Statistics with Recitation: TA Session

Danny Po-Hsien Kang (康柏賢)

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Today's agenda

1. R Guides & Tips
   - Open a script
   - Project
   - Folder Organization
   - Coding styles
2. Summary Statistics Table
   - `table()`
   - `addmargins()`
3. Remove everything in the environment
   - `rm(list = ls())`
4. Draw Graphs
   - `geom_bar()`
   - `labs()`
   - `scale_x_continuous()`, `scale_y_continuous()`

Today's Dataset

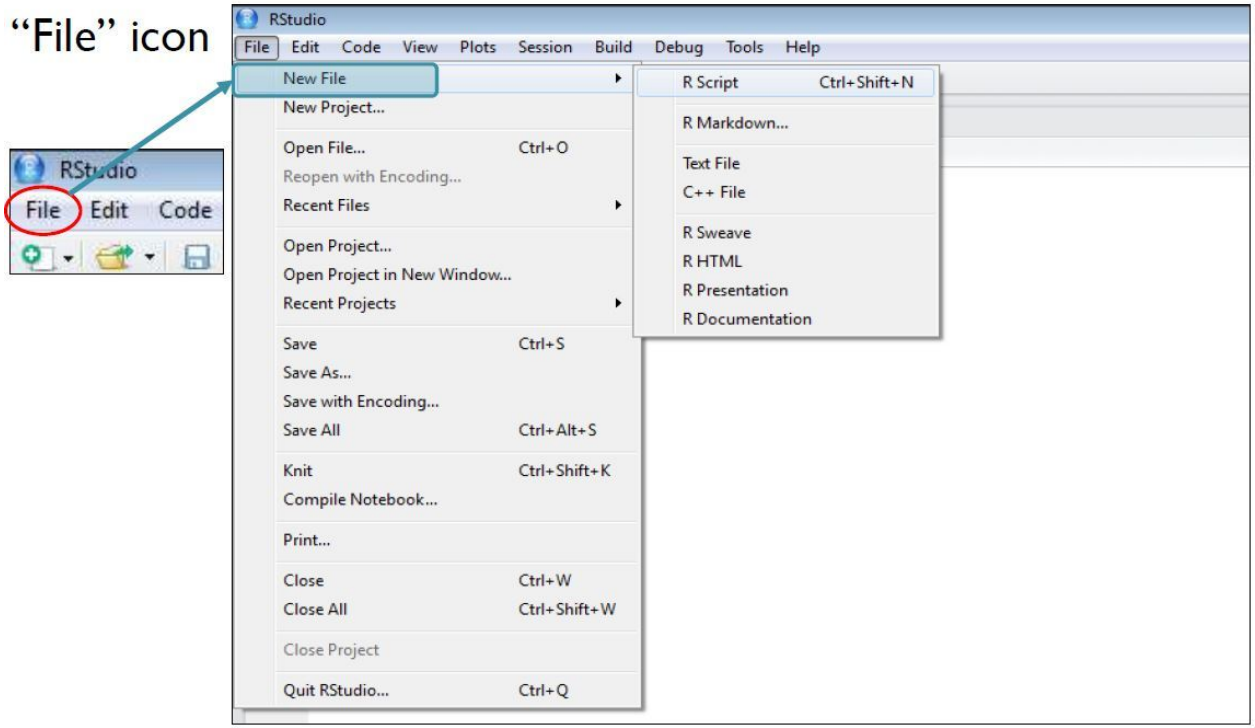
- Please download "`loan_full_schema.csv`" by the link on TA's website. This is a bigger version of "`loan50.csv`", which we used last week.
- Please import the following dataset into your RStudio.
  - `loan_full_schema.csv`
  - `county.csv`

About the Quiz

- Quiz 1 will be held on 9/23 (Tue.).
- It will cover Chapter 1-2 (i.e. Main Course week 1-3).
- Quiz 1 are handwritten questions.

