Untitled

Keyi Wang

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How many aisles are there, and which aisles are the most items ordered from?

```
## there are 134 different aisles id
instacart %>%
select(aisle_id) %>%
  distinct() %>%
  summarize((n_obs = n()))
```

```
## # A tibble: 1 x 1
##   `(n_obs = n())`
##             <int>
## 1             134
```

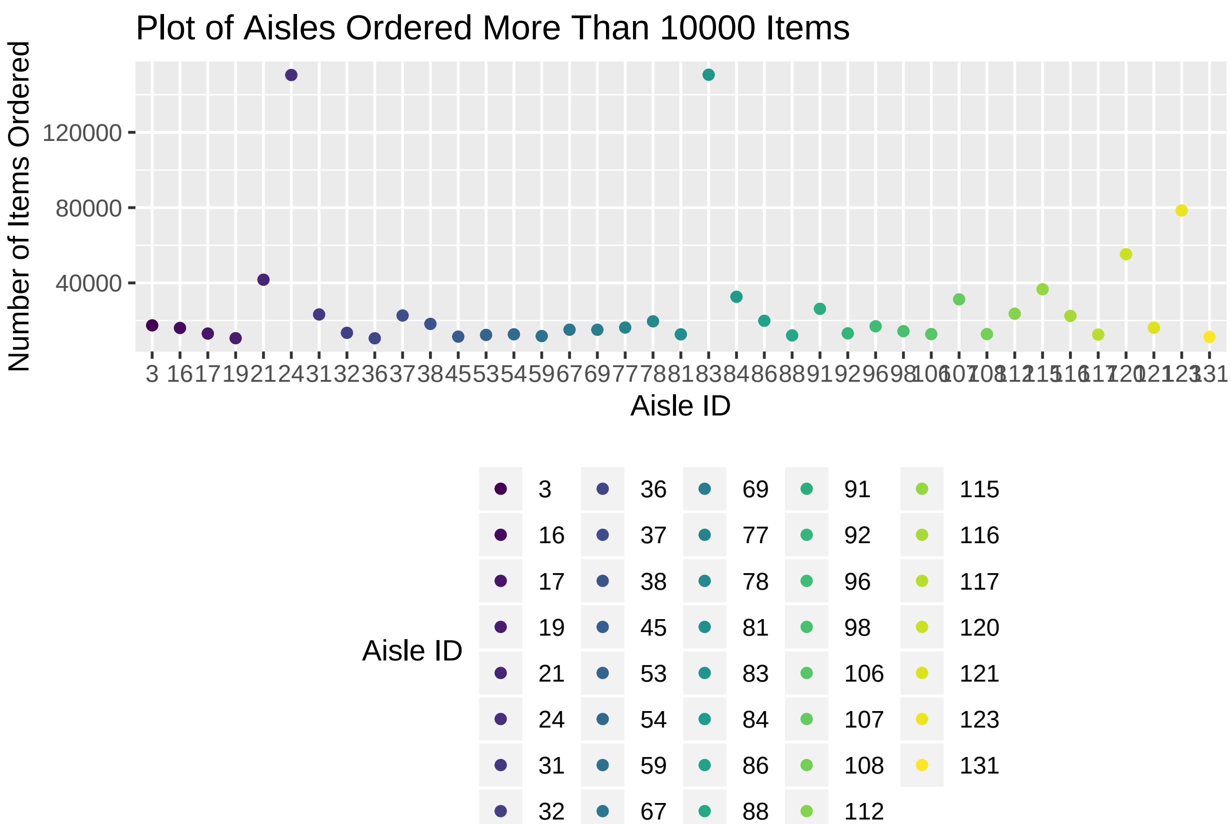
```
## the most popular aisle is aisle 83 which has been ordered 150609 times
instacart %>%
select(aisle_id) %>%
  count(aisle_id) %>%
mutate(
  number_of_aisle = n
) %>%
  arrange(desc(number_of_aisle))
```

```
## # A tibble: 134 x 3
##    aisle_id      n number_of_aisle
##       <int>  <int>           <int>
##  1       83 150609          150609
##  2       24 150473          150473
##  3      123  78493           78493
##  4      120  55240           55240
##  5       21  41699           41699
##  6      115  36617           36617
##  7       84  32644           32644
##  8      107  31269           31269
##  9       91  26240           26240
## 10      112  23635           23635
## # ... with 124 more rows
```

