Statistics with Recitation: TA Session

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Today's agenda

1. Read Data
   - `getwd()`, `setwd()`
   - `read.csv()`
2. Draw Graphs
   - `geom_point()`
   - `geom_histogram()`
   - `geom_boxplot()`
   - `geom_dotplot()`

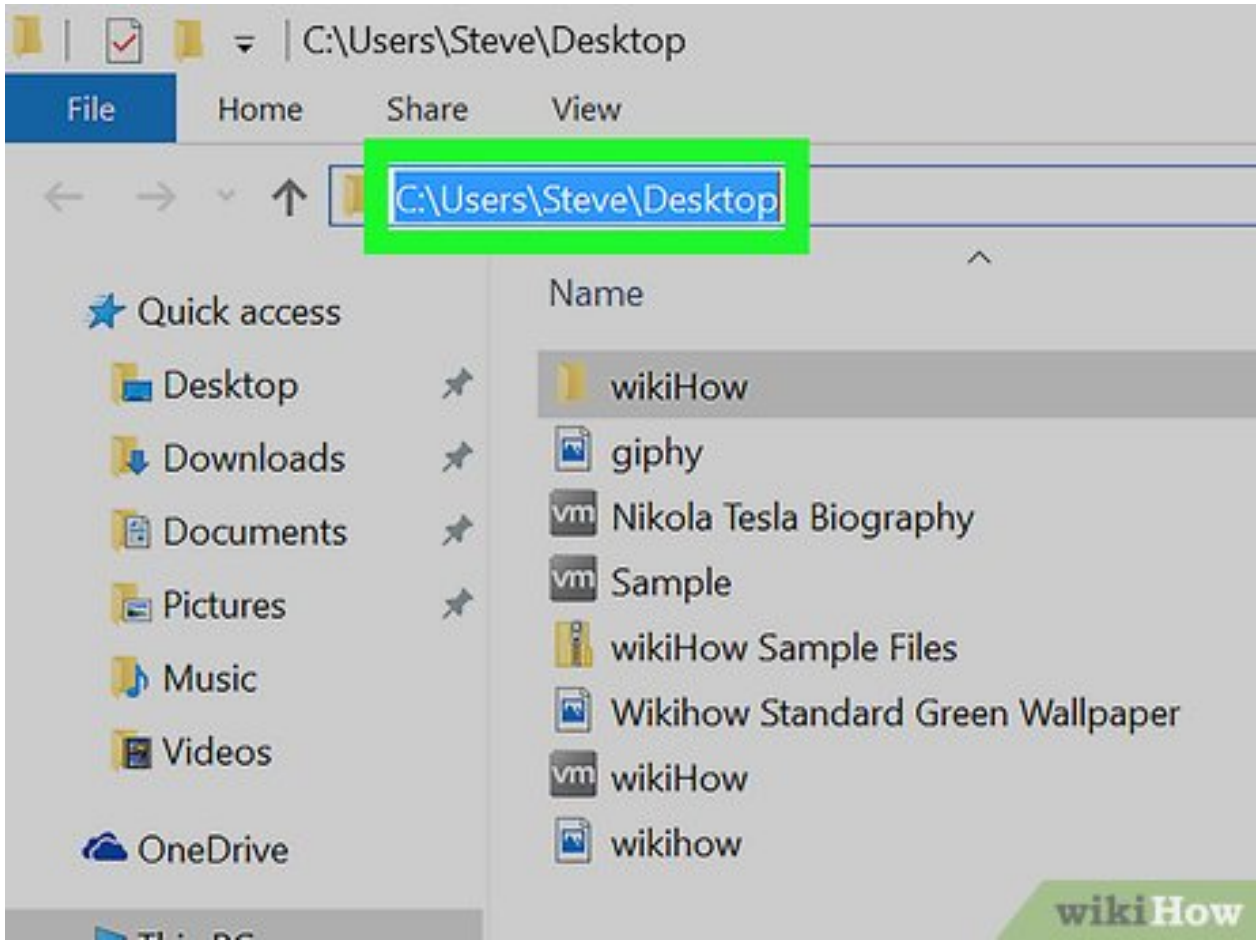
Before today's lecture

- Please make sure you have downloaded the following dataset from the link on NTU COOL[1].
  - `county.csv`
  - `loan50.csv`
- We'll learn how to analyze datasets with many different datasets, so please download them through the same link each time.
- Besides, please create a folder/directory on your computer to put all the datasets used in TA sessions.