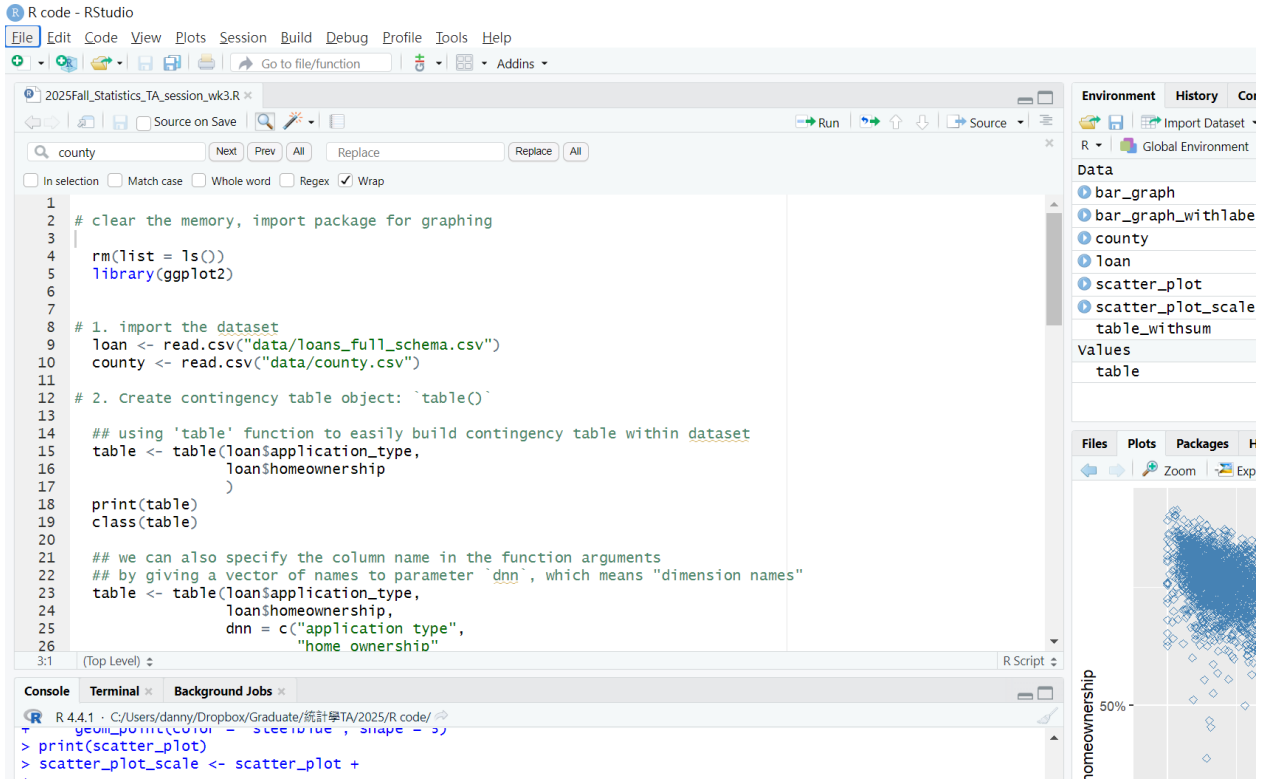
Script in RStudio

- A **script** is a text file that you can write your code in.



Why should we open a script?

- Main Reason: We open an R script so we can save it!
- Save your code in the script such that it is executable and reproducible.