Make a plot that shows the number of items ordered in each aisle, limiting this to aisles with more than 10000 items ordered. Arrange aisles sensibly, and organize your plot so others can read it.

```
### problem with the order
instacart %>%
select(aisle_id) %>%
  count(aisle_id) %>%
  arrange(desc(n)) %>%
  filter(n > 10000) %>%
mutate(
   aisle_id = factor(aisle_id),
  ) %>%
  # arrange(desc(n)) %>%
```

```r
 ggplot(aes(x = aisle_id, y = n,color = aisle_id )) +
  geom_point() +
  labs(
    title = "Plot of Aisles Ordered More Than 10000 Items",
    x = "Aisle ID",
    y = "Number of Items Ordered"
  ) +
   viridis::scale_color_viridis(
    name = "Aisle ID",
    discrete = TRUE
  ) +
   theme(legend.position = "bottom")
```



Make a table showing the three most popular items in each of the aisles “baking ingredients”, “dog food care”, and “packaged vegetables fruits”. Include the number of times each item is ordered in your table.

```r
##generating dataset for packaged vegetables fruits with top3 items
pvf =
instacart %>%
  filter(aisle == "packaged vegetables fruits" )  %>%
  select(aisle, product_name) %>%
  count(aisle, product_name) %>%
  arrange(desc(n))  %>%
  filter(n > 4059)

##generating dataset for dog food care with top 3 items
dfc =
instacart %>%
```

```
 filter(aisle == "dog food care")%>%
 select(aisle, product_name) %>%
  count(aisle, product_name) %>%
  arrange(desc(n)) %>%
 filter(n > 25)

##generating dataset for baking ingredients with top 3 items
bi =
instacart %>%
 filter(aisle == "baking ingredients")%>%
  select(aisle, product_name) %>%
  count(aisle, product_name) %>%
  arrange(desc(n)) %>%
 filter(n > 329)

## combining above dataset to make the desired table
table1 =
bind_rows(pvf,dfc,bi) %>%
knitr::kable()
table1
```

aisle	product_name	n
packaged vegetables fruits	Organic Baby Spinach	9784
packaged vegetables fruits	Organic Raspberries	5546
packaged vegetables fruits	Organic Blueberries	4966
dog food care	Snack Sticks Chicken & Rice Recipe Dog Treats	30
dog food care	Organix Chicken & Brown Rice Recipe	28
dog food care	Small Dog Biscuits	26
baking ingredients	Light Brown Sugar	499
baking ingredients	Pure Baking Soda	387
baking ingredients	Cane Sugar	336

Make a table showing the mean hour of the day at which Pink Lady Apples and Coffee Ice Cream are ordered on each day of the week; format this table for human readers (i.e. produce a 2 x 7 table).

```
instacart %>%
  select(order_dow,order_hour_of_day,product_name,) %>%
 filter(product_name == "Pink Lady Apples"|product_name == "Coffee Ice Cream") %>%
  arrange(order_dow) %>%
  group_by(product_name, order_dow) %>%
  summarize(mean_hour = mean(order_hour_of_day)) %>%
  pivot_wider(
    names_from = order_dow,
    values_from = mean_hour
  ) %>%
  rename( Sun = "0" ,
        Mon = "1",
        Tue = "2",
        Wed = "3",
        Thur = "4",
        Fri = "5" ,
        Sat = "6"
        )
```

```
## # A tibble: 2 x 8
## # Groups:   product_name [2]
##   product_name       Sun   Mon   Tue   Wed  Thur   Fri   Sat
##   <chr>            <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Coffee Ice Cream  13.8  14.3  15.4  15.3  15.2  12.3  13.8
## 2 Pink Lady Apples  13.4  11.4  11.7  14.2  11.6  12.8  11.9
```

format the data to use appropriate variable names; focus on the "Overall Health" topic include only responses from "Excellent" to "Poor" organize responses as a factor taking levels ordered from "Poor" to "Excellent"

```
## clean and change variable
brfss =
  brfss_smart2010 %>%
  janitor::clean_names() %>%
  rename( state = "locationabbr",
        location = "locationdesc"
        )
### arrange response data based on topic(Overall Health) from poor to excellent
brfss %>%
  filter(topic == "Overall Health"|response == "Excellent"|response == "Very good"
         |response == "Good"|response == "Fair"|response == "Poor")  %>%
  select(topic,response) %>%
  mutate(
    response = factor(response, levels = c("Poor","Fair","Good","Very good","Excellent"))
  ) %>%
arrange(response)
```

```
## # A tibble: 10,625 x 2
##    topic          response
##    <chr>          <fct>
##  1 Overall Health Poor
##  2 Overall Health Poor
##  3 Overall Health Poor
##  4 Overall Health Poor
##  5 Overall Health Poor
##  6 Overall Health Poor
##  7 Overall Health Poor
##  8 Overall Health Poor
##  9 Overall Health Poor
## 10 Overall Health Poor
## # ... with 10,615 more rows
```

