

# Math 300 Lesson 5 Notes

filter and summarize

YOUR NAME HERE

June, 2022

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## Objectives

1. Use the `filter()` function and logical operators to subset a data frame.
2. Use the `summarize()` function with appropriate R functions to summarize variables in a data frame.
3. Explain the possible impacts of simply ignoring missing values.

## Reading

Chapter 3 - 3.3

## Lesson

Work through the learning checks LC3.1 - LC3.4. Complete code as necessary.

- About 80% of your work analyzing data will be data acquisition and wrangling.
- The order of logical operations in the `filter()` function work from left to right. Parentheses, however, are executed first. Be careful and when in doubt use parentheses.
- Pay attention to functions that default an NA for variables with a missing value. Functions such as `mean()` and `sd()` are examples.
- This pdf summarizes the pipe operator and the main data wrangling functions.

## Setup

```
library(nycflights13)
library(ggplot2)
library(dplyr)
```

*Notice that order of logical operators doesn't matter in this example but the parentheses help the reading of the code.*

```
flights %>%
  filter(origin == "JFK", (dest == "BTV" | dest == "SEA"), month >= 10) %>%
  glimpse()
```

```
## Rows: 815
## Columns: 19
## $ year      <int> 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2~
## $ month     <int> 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, ~
## $ day       <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2~
## $ dep_time  <int> 729, 853, 916, 1216, 1452, 1459, 1754, 1825, 1925, 2238~
## $ sched_dep_time <int> 735, 900, 925, 1221, 1459, 1500, 1800, 1830, 1930, 2245~
## $ dep_delay <dbl> -6, -7, -9, -5, -7, -1, -6, -5, -5, -7, 0, -2, -7, -4, ~
## $ arr_time  <int> 1049, 1217, 1016, 1326, 1602, 1817, 2102, 2159, 2227, 2~
## $ sched_arr_time <int> 1040, 1157, 1033, 1328, 1622, 1829, 2103, 2150, 2250, 2~
## $ arr_delay <dbl> 9, 20, -17, -2, -20, -12, -1, 9, -23, -5, -14, 15, -7, ~
## $ carrier   <chr> "DL", "B6", "B6", "B6", "B6", "DL", "B6", "DL", "AA", "~
## $ flight    <int> 183, 63, 1634, 34, 1734, 161, 263, 442, 235, 234, 183, ~
## $ tailnum   <chr> "N721TW", "N807JB", "N192JB", "N318JB", "N258JB", "N169~
## $ origin    <chr> "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", ~
## $ dest      <chr> "SEA", "SEA", "BTV", "BTV", "BTV", "SEA", "SEA", "SEA", ~
## $ air_time  <dbl> 352, 362, 48, 49, 46, 348, 338, 366, 332, 48, 330, 344, ~
## $ distance  <dbl> 2422, 2422, 266, 266, 266, 2422, 2422, 2422, 2422, 266, ~
## $ hour      <dbl> 7, 9, 9, 12, 14, 15, 18, 18, 19, 22, 7, 9, 9, 12, 14, 1~
## $ minute    <dbl> 35, 0, 25, 21, 59, 0, 0, 30, 30, 45, 35, 0, 25, 21, 59, ~
## $ time_hour <dtm> 2013-10-01 07:00:00, 2013-10-01 09:00:00, 2013-10-01 0~
```

```
flights %>%
  filter(origin == "JFK", dest == "BTV" | dest == "SEA", month >= 10) %>%
  glimpse()
```

```
## Rows: 815
## Columns: 19
## $ year      <int> 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2013, 2~
## $ month     <int> 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, ~
## $ day       <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2~
## $ dep_time  <int> 729, 853, 916, 1216, 1452, 1459, 1754, 1825, 1925, 2238~
## $ sched_dep_time <int> 735, 900, 925, 1221, 1459, 1500, 1800, 1830, 1930, 2245~
## $ dep_delay <dbl> -6, -7, -9, -5, -7, -1, -6, -5, -5, -7, 0, -2, -7, -4, ~
## $ arr_time  <int> 1049, 1217, 1016, 1326, 1602, 1817, 2102, 2159, 2227, 2~
## $ sched_arr_time <int> 1040, 1157, 1033, 1328, 1622, 1829, 2103, 2150, 2250, 2~
## $ arr_delay <dbl> 9, 20, -17, -2, -20, -12, -1, 9, -23, -5, -14, 15, -7, ~
## $ carrier   <chr> "DL", "B6", "B6", "B6", "B6", "DL", "B6", "DL", "AA", "~
## $ flight    <int> 183, 63, 1634, 34, 1734, 161, 263, 442, 235, 234, 183, ~
## $ tailnum   <chr> "N721TW", "N807JB", "N192JB", "N318JB", "N258JB", "N169~
```

```
## $ origin      <chr> "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", "JFK", ~
## $ dest       <chr> "SEA", "SEA", "BTV", "BTV", "BTV", "SEA", "SEA", "SEA", ~
## $ air_time    <dbl> 352, 362, 48, 49, 46, 348, 338, 366, 332, 48, 330, 344, ~
## $ distance    <dbl> 2422, 2422, 266, 266, 266, 2422, 2422, 2422, 2422, 266, ~
## $ hour        <dbl> 7, 9, 9, 12, 14, 15, 18, 18, 19, 22, 7, 9, 9, 12, 14, 1~
## $ minute      <dbl> 35, 0, 25, 21, 59, 0, 0, 30, 30, 45, 35, 0, 25, 21, 59, ~
## $ time_hour   <dtm> 2013-10-01 07:00:00, 2013-10-01 09:00:00, 2013-10-01 0~
```

### LC 3.1 (Objective 1)

(LC 3.1) What's another way using the “not” operator `!` to filter only the rows that are not going to Burlington, VT nor Seattle, WA in the `flights` data frame? Test this out using the code above.

**Solution:**

### LC 3.2 (Objective 3)

(LC 3.2) Say a doctor is studying the effect of smoking on lung cancer for a large number of patients who have records measured at five year intervals. She notices that a large number of patients have missing data points because the patient has died, so she chooses to ignore these patients in her analysis. What is wrong with this doctor's approach?

**Solution:**

### LC 3.3 (Objective 2)

```
summary_temp <- weather %>%
  summarize(mean = mean(temp, na.rm = TRUE),
            std_dev = sd(temp, na.rm = TRUE))
summary_temp
```

```
## # A tibble: 1 x 2
##   mean std_dev
##   <dbl> <dbl>
## 1  55.3   17.8
```

(LC 3.3) Modify the above `summarize` function to create `summary_temp` to also use the `n()` summary function: `summarize(count = n())`. What does the returned value correspond to?

**Solution:**

### LC 3.4 (Objective 2)

(LC 3.4) Why doesn't the following code work? Run the code line by line instead of all at once, and then look at the data. In other words, run `summary_temp <- weather %>% summarize(mean = mean(temp, na.rm = TRUE))` first.

```
summary_temp <- weather %>%
  summarize(mean = mean(temp, na.rm = TRUE)) %>%
  summarize(std_dev = sd(temp, na.rm = TRUE))
```

**Solution:**

## Documenting software

- File creation date: 2022-06-04
- R version 4.1.3 (2022-03-10)
- ggplot2 package version: 3.3.6
- dplyr package version: 1.0.9
- nycflights13 package version: 1.0.2