' not found, will use 'wqy-microhei' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## family 'Songti SC' not found, will use 'wqy-microhei' instead

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## family 'Songti SC' not found, will use 'wqy-microhei' instead

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font family 'Songti SC' not found, will use 'wqy-microhei' instead

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font family 'Songti SC' not found, will use 'wqy-microhei' instead

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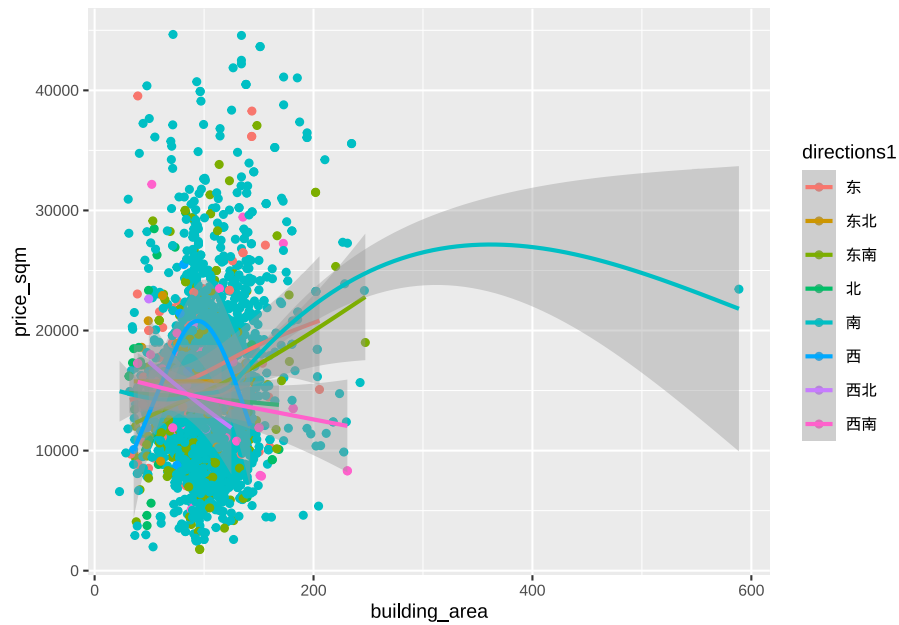
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```


发现：

- 朝南的建筑单价就较高

- 朝南的建筑比较多

4.4 靠近地铁的房价比不靠近地铁的房价更高

```
temp <-
  filter(lj, near_subway == '近地铁'|is.na(near_subway))%>%
  group_by(near_subway) %>%
  summarize(count = n(),
            m_price = mean(price_sqm, na.rm = TRUE),
  )


temp %>%
```

```r
ggplot(aes(x = near_subway, y = m_price)) +
geom_col()
```

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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```


发现：

- 近地铁的房屋单价比远离地铁的房屋单价更高

4.5 房屋单价跟楼层间的关系

```r
temp2 <- lj %>%
  group_by(property_t_height) %>%
  summarize(count = n(),
            ttl = mean(price_sqm, na.rm = TRUE),
  )

temp2 %>%
  ggplot(aes(x = property_t_height, y = ttl)) +
  geom_point() +
  geom_smooth()
```

```
## `geom_smooth()` using method = 'loess' and formula = 'y ~ x'

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```
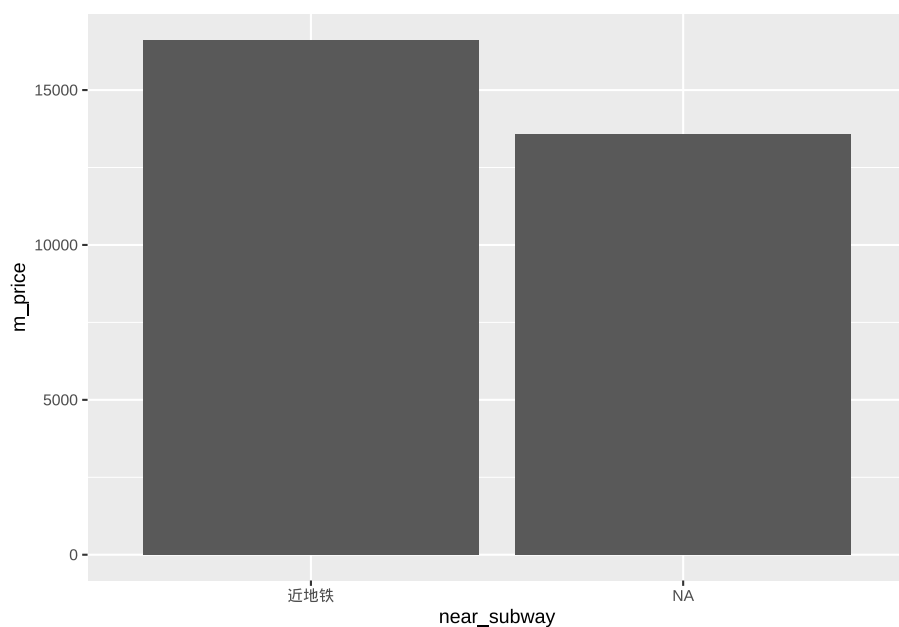
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```


发现：

- 1-15 层楼，房屋单价并没随着层数的递增而增加

- 20-50 楼层越高，房屋单价往往越高

- 超过 50 层楼，房屋单价在下降

4.6 房屋类型对房屋单价的影响