In 2002, which states were observed at 7 or more locations? What about in 2010?

```
## data manipulation to know which states were observed 7 or more locations in 2002
brfss %>%
filter(year == "2002") %>%
  select(year,state,location) %>%
  group_by(state,location) %>%
  distinct(location) %>%
  arrange(state) %>%
  group_by(state) %>%
  summarize(n_obs = n()) %>%
  filter(n_obs >= 7)
```

```
## # A tibble: 6 x 2
##   state n_obs
##   <chr> <int>
## 1 CT        7
## 2 FL        7
## 3 MA        8
## 4 NC        7
## 5 NJ        8
## 6 PA       10
```

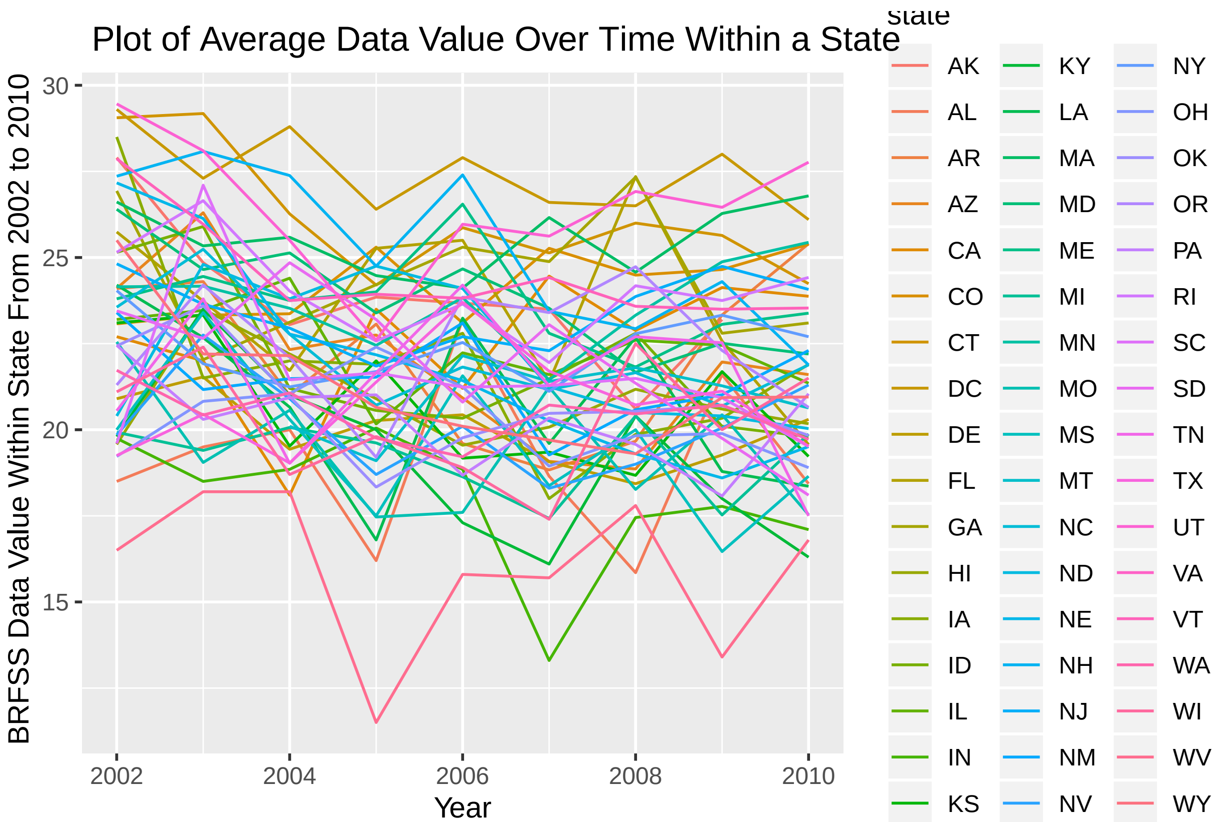
```r
## data manipulation to know which states were observed 7 or more locations in 2010
brfss %>%
filter(year == "2010") %>%
  select(year,state,location) %>%
  group_by(state,location) %>%
  distinct(location) %>%
  arrange(state) %>%
  group_by(state) %>%
  summarize(n_obs = n()) %>%
  filter(n_obs >= 7)
```

```
## # A tibble: 14 x 2
##    state n_obs
##    <chr> <int>
##  1 CA       12
##  2 CO        7
##  3 FL       41
##  4 MA        9
##  5 MD       12
##  6 NC       12
##  7 NE       10
##  8 NJ       19
##  9 NY        9
## 10 OH        8
## 11 PA        7
## 12 SC        7
## 13 TX       16
## 14 WA       10
```