[1] You can also download the same dataset from OpenIntro Website, which provides the complete information about the dataset.

Path of a file

- A **path** for a file is the place where you save it.



Get/Set Current Directory

- `getwd()`: Get current working directory

```
getwd() #Example Output: "C:/your/working/directory"
```

- `setwd()`: Change your working directory[2]

```
setwd("C:\your\working\directory") #Error!
setwd("C:\\your\\working\\directory") #Works on Windows!
setwd("C:/your/working/directory") #Works everywhere!
```

[2] You can use `dir.exists()` to check if the directory exists.

Supplement: Escape Character \

- If you directly copy the path in Windows (C:/your/working/directory) and put it in `setwd()`, you'll get an error. But why?
  - Because "\" is an escape character in R!
- An **escape character** is used to represent special characters within a string.
  - `\n`: newline character
  - `\t`: horizontal tab character
- This is why the error message shows: `'\U'` used without ...!
- If you want to type \ in R, use \\
  - Similar for ", you need to use \"

Read CSV File

- **Syntax:**

```
df <- read.csv("file.csv") #Work if file in working directory
df <- read.csv("C:/your/working/directory/file.csv")
```

- **Example:**

```
county <- read.csv("county.csv")
loan <- read.csv("loan50.csv")
```

Supplement: Using ~ and .. as directory

- In R, there is a personal base folder called **home directory**
  - You can check your home directory by `path.expand("~")`.
  - Won't change by applying `setwd()`
  - Can be changed by using `Sys.setenv` or options in the Global Options.
- ~ is a shorthand path notation, representing the home directory.
  - You may write: `data <- read.csv("~/Documents/mydata.csv")`
- .. refers to "one level up" from the current working directory.
  - Can be chained: `../../` means "go up two folders".
  - `read.csv("../somefile.csv")` reads the csv from the parent folder of the current working directory.

What's Recorded in Dataset?

- `county.csv`
  - **county**: County name in United States
  - **homeownership**: Home ownership rate, 2006-2010
  - **multi_unit**: Percent of housing units in multi-unit structures, 2006-2010
- `loan50.csv`
  - **annual_income**: Annual income of the applicant
  - **interest_rate**: Interest rate of the loan the applicant received
  - **grade**: Grade associated with the loan.

Scatter Plot: geom_point()

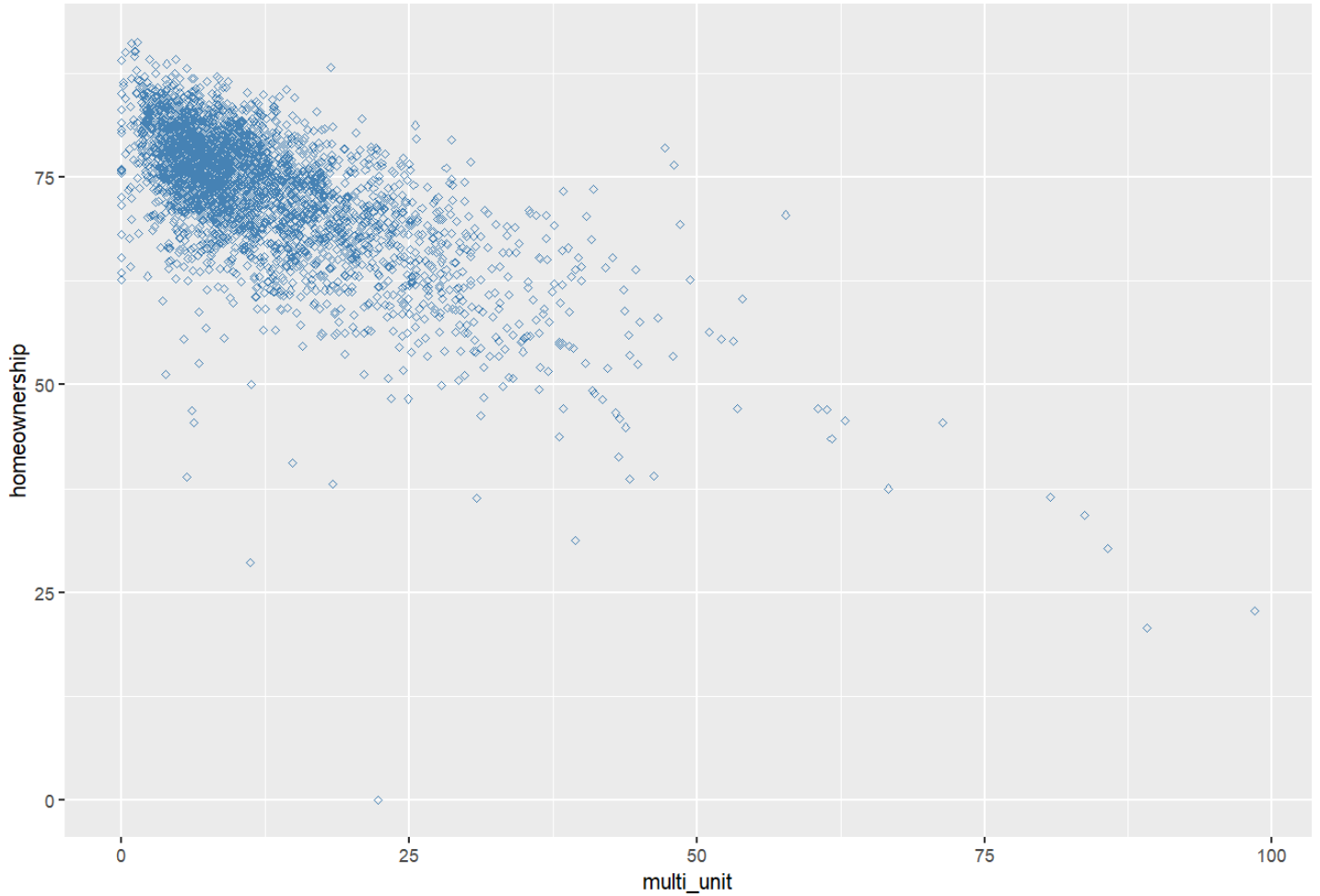


Figure: Scatter plot of multiple unit ratio and home ownerships.

Scatter Plot: geom_point()

- **Syntax:**

```
ggplot(data, aes(x = ..., y = ...)) +
  geom_point(color = ...,
             size = ...,
             shape = ...
             )
```

- **Example:**[3][4]

```
ggplot(county, aes(x = multi_unit, y = homeownership)) +
  geom_point(color = "steelblue",
             size = 1,
             shape = 5
             )
```

[3] R color cheatsheet.

[4] ggplot2 Quick Reference: shape

Histogram: geom_histogram()