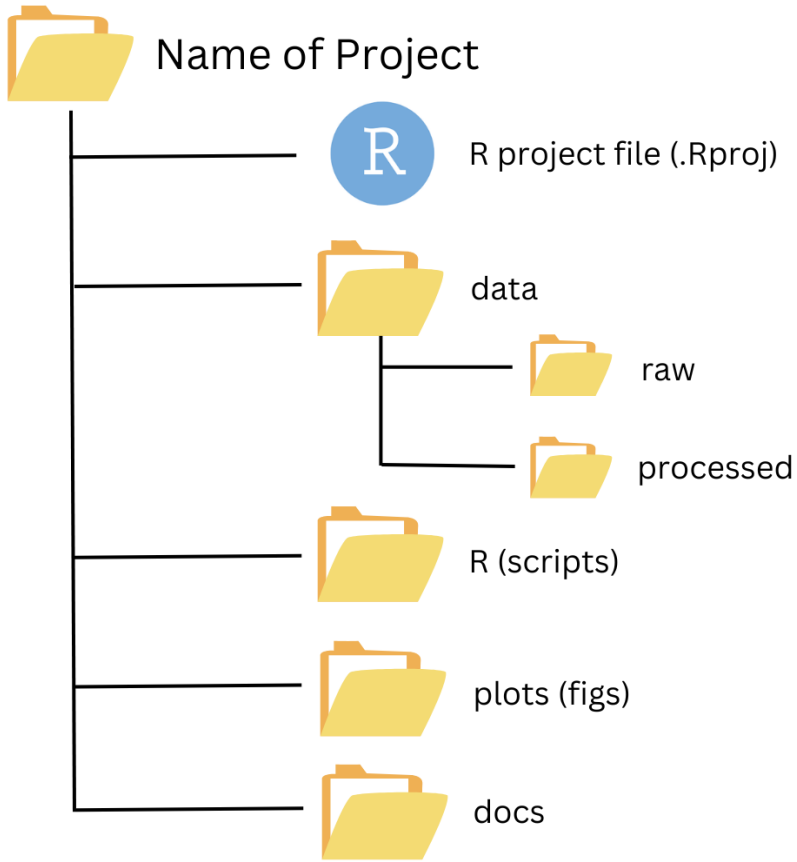


RStudio project

- **RStudio project**: A tool to organize all files related to a task.
  - Sets the root folder as the wd for all R sessions within the project.
  - No more `setwd()`!
  - Keep history, options ... etc.
  - More advantages. e.g. portable path: `here()` function.
- Open a project by (File → New Project) at the top left corner of RStudio.
- When should I open a RStudio project?
  - If the task lasts for multiple periods, or with multiple files.
- Recommend to open a RStudio project for the TA Session Practices!

Folder Organization

- After opening a project, it is important to have well-organized folders.
  - Different types of things (scripts, data, output, etc.) should be saved in different folders!



Coding styles: Naming

- Only lowercase letters, numbers, and _ within a name.
- The name should be readable![1]

```
# Good
lesson_one
lesson_1

# Bad
LessonOne
lessonone
one
a <- 1
```

[1] See this website for more on coding styles.

Coding styles: Spacing

- Always put a space after a comma, never before.
- Do not put spaces inside or outside parentheses.

```
# Good
x[, 1]
mean(x, na.rm = TRUE)

# Bad
x[,1]
x[ ,1]
x[ , 1]
mean (x, na.rm = TRUE)
mean( x, na.rm = TRUE )
```

Coding styles: Function Indents

- Indent the argument name with a single indent (two spaces).
- Don't put + or , in a new line!

```
# Good
long_function_name <- function(
  a = "a long argument",
  b = "another argument",
  c = "another long argument"
) {
}
# Bad
long_function_name <- function(a = "a long argument",
  b = "another argument",
  c = "another long argument"
) {
}

long_function_name <- function(a = "a long argument", b = "anot
```

Create Contingency Table: table()

	home ownership		
application type	**Rent**	**Mortgage**	**Own**
individual	3496	3839	1170
joint	362	950	183

Table: Homeownership by application type

Create Contingency Table: table()

- **Syntax:**

```
# dnn = dimension names
A <- table(..., dnn = ...)
```

- **Example:**

```
loan <- read.csv("loans_full_schema.csv")
table <- table(loan$application_type,
               loan$homeownership,
               dnn = c("application type",
                       "home ownership"
                       )
               )
```

Add Sum Row and Sum Column: addmargins()

	homeownership			
application_type	**Rent**	**Mortgage**	**Own**	**Total**
individual	3496	3839	1170	8505
joint	362	950	183	1495
Total	3858	4789	1353	10 000

Table: Homeownership by application type, with sum row and sum column

Add Sum Row and Sum Column: addmargins()

- **Syntax:**

```
A <- addmargins(table)
```

- **Example:**

```
table_withsum <- addmargins(table)
```

Remove Everything: rm(list = ls())

- `rm(list = ls())` removes everything inside the global environment.
  - Useful when you want to re-run the whole code.
- `ls()` returns a character vector of object names in the current environment.

```
x <- 1
y <- "hi"
ls()
# [1] "x" "y"
```

Barplot: geom_bar()