Construct a dataset that is limited to Excellent responses, and contains, year, state, and a variable that averages the data_value across locations within a state. Make a "spaghetti" plot of this average value over time within a state (that is, make a plot showing a line for each state across years – the geom_line geometry and group aesthetic will help).

```r
brfss %>%
  filter(response == "Excellent")  %>%
  select(year,state,location,data_value) %>%
  drop_na() %>%
  group_by(year,state) %>%
  summarize(ave_within_state_overtime = mean(data_value)) %>%
  ggplot(aes(x = year,y = ave_within_state_overtime,color = state)) +
  geom_line() +
  labs(
    title = " Plot of Average Data Value Over Time Within a State ",
    x = "Year",
    y = " BRFSS Data Value Within State From 2002 to 2010",
```

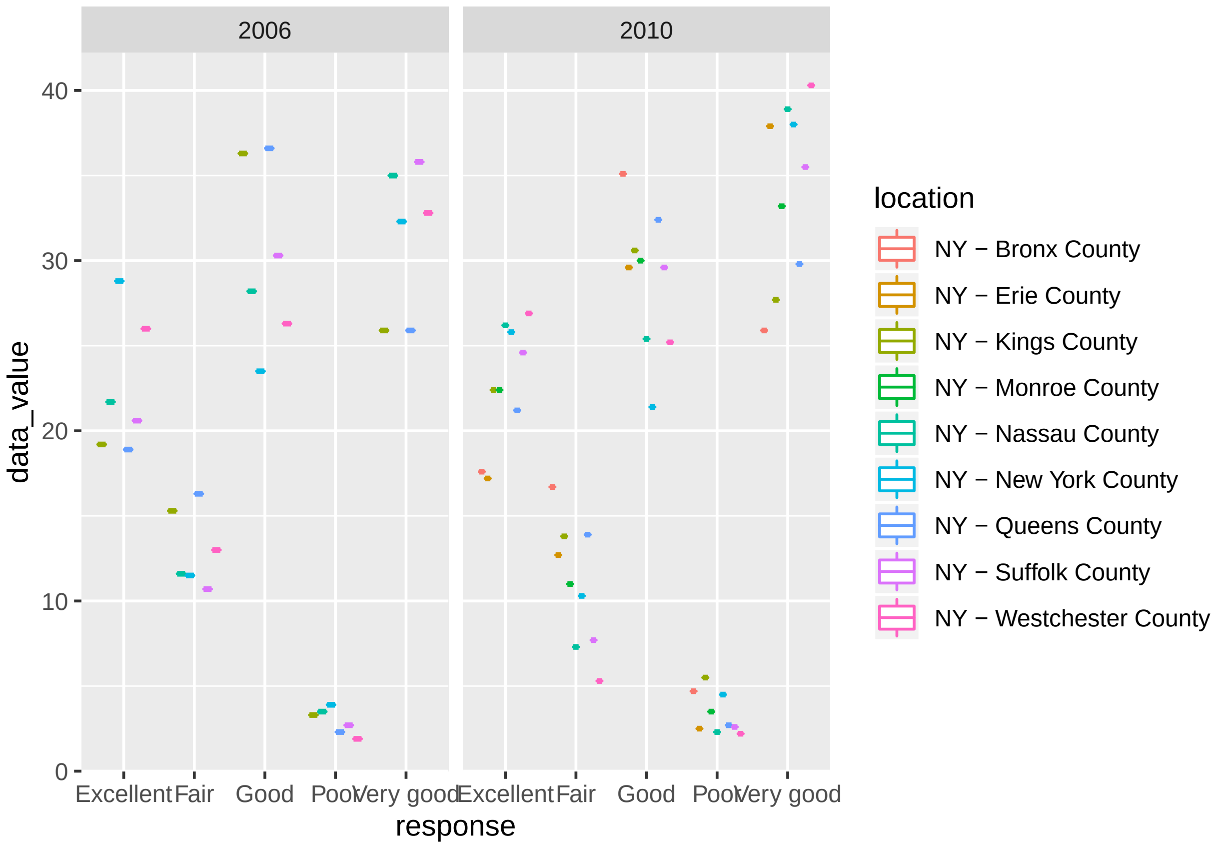
```r
  caption = "Data from BRFSS "
)
```