```
temp3 <- lj %>%
  group_by(property_style) %>%
  summarize(count = n(),
            ttl = mean(price_sqm, na.rm = TRUE),
  )
```

```r
temp3 %>%
  ggplot(aes(x = property_style, y = ttl)) +
  geom_col()
```

```
## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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```
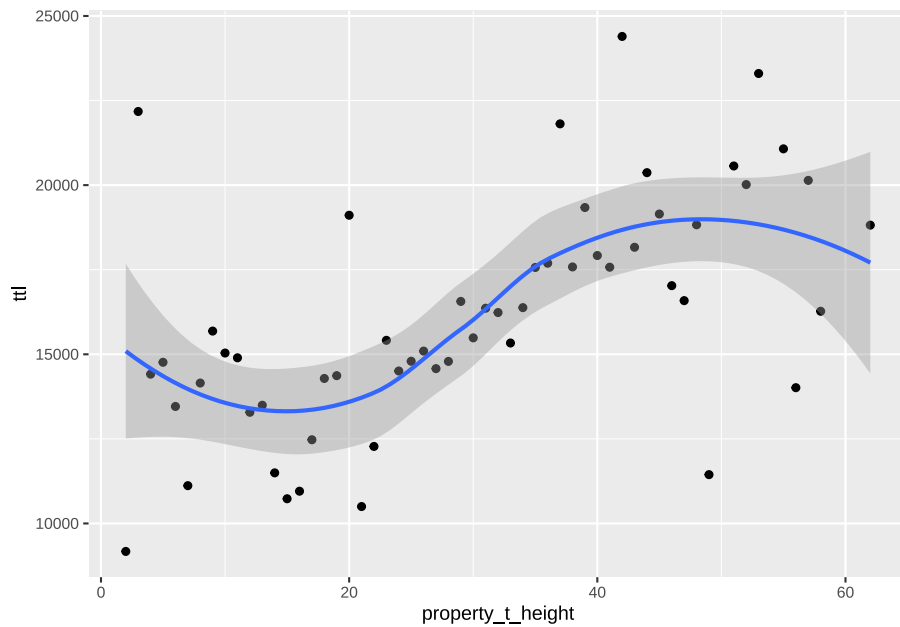
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## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
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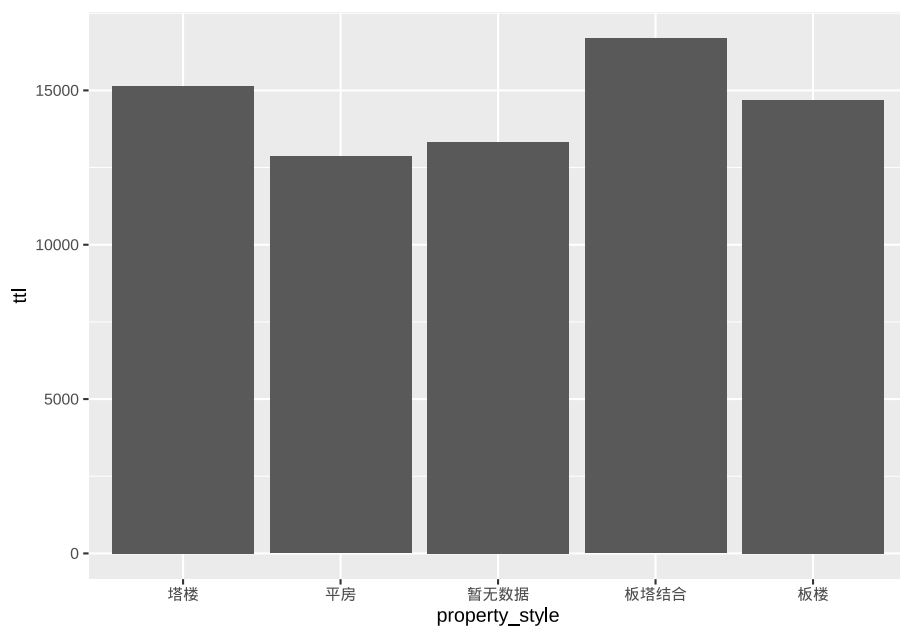
```
## font family 'Songti SC' not found, will use 'wqy-microhei' instead

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```


发现:

- 板塔结合的房屋单价最高

- 平房房屋单价最低

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5 发现总结

武汉市在售房屋均价不超过 200w，房屋绝大多数是朝南的。房屋的单价跟是否靠近地铁有直接联系。50 层以下，楼层高度越高，房屋单价越高。50 层以上，则不适用这个规则。板塔结合的房屋单价最高，平房房屋单价最低。