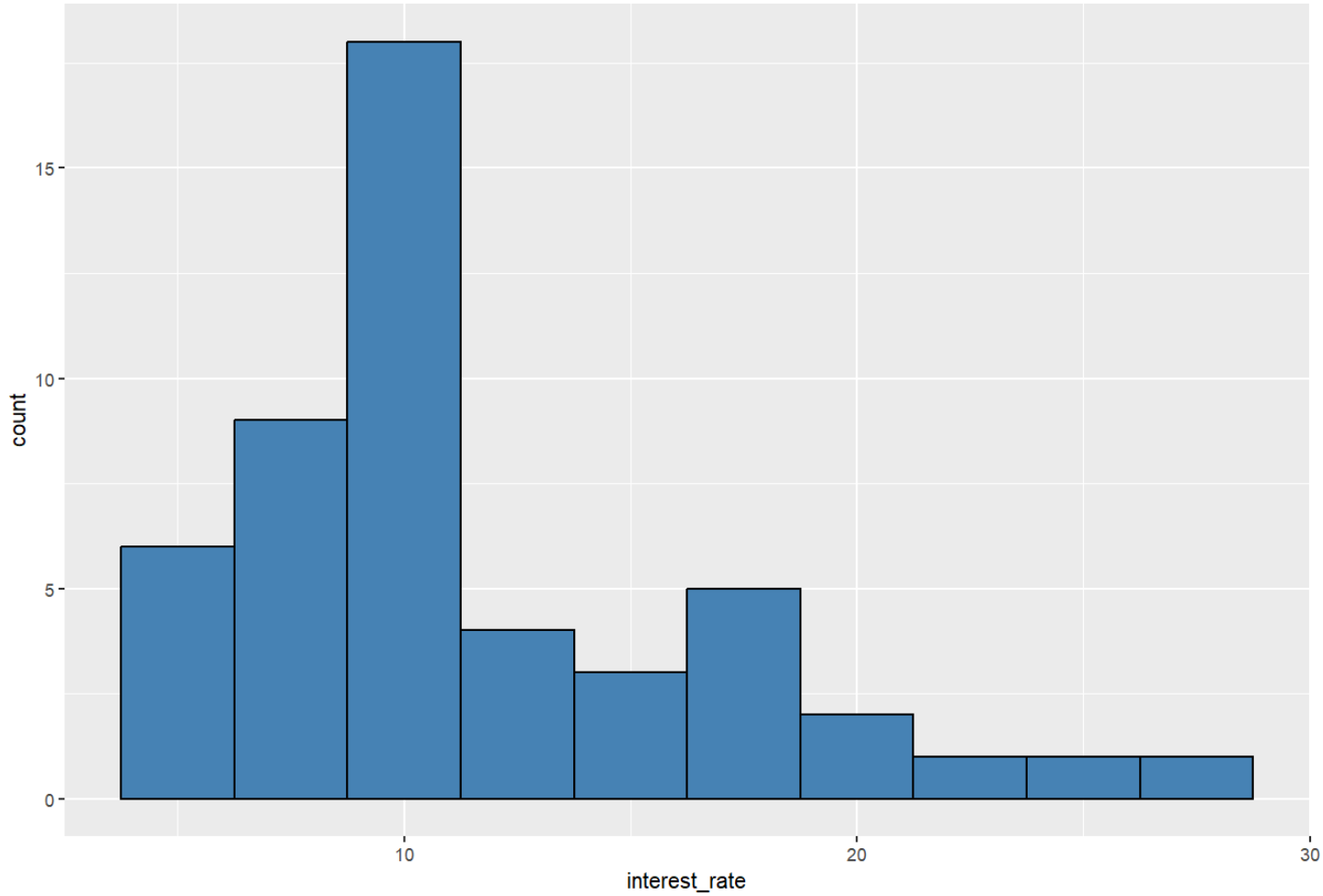


Figure: Histogram of interest rates.

Histogram: geom_histogram()

- **Syntax:**

```
ggplot(data, aes(x = ...)) +
  geom_histogram(binwidth = ...,
                 fill = ...,
                 color = ...
                 )
```

- **Example:**

```
ggplot(loan, aes(x = interest_rate)) +
  geom_histogram(binwidth = 2.5,
                 fill = "steelblue",
                 color = "black"
                )
```

Boxplot: geom_boxplot()