Data from BRFSS

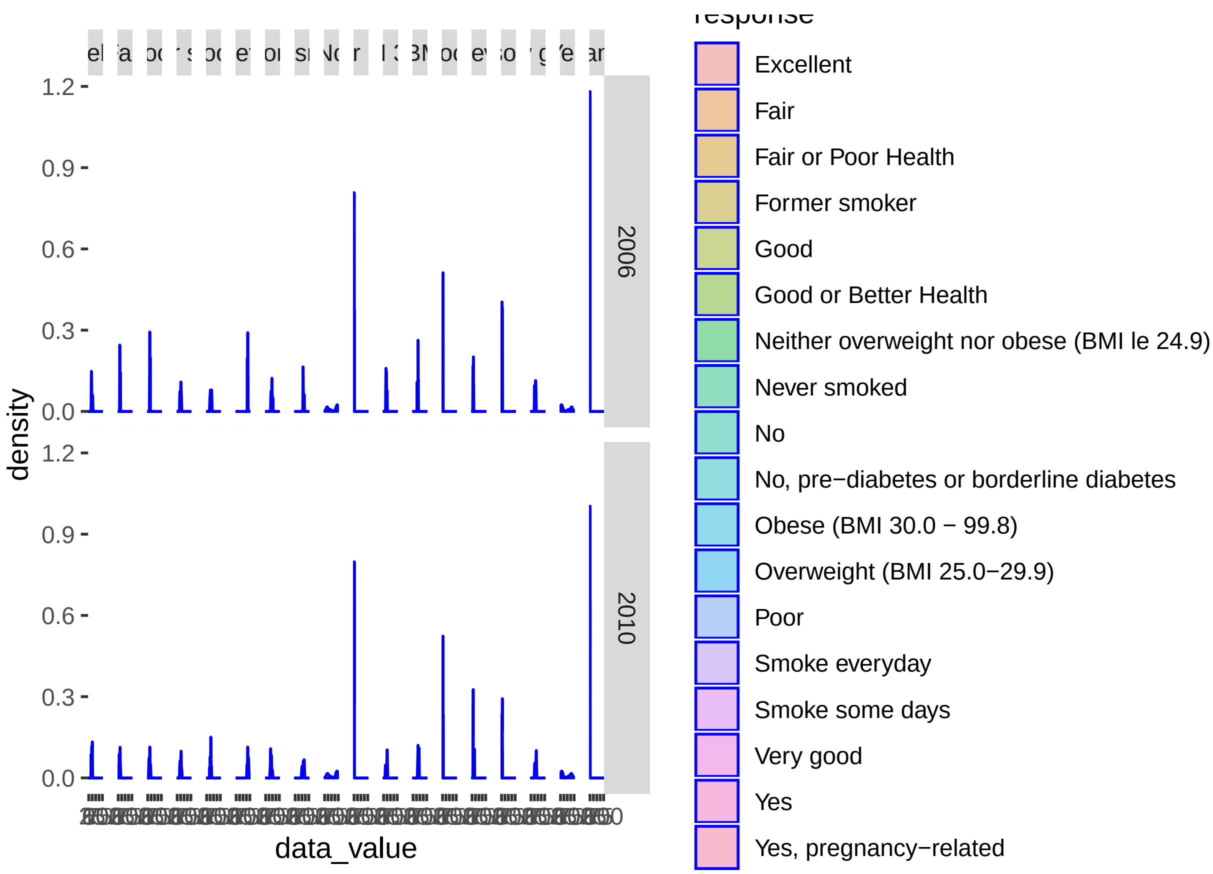
Make a two-panel plot showing, for the years 2006, and 2010, distribution of data_value for responses ("Poor" to "Excellent") among locations in NY State.

```r
## boxplot
brfss %>%
select (year, state,location,response,data_value)  %>%
filter (response %in% c("Excellent","Very good","Good","Fair","Poor"),
        year %in% c("2006","2010"),state  %in%  c("NY")) %>%
  group_by(location)%>%
ggplot(aes(x = response,y = data_value,color = location))+ geom_boxplot()+ facet_grid(~year)
```




```r
## distribution plot
brfss %>%
filter(year == 2006 | year == 2010) %>%
filter(state == "NY") %>%
group_by(response) %>%
ggplot(aes(x = data_value, fill = response)) +
#geom_density_ridges(scale = .85) #+
#geom_histogram() +
geom_density(alpha = .4, adjust = .5, color = "blue") +
facet_grid(year ~ response)
```

```
## Warning: Removed 52 rows containing non-finite values (stat_density).
```



