Assignment 04

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GitHub: https://github.com/seung-m1nsong/607
rpubs: https://rpubs.com/seungm1nsong/951638

1. Data Read and Transform

Retrieve data from csv file into a data table *dt_wider*.

```
dt_wider <- as.data.table(read.csv('https://raw.githubusercontent.com/seung-m1nsong/607/main/homework4/
```

Define the names of empty columns 1 and 2 with column names *Airlines* and *Status*.

```
colnames(dt_wider)[1:2] = c('Airlines', 'Status')
dt_wider
```

```
##    Airlines  Status Los_Angeles Phoenix San_Diego San_Francisco Seattle
## 1:   ALASKA on time         497     221       212           503    1841
## 2:          delayed          62      12        20           102     305
## 3:  AM WEST on time         694    4840       383           320     201
## 4:          delayed         117     415        65           129      61
```

Fill in the empty Airlines cells (probably two rows combined) with the cell value directly above.
RDocumentation. := Assignment by reference
RDocumentation. shift Fast lead/lag for vectors and lists

```
dt_wider[, Airlines := ifelse(Airlines != '', Airlines, shift(Airlines))]
dt_wider
```

```
##    Airlines  Status Los_Angeles Phoenix San_Diego San_Francisco Seattle
## 1:   ALASKA on time         497     221       212           503    1841
## 2:   ALASKA delayed          62      12        20           102     305
## 3:  AM WEST on time         694    4840       383           320     201
## 4:  AM WEST delayed         117     415        65           129      61
```

Use pivit_loger() function to create new column named *Air_Port* and insert city name into *Air_Port* column.

```
dt_long <- dt_wider %>%
              pivot_longer(
              cols = c('Los_Angeles', 'Phoenix', 'San_Diego', 'San_Francisco', 'Seattle'),
              names_to = 'Air_Port',
              values_to = 'Flights')
dt_long
```

```
## # A tibble: 20 x 4
##    Airlines Status  Air_Port      Flights
##    <chr>    <chr>   <chr>           <int>
##  1 ALASKA   on time Los_Angeles       497
##  2 ALASKA   on time Phoenix           221
##  3 ALASKA   on time San_Diego         212
##  4 ALASKA   on time San_Francisco     503
##  5 ALASKA   on time Seattle          1841
##  6 ALASKA   delayed Los_Angeles        62
##  7 ALASKA   delayed Phoenix            12
##  8 ALASKA   delayed San_Diego          20
##  9 ALASKA   delayed San_Francisco     102
## 10 ALASKA   delayed Seattle           305
## 11 AM WEST  on time Los_Angeles       694
## 12 AM WEST  on time Phoenix          4840
## 13 AM WEST  on time San_Diego         383
## 14 AM WEST  on time San_Francisco     320
```

```
## 15 AM WEST  on time Seattle           201
## 16 AM WEST  delayed Los_Angeles       117
## 17 AM WEST  delayed Phoenix           415
## 18 AM WEST  delayed San_Diego          65
## 19 AM WEST  delayed San_Francisco     129
## 20 AM WEST  delayed Seattle            61
```

2. Analysis for Arrival Delays

To perform analysis to compare the arrival delays for the two airlines, we tried to see the delayed frequency for both airlines and see which airports have higher delayed rate than the average.

A. Calculate the *delayed_rate* percentage of each carrier for each city.

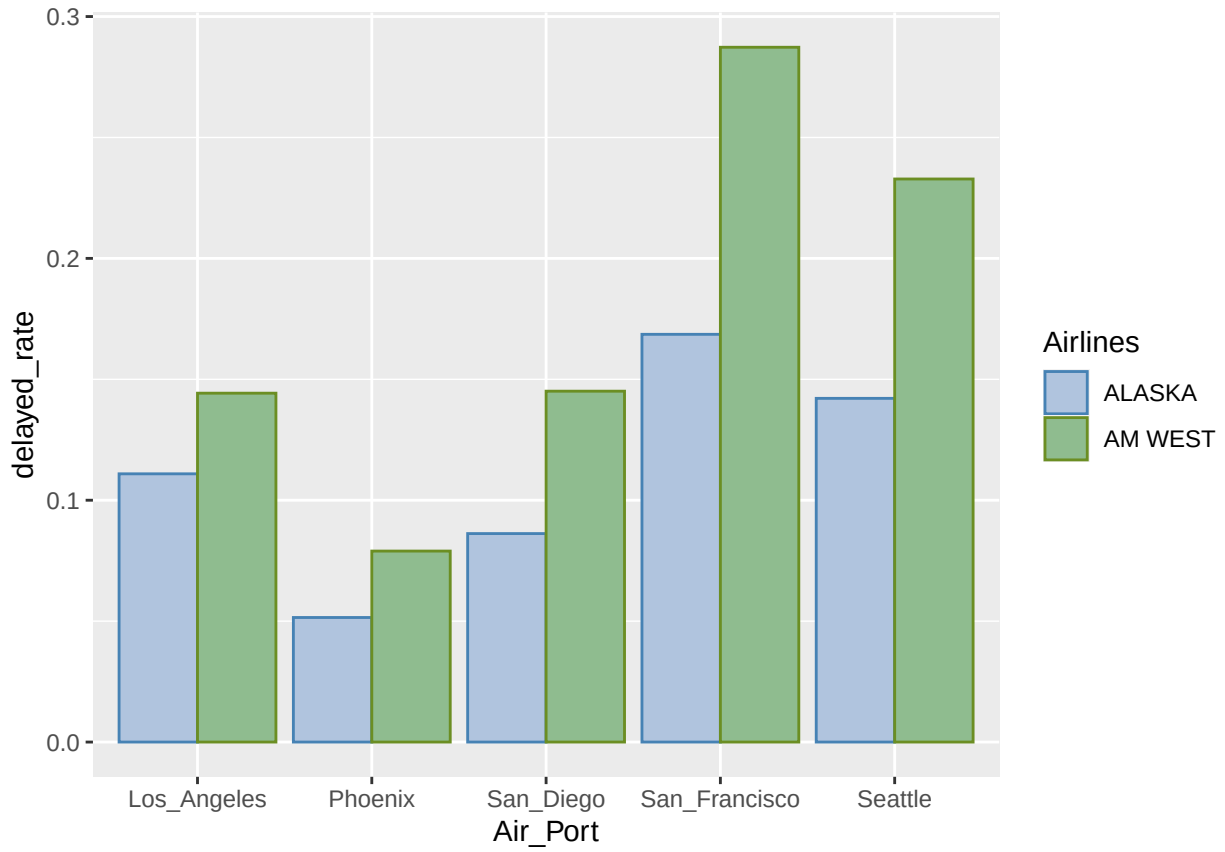
```
dt_summary <- dt_long %>%
  group_by(Airlines, Air_Port) %>%
  summarise(
    on_time = Flights[Status == 'on time'],
    delayed = Flights[Status == 'delayed'],
    total = Flights[Status == 'delayed'] + Flights[Status == 'on time'],
    delayed_rate = Flights[Status == 'delayed']
                   / (Flights[Status == 'delayed'] + Flights[Status == 'on time']))
dt_summary
```

```
## # A tibble: 10 x 6
## # Groups:   Airlines [2]
##    Airlines Air_Port      on_time delayed total delayed_rate
##    <chr>    <chr>           <int>   <int> <int>        <dbl>
##  1 ALASKA   Los_Angeles       497      62   559       0.111
##  2 ALASKA   Phoenix           221      12   233       0.0515
##  3 ALASKA   San_Diego         212      20   232       0.0862
##  4 ALASKA   San_Francisco     503     102   605       0.169
##  5 ALASKA   Seattle          1841     305  2146       0.142
##  6 AM WEST  Los_Angeles       694     117   811       0.144
```

```
##  7 AM WEST  Phoenix          4840     415  5255       0.0790
##  8 AM WEST  San_Diego         383      65   448       0.145
##  9 AM WEST  San_Francisco     320     129   449       0.287
## 10 AM WEST  Seattle           201      61   262       0.233
```

B. ggplot to draw a geom_bar graph to compare two carriers.

```
ggplot(data = dt_summary, aes(x = Air_Port, y = delayed_rate,
                              fill = Airlines, color = Airlines )) +
  geom_bar(stat='identity', position='dodge') +
  scale_color_manual(values = c('SteelBlue', 'OliveDrab')) +
  scale_fill_manual(values = c('LightSteelBlue', 'DarkSeaGreen'))
```



C. Calculate the mean delayed for each carrier. And, check whether the airports' delayed rate is above or below average.

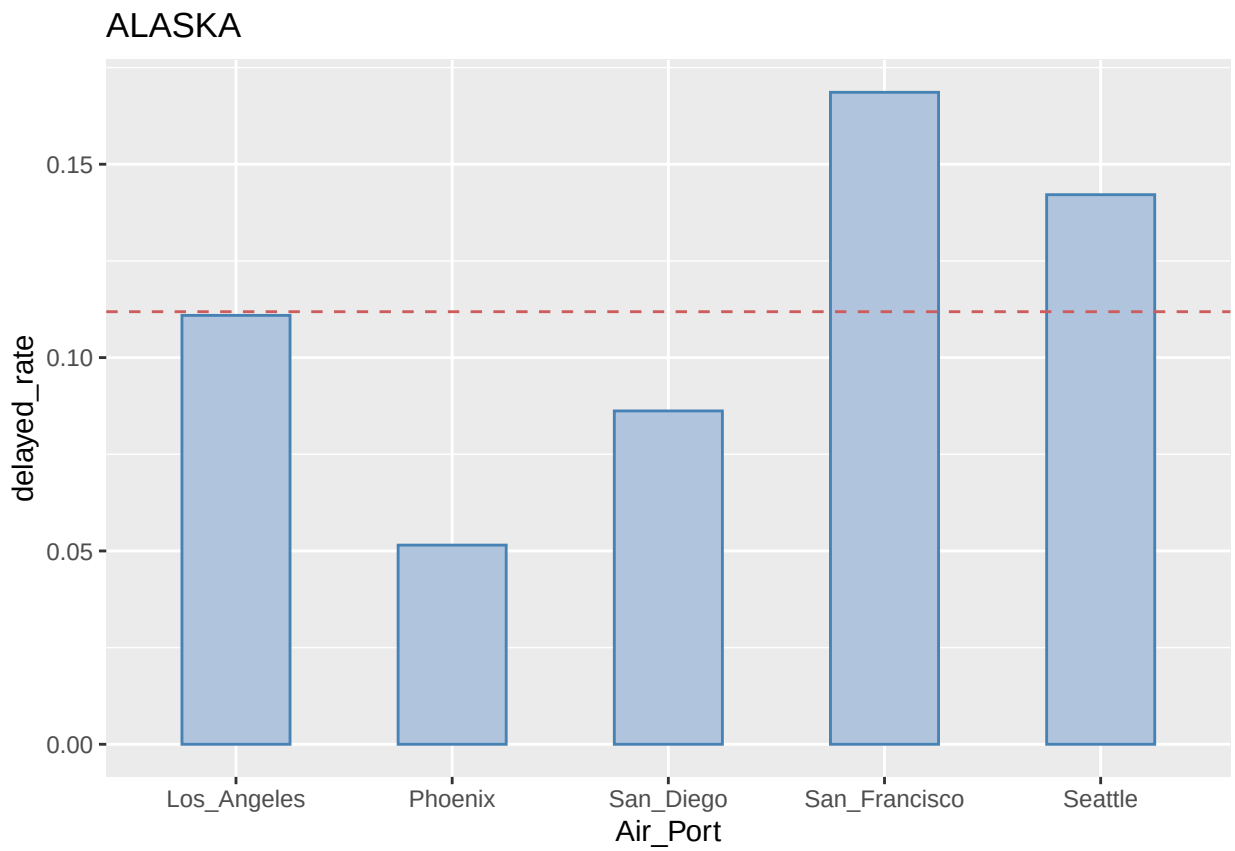
```
dt_summary <- dt_summary %>%
   group_by(Airlines) %>%
    mutate(
      mean_delay = mean(delayed_rate),
      above_below_avg = ifelse(delayed_rate > mean(delayed_rate), 'above', 'below')
    )

dt_summary
```

```
## # A tibble: 10 x 8
## # Groups:   Airlines [2]
##    Airlines Air_Port      on_time delayed total delayed_rate mean_delay above_~1
##    <chr>    <chr>           <int>   <int> <int>        <dbl>      <dbl> <chr>
##  1 ALASKA   Los_Angeles       497      62   559       0.111       0.112 below
##  2 ALASKA   Phoenix           221      12   233       0.0515      0.112 below
##  3 ALASKA   San_Diego         212      20   232       0.0862      0.112 below
##  4 ALASKA   San_Francisco     503     102   605       0.169       0.112 above
##  5 ALASKA   Seattle          1841     305  2146       0.142       0.112 above
##  6 AM WEST  Los_Angeles       694     117   811       0.144       0.178 below
##  7 AM WEST  Phoenix          4840     415  5255       0.0790      0.178 below
##  8 AM WEST  San_Diego         383      65   448       0.145       0.178 below
##  9 AM WEST  San_Francisco     320     129   449       0.287       0.178 above
## 10 AM WEST  Seattle           201      61   262       0.233       0.178 above
## # ... with abbreviated variable name 1: above_below_avg
```

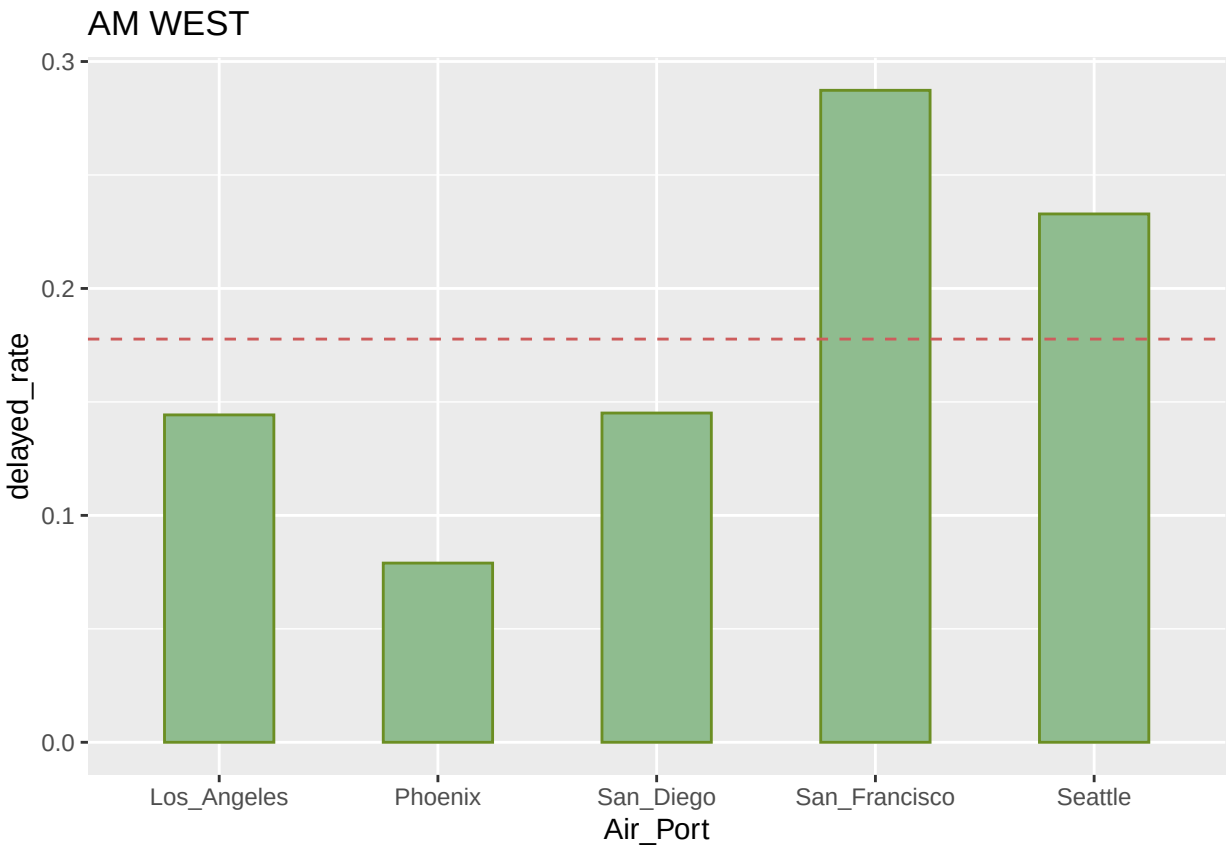
Draw geom_bar graph to compare Alaska airline's delay frequency in each airport with average delay rate.

```
mean_delay = unique(dt_summary[dt_summary$Airlines == 'ALASKA',]$mean_delay)
p <- dt_summary %>%
        filter(Airlines == 'ALASKA') %>%
          ggplot(aes(x = Air_Port, y = delayed_rate)) +
            ggtitle('ALASKA ') +
              geom_bar(stat = 'identity', color = 'SteelBlue',
                       fill = 'LightSteelBlue', width=0.5)
p + geom_hline(yintercept = unique(mean_delay), linetype='dashed', color = 'IndianRed')
```



Draw geom_bar graph to compare AM West airline's delay frequency in each airport with average delay rate.

```
mean_delay = unique(dt_summary[dt_summary$Airlines == 'AM WEST',]$mean_delay)
p <- dt_summary %>%
        filter(Airlines == 'AM WEST') %>%
          ggplot(aes(x = Air_Port, y = delayed_rate)) +
            ggtitle('AM WEST') +
              geom_bar(stat = 'identity', color = 'OliveDrab',
                       fill = 'DarkSeaGreen', width=0.5)
p + geom_hline(yintercept = unique(mean_delay), linetype='dashed', color = 'IndianRed')
```



3. Conclusion

AM West has a higher delay frequency in every city than Alaska, and AM West has a higher average delay percentage than Alaska. Both airlines have two airports above average and three below average. San Francisco and Seattle are the most delayed cities based on this data set. Moreover, this data set is not sufficient to clearly identify which airline is better in general. This could be analyzed deeper if it contains the year, month, departure delay, and arrival delay data. Year and month data is useful in analyzing trends over time or comparing seasonal airline performance. Departure delay and arrival delay data are useful to spectate how severe the delay is. Because to some people, a delay of five to ten minutes may not be considered a delay. Therefore, if there is no big difference in price and service, Alaska with fewer delays looks better than AM West.