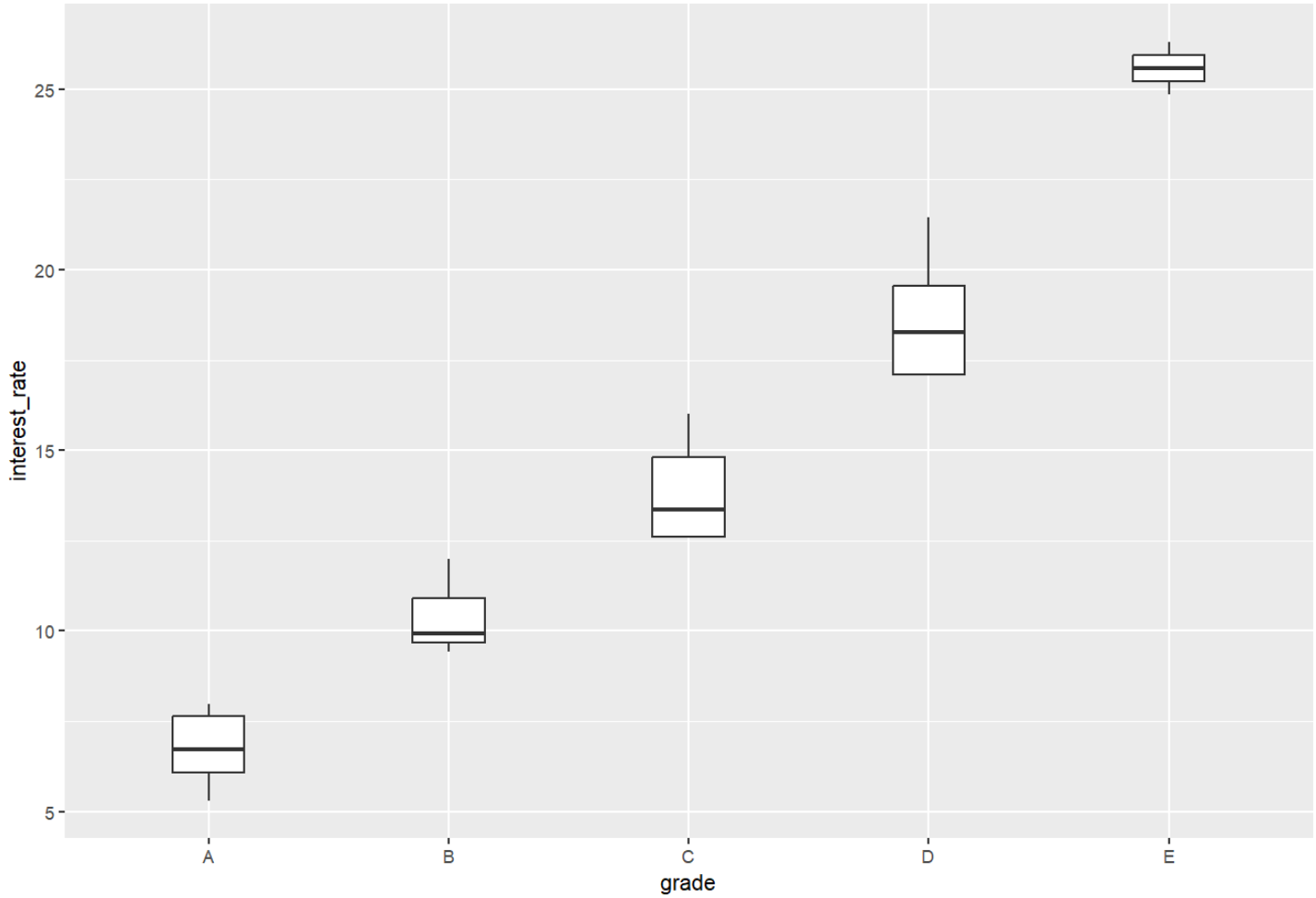


Figure: Box plot of interest rates by verified income.

Boxplot: geom_boxplot()

- **Syntax:**

```
ggplot(data, aes(x = ..., y = ...)) +
  geom_boxplot(width = ...) #optional
```

- **Example:**

```
ggplot(loan, aes(x = grade, y = interest_rate)) +
  geom_boxplot(width = 0.3)
```

Dotplot: geom_dotplot()