Load, tidy, and otherwise wrangle the data. Your final dataset should include all originally observed variables and values; have useful variable names; include a weekday vs weekend variable; and encode data with reasonable variable classes. Describe the resulting dataset (e.g. what variables exist, how many observations, etc).

```
accel_data = read_csv(file = "./data/accel_data.csv")
```

```
## Parsed with column specification:
## cols(
##   .default = col_double(),
##   day = col_character()
## )
```

```
## See spec(...) for full column specifications.
```

```
tidy_accel_data =
accel_data %>%
janitor::clean_names() %>%
pivot_longer(
  activity_1:activity_1440, ## choose the column you want to combine
  names_to = "nth_minute",  ###name the new-made column
  names_prefix = "activity_",
  values_to = "activity"
  ) %>%
  mutate(
    week = as.factor(week),
    nth_minute = as.numeric(nth_minute),
    day_id = as.integer(day_id),
```

```
    day = forcats::fct_relevel(day,c("Monday","Tuesday","Wednesday","Thursday","Friday","Saturday","Sund
    arrange(day) %>%
    mutate(weekday_weekend = case_when(
    day %in% c("Monday","Tuesday","Wednesday","Thursday","Friday")~ "weekday",
    day %in% c("Saturday","Sunday")~ "weekend",
    TRUE     ~ ""
  ))
```

Traditional analyses of accelerometer data focus on the total activity over the day. Using your tidied dataset, aggregate accross minutes to create a total activity variable for each day, and create a table showing these totals. Are any trends apparent?

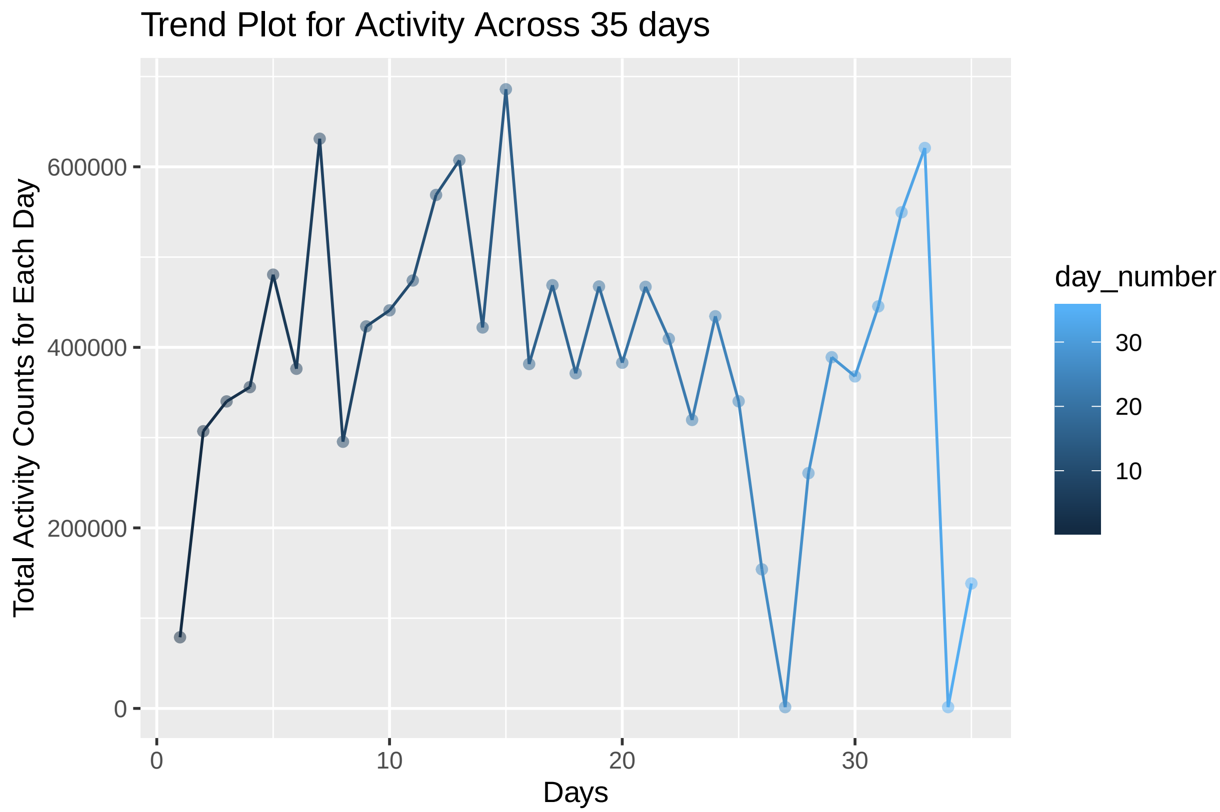
```
tidy_accel_data %>%
  group_by(week, day,weekday_weekend) %>%
  summarize(
    total_activity = sum(activity)
  ) %>%
 knitr::kable()
```