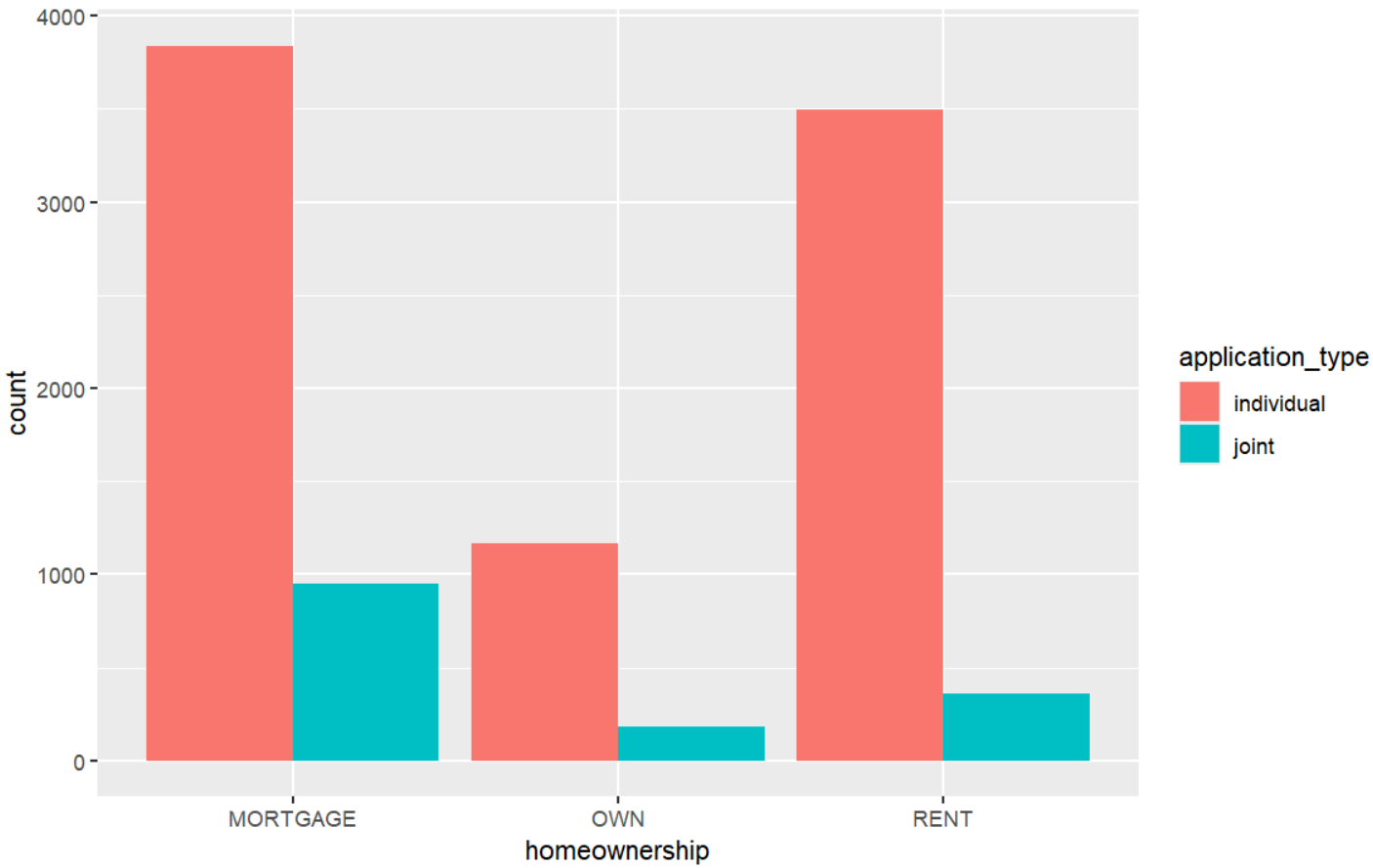


Figure: Bar plot of homeownership by application type.

Barplot: geom_bar()

- **Syntax:**

```
ggplot(loan, aes(x = ..., fill = ...)) +
  geom_bar(position = ...)
```

- **Example:**

```
ggplot(loan, aes(x = homeownership, fill = application_type)) +
  geom_bar(position = "dodge") # stack, fill, ...
```

Add Title and Axis Labels: labs()

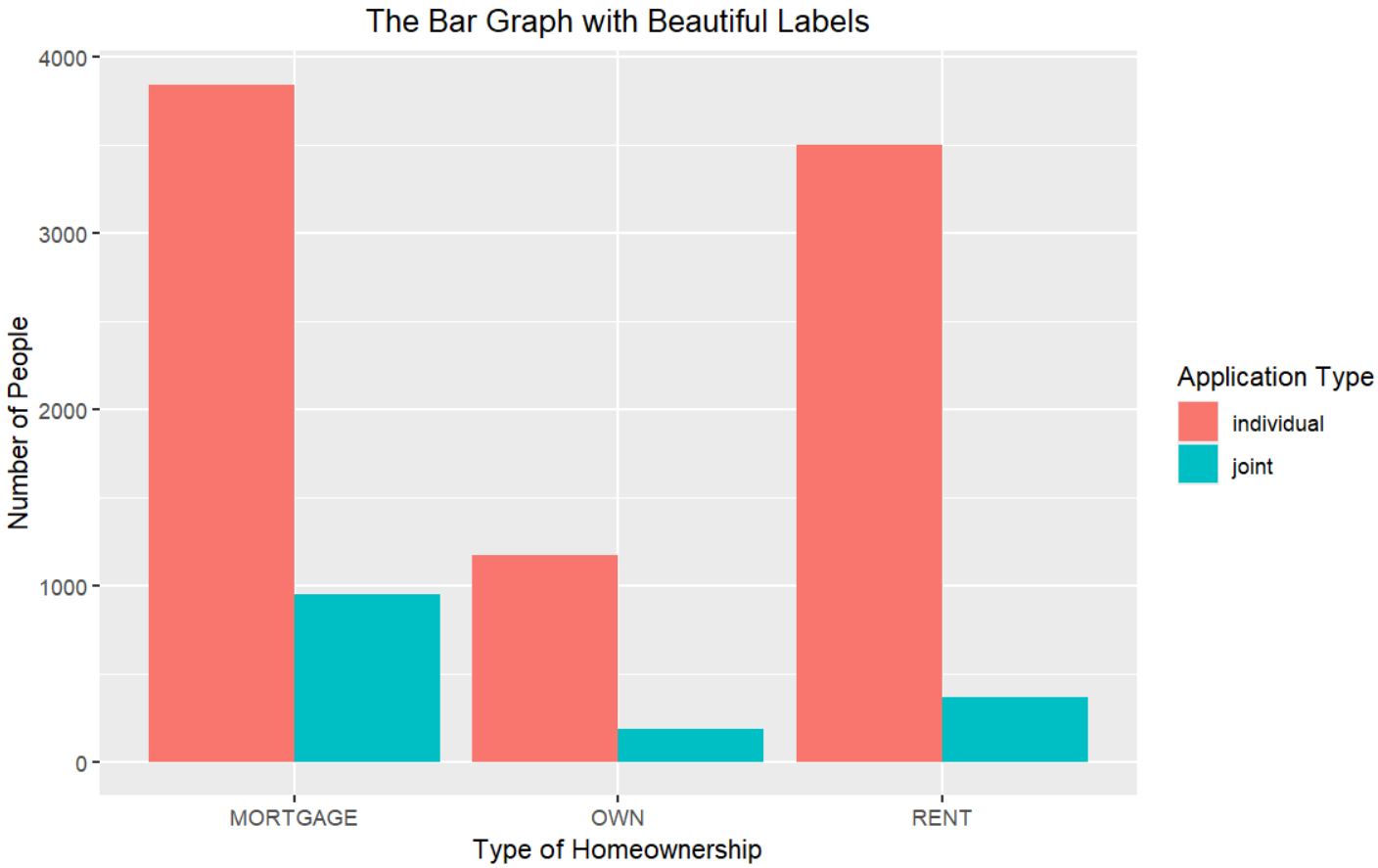


Figure: Same bar plot, **but with title and labels.**

Add Title and Axis Labels: labs()

- **Syntax:**

```
Your_Plot +
 labs(x = ..., y = ..., title = ...) +
 theme(plot.title = element_text(hjust = 0.5))
```

- **Example:**

```
ggplot(loan, aes(x = homeownership, fill = application_type)) +
  geom_bar(position = "dodge") +
  labs(
    x = "Type of Homeownership",
    y = "Number of People",
    title = "The Bar Graph with Beautiful Labels",
    fill = "Application Type"
  ) +
  theme(plot.title = element_text(hjust = 0.5))
```

Adjust Scale of x, y Axes: scale_x_continuous()

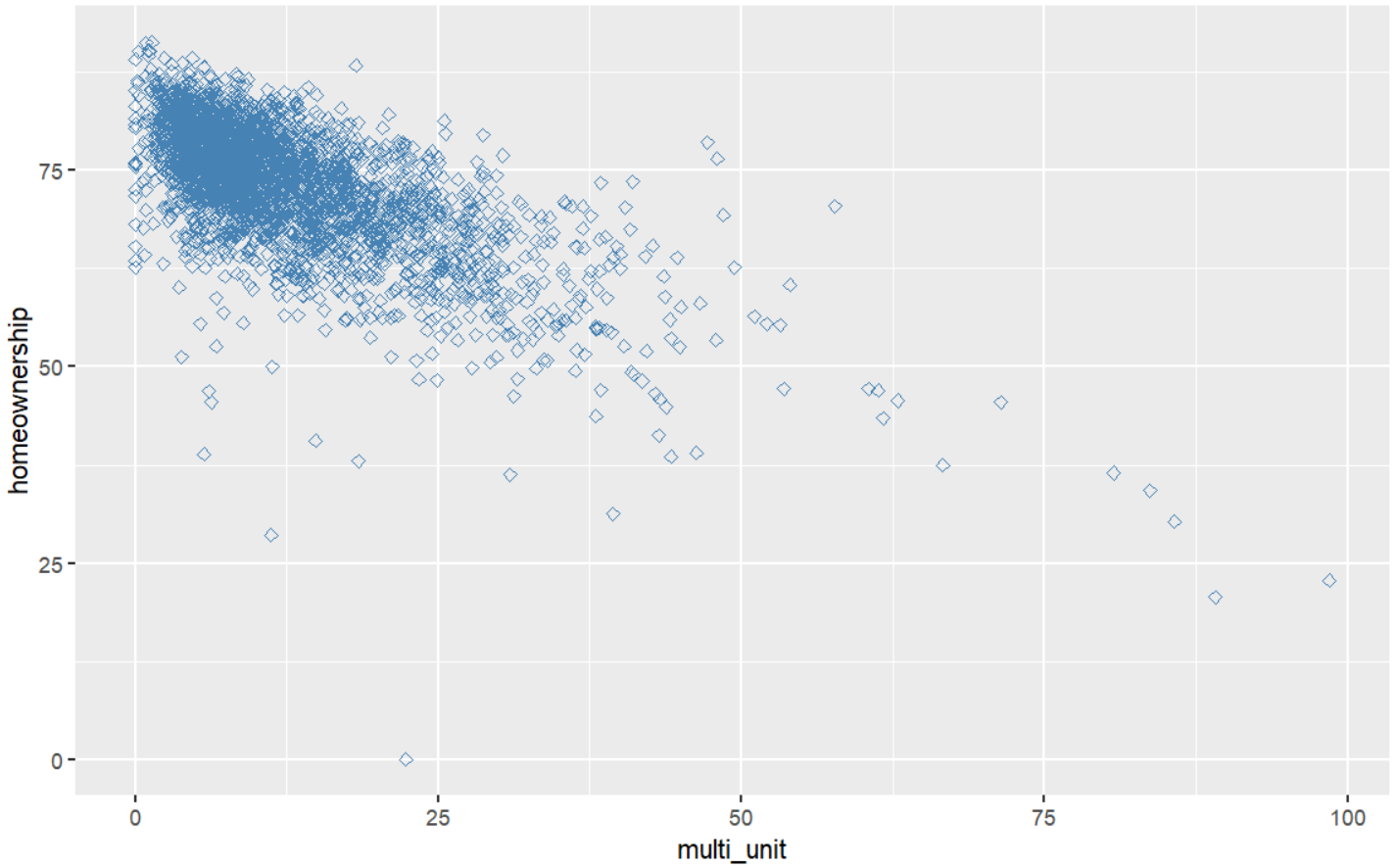


Figure: Figure: Scatter plot last week

Adjust Scale of x, y Axes: scale_x_continuous()

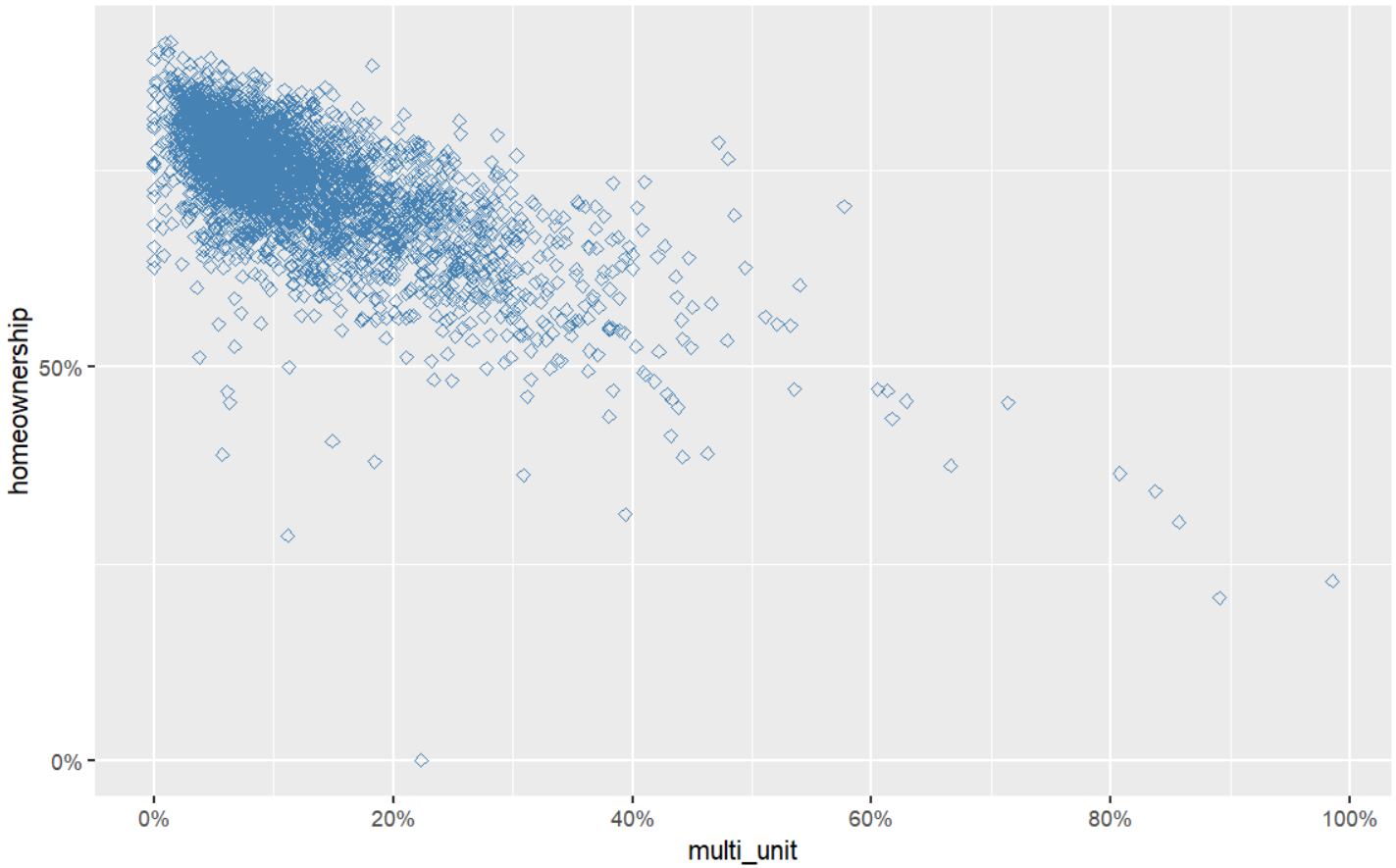


Figure: Figure: Scatter plot last week, with adjusted scale.

Add Title and Axis Labels: labs()

- **Syntax:**

```
Your_Plot +
  scale_x_continuous(breaks = ..., labels = ...) +
  scale_y_continuous(breaks = ..., labels = ...)
```

- **Example:**

```
.. +
  scale_x_continuous(
    breaks = c(0, 20, 40, 60, 80, 100),
    labels = c("0%", "20%", "40%", "60%", "80%", "100%")
    ) +
  scale_y_continuous(
    breaks = c(0, 50, 100),
    labels = c("0%", "50%", "100%")
    )
```