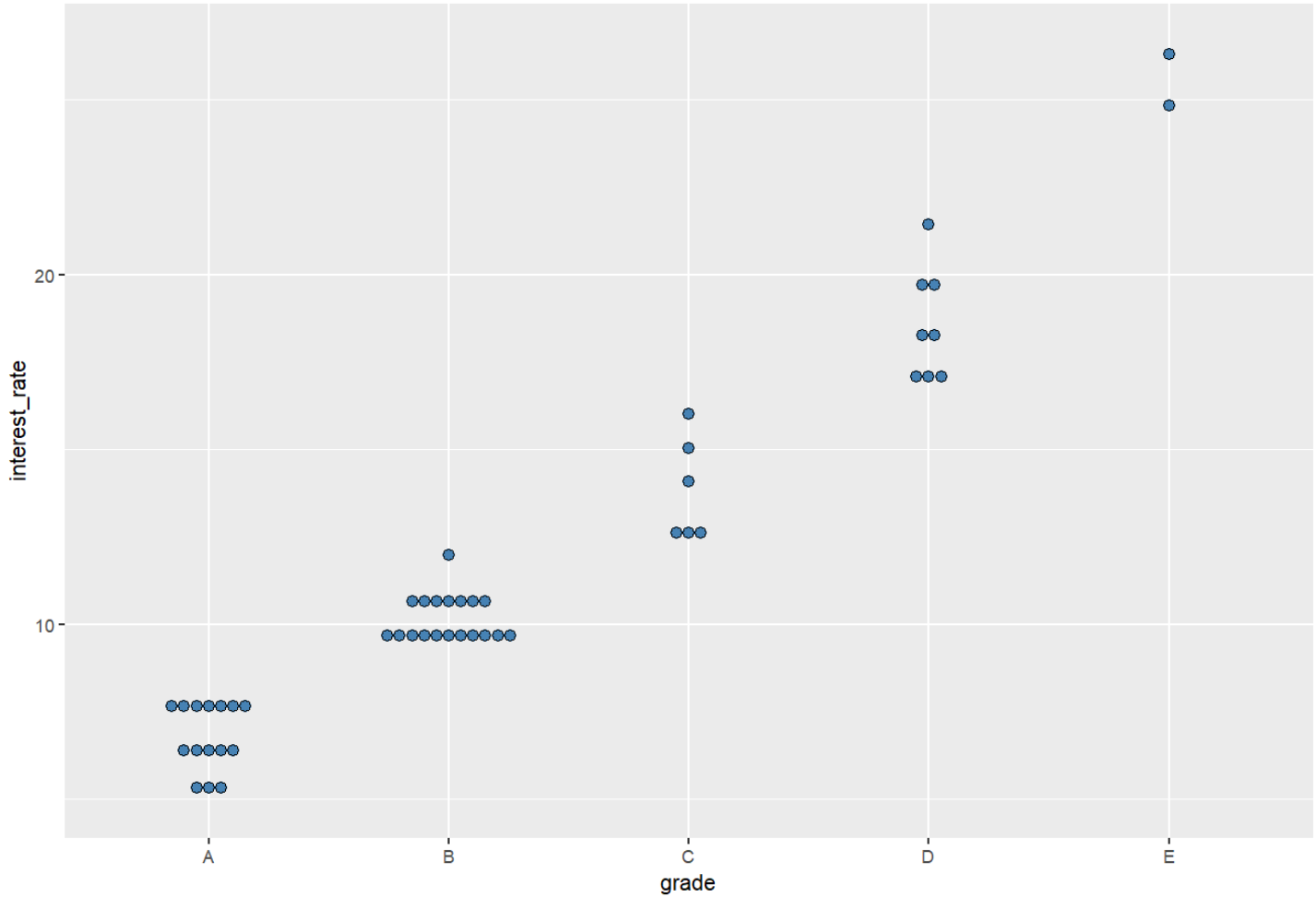


Figure: Dot plot of interest rates by verified income.

Dotplot: geom_dotplot()

- **Syntax:**

```
ggplot(data, aes(x = ..., y = ...)) +
  geom_dotplot(binaxis = ...,  #"x" (default) or "y"
               stackdir = ..., #"up", "down", "center",...
               dotsize = ...,
               fill = ...
               )
```

- **Example:**

```
ggplot(loan, aes(x = "grade", y = interest_rate)) +
  geom_dotplot(binaxis = 'y',
               stackdir = 'center',
               dotsize = 0.5,
               fill = "lightblue"
               )
```