week	day	weekday_weekend	total_activity
1	Monday	weekday	78828.07
1	Tuesday	weekday	307094.24
1	Wednesday	weekday	340115.01
1	Thursday	weekday	355923.64
1	Friday	weekday	480542.62
1	Saturday	weekend	376254.00
1	Sunday	weekend	631105.00
2	Monday	weekday	295431.00
2	Tuesday	weekday	423245.00
2	Wednesday	weekday	440962.00
2	Thursday	weekday	474048.00
2	Friday	weekday	568839.00
2	Saturday	weekend	607175.00
2	Sunday	weekend	422018.00
3	Monday	weekday	685910.00
3	Tuesday	weekday	381507.00
3	Wednesday	weekday	468869.00
3	Thursday	weekday	371230.00
3	Friday	weekday	467420.00
3	Saturday	weekend	382928.00
3	Sunday	weekend	467052.00
4	Monday	weekday	409450.00
4	Tuesday	weekday	319568.00
4	Wednesday	weekday	434460.00
4	Thursday	weekday	340291.00
4	Friday	weekday	154049.00
4	Saturday	weekend	1440.00
4	Sunday	weekend	260617.00
5	Monday	weekday	389080.00
5	Tuesday	weekday	367824.00
5	Wednesday	weekday	445366.00
5	Thursday	weekday	549658.00
5	Friday	weekday	620860.00
5	Saturday	weekend	1440.00

week	day	weekday_weekend	total_activity
5	Sunday	weekend	138421.00

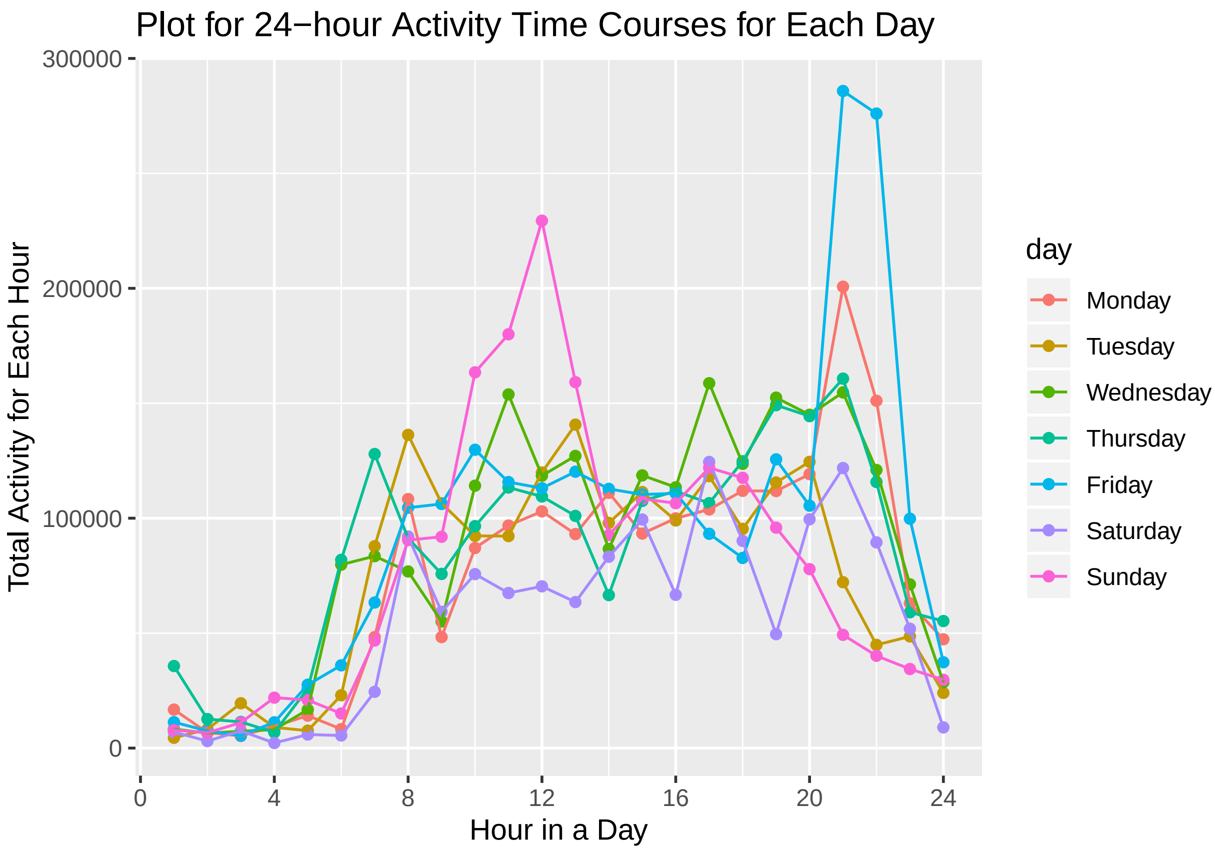
```
### since it is not very easy for us to find an exact trend in a
### table, I decided to it into a plot.
  table_data =
  tidy_accel_data %>%
  group_by(week, day) %>%
  summarize(
    sum_of_day = sum(activity)
  )  %>%
    ungroup(week,day)%>%
    mutate(
      day_number  =  row_number()
    )

table_data %>%
  ggplot(aes(x = day_number, y = sum_of_day)) +
  geom_point(aes(color = day_number), alpha = 0.5) +
  geom_line(aes(color = day_number)) +
  # add title, labels for x- and y- axis and caption
  labs(
    title = "Trend Plot for Activity Across 35 days ",
    x = "Days",
    y = "Total Activity Counts for Each Day",
    caption = "Data from the Advanced Cardiac Care Center of Columbia University Medical Center"
  ) +
  scale_y_continuous(
    # make the y-axis labels a bit prettier
    breaks = c(0, 200000, 400000, 600000, 800000),
    labels = c("0", "200000", "400000", "600000", "800000")
    )
```



Accelerometer data allows the inspection activity over the course of the day. Make a single-panel plot that shows the 24-hour activity time courses for each day and use color to indicate day of the week. Describe in words any patterns or conclusions you can make based on this graph.

```
tidy_accel_data %>%
  group_by(day) %>%
  mutate(
  hour_per_day = ceiling(nth_minute/60)) %>%
  group_by(day, hour_per_day) %>%
  summarize(sum_by_hour = sum(activity)) %>%
  ggplot(aes(x = hour_per_day, y = sum_by_hour)) +
  geom_point(aes(color = day)) +
  geom_line(aes(color = day)) +
  labs(
    title = "Plot for 24-hour Activity Time Courses for Each Day",
    x = "Hour in a Day",
    y = "Total Activity for Each Hour"
    ) +
    scale_y_continuous(
    breaks = c(0, 100000, 200000, 300000),
    labels = c("0", "100000", "200000", "300000")
  ) +
    scale_x_continuous(
    breaks = c(0, 4, 8, 12, 16, 20, 24),
    labels = c("0", "4", "8", "12", "16", "20", "24"))
```


Plot for 24−hour Activity Time Courses for Each Day
300000
200000
100000
0
Total Activity for Each Hour
0
4
8
12
16
20
24
Hour in a Day
day
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday