Assessing Student Satisfaction

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Assessing Student Satisfaction in Online Shopping

```
#install.packages("readr")
#install.packages("dplyr")
#install.packages("ggplot2")
#install.packages("tidyr")
#install.packages("stringr")
library(readr)
library(dplyr)
```

Load CSV Data

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2)
library(tidyr)
library(stringr)


student_satisfaction <- read_csv("CSV Folder/student_satisfaction.csv")
```

```
## Rows: 114 Columns: 40
```

```
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (40): Timestamp, name, age, gender, grade_level, address, contact, prefe...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
str(student_satisfaction)
```

```
## spc_tbl_ [114 x 40] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ Timestamp           : chr [1:114] "3/9/2024 20:26:36" "3/9/2024 20:27:32" "3/9/2024 20:35:20" "3/9
##  $ name                : chr [1:114] "Karl" "Ardwayne Gregorio" "Cedric Mikhail P Talon" "Braga Franz
##  $ age                 : chr [1:114] "19" "21" "21" "20" ...
##  $ gender              : chr [1:114] "Male" "Male" "Attack Helicopter" "Sigma" ...
##  $ grade_level         : chr [1:114] "College" "College" "College" "College" ...
##  $ address             : chr [1:114] "Blk 8 Brgy. Sinikway, La Paz, Iloilo City" "Railway La paz Iloi
##  $ contact             : chr [1:114] "09287313637" "09934099895" "09054191081" "09564287438" ...
##  $ prefered_platform   : chr [1:114] "Shopee" "Shopee" "Shopee" "Shopee" ...
##  $ online_shopping_freq: chr [1:114] "Occasionally" "Rarely" "Weekly" "Rarely" ...
##  $ U6                  : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Strongly Agr
##  $ RA1                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Neutral" ...
##  $ RA5                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  $ OE7                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Strongly Agr
##  $ EOU3                : chr [1:114] "Strongly Agree" "Agree" "Strongly Agree" "Agree" ...
##  $ EOUS                : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ EOU6                : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ EU4                 : chr [1:114] "Strongly Agree" "Agree" "Agree" "Agree" ...
##  $ A1                  : chr [1:114] "Strongly Agree" "Neutral" "Agree" "Strongly Agree" ...
##  $ AF1                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Neutral" ...
##  $ AF2                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  $ Affect1             : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  $ SN1                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Strongly Agr
##  $ SN2                 : chr [1:114] "Strongly Agree" "Agree" "Strongly Agree" "Agree" ...
##  $ SF2                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  $ SF4                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  $ PBC2                : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Neutral" ...
##  $ PBC3                : chr [1:114] "Strongly Agree" "Agree" "Strongly Agree" "Strongly Agree" ...
##  $ PBC5                : chr [1:114] "Strongly Agree" "Agree" "Strongly Agree" "Neutral" ...
##  $ FC3                 : chr [1:114] "Strongly Agree" "Disagree" "Agree" "Agree" ...
##  $ SE1                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ SE4                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ SE6                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Neutral" ...
##  $ SE7                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ ANX1                : chr [1:114] "Strongly Agree" "Neutral" "Agree" "Neutral" ...
##  $ ANX2                : chr [1:114] "Strongly Agree" "Strongly Agree" "Neutral" "Neutral" ...
##  $ ANX3                : chr [1:114] "Strongly Agree" "Strongly Agree" "Neutral" "Agree" ...
##  $ ANX4                : chr [1:114] "Strongly Agree" "Strongly Agree" "Agree" "Agree" ...
##  $ BI1                 : chr [1:114] "Strongly Agree" "Agree" "Strongly Agree" "Agree" ...
##  $ BI2                 : chr [1:114] "Strongly Agree" "Neutral" "Strongly Agree" "Neutral" ...
##  $ BI3                 : chr [1:114] "Strongly Agree" "Strongly Agree" "Strongly Agree" "Agree" ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   Timestamp = col_character(),
##   ..   name = col_character(),
##   ..   age = col_character(),
##   ..   gender = col_character(),
##   ..   grade_level = col_character(),
##   ..   address = col_character(),
##   ..   contact = col_character(),
##   ..   prefered_platform = col_character(),
##   ..   online_shopping_freq = col_character(),
##   ..   U6 = col_character(),
##   ..   RA1 = col_character(),
```

```
##   ..   RA5 = col_character(),
##   ..   OE7 = col_character(),
##   ..   EOU3 = col_character(),
##   ..   EOUS = col_character(),
##   ..   EOU6 = col_character(),
##   ..   EU4 = col_character(),
##   ..   A1 = col_character(),
##   ..   AF1 = col_character(),
##   ..   AF2 = col_character(),
##   ..   Affect1 = col_character(),
##   ..   SN1 = col_character(),
##   ..   SN2 = col_character(),
##   ..   SF2 = col_character(),
##   ..   SF4 = col_character(),
##   ..   PBC2 = col_character(),
##   ..   PBC3 = col_character(),
##   ..   PBC5 = col_character(),
##   ..   FC3 = col_character(),
##   ..   SE1 = col_character(),
##   ..   SE4 = col_character(),
##   ..   SE6 = col_character(),
##   ..   SE7 = col_character(),
##   ..   ANX1 = col_character(),
##   ..   ANX2 = col_character(),
##   ..   ANX3 = col_character(),
##   ..   ANX4 = col_character(),
##   ..   BI1 = col_character(),
##   ..   BI2 = col_character(),
##   ..   BI3 = col_character()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```
summary(student_satisfaction)
```

```
##   Timestamp             name                age               gender
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##  grade_level          address             contact          prefered_platform
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##  online_shopping_freq      U6                 RA1                RA5
##  Length:114           Length:114         Length:114         Length:114
##  Class :character     Class :character   Class :character   Class :character
##  Mode  :character     Mode  :character   Mode  :character   Mode  :character
##      OE7                 EOU3               EOUS               EOU6
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##      EU4                  A1                 AF1                AF2
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##    Affect1              SN1                SN2                SF2
```

```
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##      SF4                PBC2               PBC3               PBC5
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##      FC3                SE1                SE4                SE6
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##      SE7                ANX1               ANX2               ANX3
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##      ANX4               BI1                BI2                BI3
##  Length:114         Length:114         Length:114         Length:114
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
```

```
student_satisfaction <- student_satisfaction %>%
  filter(prefered_platform != "None")
```

Remove Useless Rows

```
question_columns <- c("U6", "RA1", "RA5", "OE7", "EOU3", "EOUS", "EOU6", "EU4", "A1", "AF1", "AF2", "Af
```

Question Columns

```
student_satisfaction <- student_satisfaction %>%
  mutate_all(na_if, "")
```

Change Blank Cells to NA

```
# Change questions column to factor
for (column_name in question_columns) {
  student_satisfaction[[column_name]] <- factor(student_satisfaction[[column_name]],
                                levels = c("Strongly Disagree", "Disagree", "Neutral", "Agree", "Strongly
                                ordered = TRUE)
}

# Change preferred platform column to factor
student_satisfaction$prefered_platform <- factor(student_satisfaction$prefered_platform,
                                      levels = c("Shopee", "Lazada", "TikTok", "Shein"))

# Change online_shopping_freq column to factor
student_satisfaction$online_shopping_freq <- factor(student_satisfaction$online_shopping_freq,
                                levels = c("Rarely", "Occasionally", "Monthly", "Weekly", "Daily"))
```

Change Columns to a Factor

```r
demographic_cols <- c("Timestamp", "name", "age", "gender", "grade_level", "address", "contact", "prefe
demographics <- student_satisfaction %>%
  select(all_of(demographic_cols))

determinant_cols <- setdiff(names(student_satisfaction), demographic_cols)
determinants <- student_satisfaction %>%
  select(all_of(determinant_cols))
```

Separate demographic, shopping behavior, and determinant columns

```r
category_map <- list(
  "Performance Expectancy" = c("U6", "RA1", "RA5", "OE7"),
  "Effort Expectancy" = c("EOU3", "EOUS", "EOU6", "EU4"),
  "Attitude toward using technology" = c("A1", "AF1", "AF2", "Affect1"),
  "Social influence" = c("SN1", "SN2", "SF2", "SF4"),
  "Facilitating Conditions" = c("PBC2", "PBC3", "PBC5", "FC3"),
  "Self-Efficacy" = c("SE1", "SE4", "SE6", "SE7"),
  "Anxiety" = c("ANX1", "ANX2", "ANX3", "ANX4"),
  "Behavioral Intention to Use the System" = c("BI1", "BI2", "BI3")
)
category_df <- stack(category_map)
colnames(category_df) <- c("question", "category")
```

Category Map

```r
determinants_means <- determinants %>%
  mutate(across(everything(), as.numeric)) %>%
  summarise_all(.funs = mean) %>%
  pivot_longer(cols = everything(), names_to = "question", values_to = "mean")

determinants_sds <- determinants %>%
  mutate(across(everything(), as.numeric)) %>%
  summarise_all(.funs = sd) %>%
  pivot_longer(cols = everything(), names_to = "question", values_to = "sd")


determinant_summary <- determinants_means %>%
  inner_join(determinants_sds, by = "question") %>%
  inner_join(category_df, by = "question")

determinant_summary
```

Converting Determinants to numeric then mean and standard deviation and joining with category map

```
## # A tibble: 31 x 4
##    question  mean    sd category
##    <chr>    <dbl> <dbl> <fct>
##  1 U6        4.40 0.620 Performance Expectancy
##  2 RA1       4.16 0.808 Performance Expectancy
##  3 RA5       4.41 0.690 Performance Expectancy
##  4 OE7       4.27 0.771 Performance Expectancy
```

```
##  5 EOU3      4.16 0.714 Effort Expectancy
##  6 EOUS      4.29 0.703 Effort Expectancy
##  7 EOU6      4.39 0.633 Effort Expectancy
##  8 EU4       4.41 0.622 Effort Expectancy
##  9 A1        4.24 0.685 Attitude toward using technology
## 10 AF1       4.18 0.684 Attitude toward using technology
## # i 21 more rows
```

```
determinant_mean_by_category <- aggregate(mean ~ category, determinant_summary, mean)
determinant_sd_by_category <- aggregate(sd ~ category, determinant_summary, sd)

determinant_summary_by_category <- determinant_mean_by_category %>%
  inner_join(determinant_sd_by_category, by= "category")

determinant_summary_by_category
```

Get mean and sd by category

```
##                                  category     mean          sd
## 1                 Performance Expectancy 4.309735 0.084006072
## 2                     Effort Expectancy 4.311947 0.047434486
## 3       Attitude toward using technology 4.219027 0.032084073
## 4                      Social influence 4.115044 0.020994397
## 5                Facilitating Conditions 4.320796 0.077020623
## 6                           Self-Efficacy 4.148230 0.068016440
## 7                                Anxiety 3.898230 0.162799440
## 8 Behavioral Intention to Use the System 4.274336 0.004848797
```

```
#write.csv(determinant_summary_by_category, "determinant_mean_sd.csv")
```

```
library(dplyr)
demographics <- demographics %>%
  select(-Timestamp, -name, -contact, -address)

demographics <- demographics %>%
  mutate_all(tolower)

# gender
demographics$gender[!(demographics$gender %in% c("male", "female"))] <- "other"

# age
demographics$age <- as.numeric(demographics$age)
```

Clean Demographics

```
## Warning: NAs introduced by coercion
```

```
demographics <- demographics[!is.na(demographics$age) & demographics$age < 24, ]
age_bins <- c(14, 18, 24)
labels <- c("14-18", "19-24")
demographics$age_group <- cut(demographics$age, breaks = age_bins, labels = labels, right = FALSE)


# grade level
```

```r
demographics$grade_level <- gsub("senior", "", demographics$grade_level)
demographics$grade_level <- str_trim(demographics$grade_level)


# convert to factor
demographics$gender <- as.factor(demographics$gender)
demographics$grade_level <- as.factor(demographics$grade_level)
demographics$prefered_platform <- as.factor(demographics$prefered_platform)
demographics$online_shopping_freq <- factor(demographics$online_shopping_freq,
                          levels = c("rarely", "occasionally", "monthly", "weekly", "daily"),
                          ordered = TRUE)


str(demographics)
```

```
## tibble [108 x 6] (S3: tbl_df/tbl/data.frame)
##  $ age                 : num [1:108] 19 21 21 20 20 19 19 21 23 20 ...
##  $ gender              : Factor w/ 3 levels "female","male",..: 2 2 3 3 2 2 3 1 2 1 ...
##  $ grade_level         : Factor w/ 2 levels "college","high school": 1 1 1 1 1 1 1 1 1 1 ...
##  $ prefered_platform   : Factor w/ 4 levels "lazada","shein",..: 3 3 3 3 3 1 3 3 4 4 ...
##  $ online_shopping_freq: Ord.factor w/ 5 levels "rarely"<"occasionally"<..: 2 1 4 1 1 2 4 1 1 3 ...
##  $ age_group           : Factor w/ 2 levels "14-18","19-24": 2 2 2 2 2 2 2 2 2 2 ...
```

```r
#write.csv(demographics, "cleaned-demographics.csv")
```

Visualization for determinants

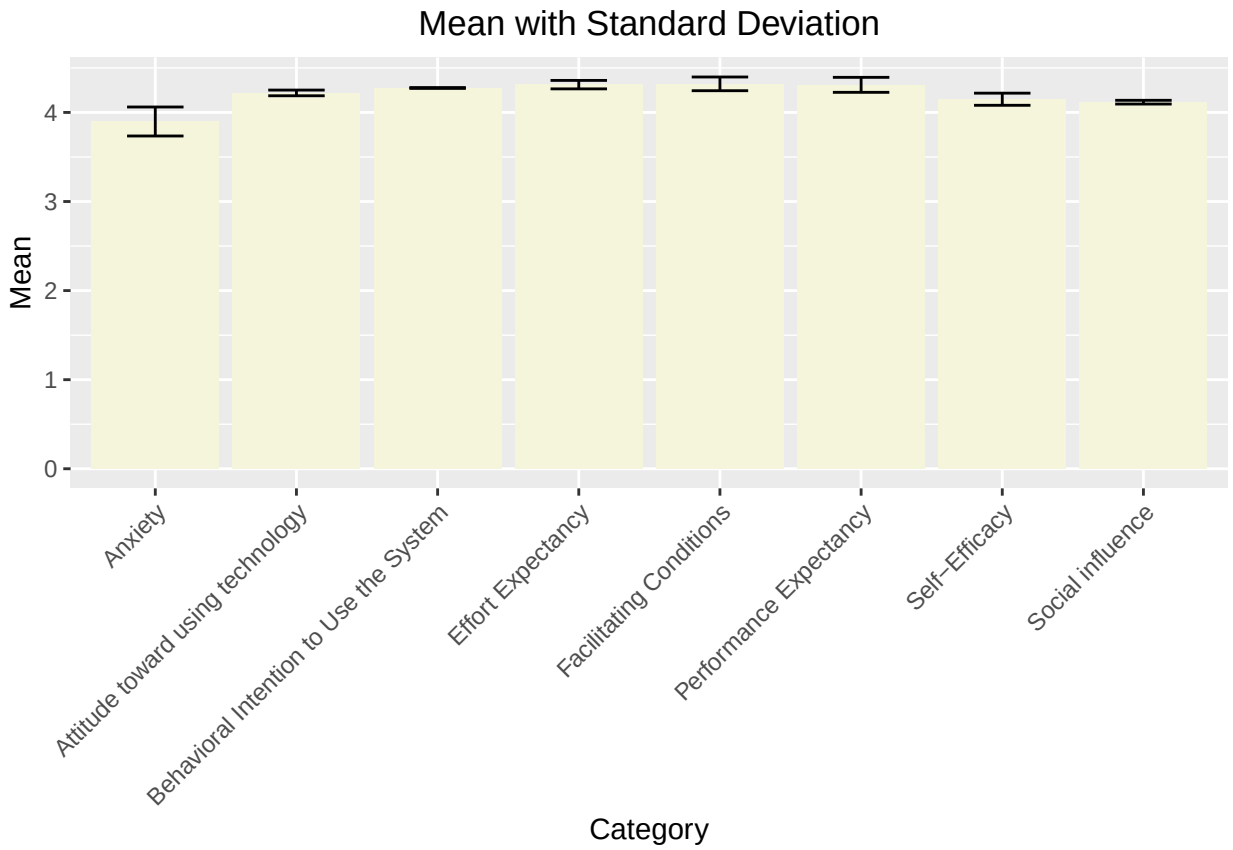
```r
determinant_mean_sd <- read_csv("CSV Folder/determinant_mean_sd.csv")
```

```
## New names:
## Rows: 8 Columns: 4
## -- Column specification
## -------------------------------------------------------- Delimiter: "," chr
## (1): category dbl (3): ...1, mean, sd
## i Use `spec()` to retrieve the full column specification for this data. i
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## * `` -> `...1`
```

```r
determinant_plot <- ggplot(determinant_mean_sd,aes(x=category, y=mean))+
                    geom_bar(stat='identity', fill='beige')+
                    geom_errorbar(aes(ymin = mean-sd, ymax = mean+sd),width=0.4,position=position_dodge
                    labs(title = "Mean with Standard Deviation",
                    x = "Category",
                    y = "Mean") +
                    theme(plot.title = element_text(hjust = 0.5),
                    axis.text.x = element_text(angle = 45, hjust = 1))

#ggsave("/cloud/project/CS_102_Bagilidad_Olivo_Talon/Determinants_Plot.png", determinant_plot , width =

determinant_plot
```



The graph show strong favorable attitudes and intentions of students to use online shopping, as evidenced by high scores and minimal variability in performance expectancy, effort expectancy, and behavioral intention. However, there is some variation in self-efficacy, anxiety, and attitudes, indicating that there may be issues with using online shopping.

Visualization for Demographics

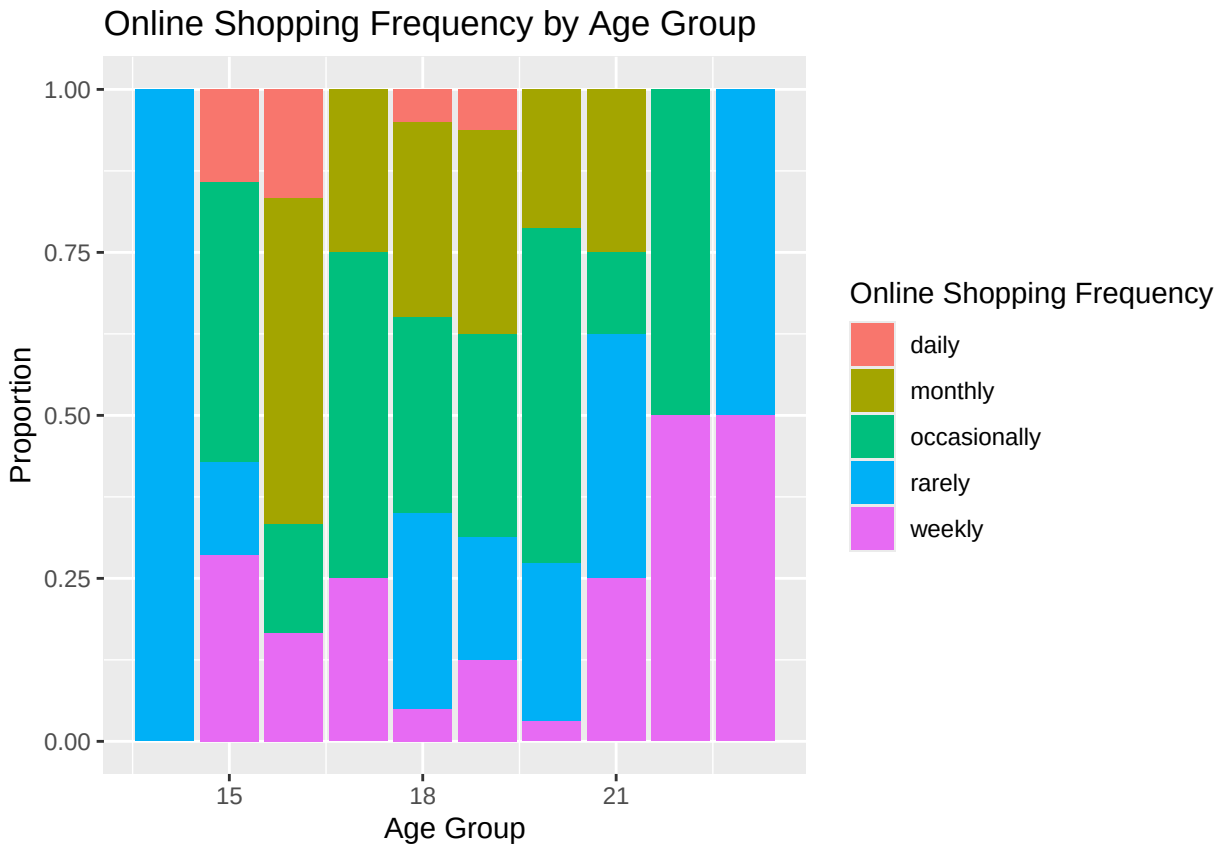
Online Shopping Frequency by Age Group

```
cleaned_demographics <- read_csv("CSV Folder/cleaned-demographics.csv")
```

```
## New names:
## Rows: 108 Columns: 7
## -- Column specification
## -------------------------------------------------------- Delimiter: "," chr
## (5): gender, grade_level, prefered_platform, online_shopping_freq, age_g... dbl
## (2): ...1, age
## i Use `spec()` to retrieve the full column specification for this data. i
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## * `` -> `...1`
```

```
#Online shopping frequency by age group
ageShoppingFreq_plot <-
  ggplot(cleaned_demographics, aes(x = age, fill = online_shopping_freq)) +
  geom_bar(position = "fill") +
  labs(title = "Online Shopping Frequency by Age Group",
       x = "Age Group",
       y = "Proportion",
```

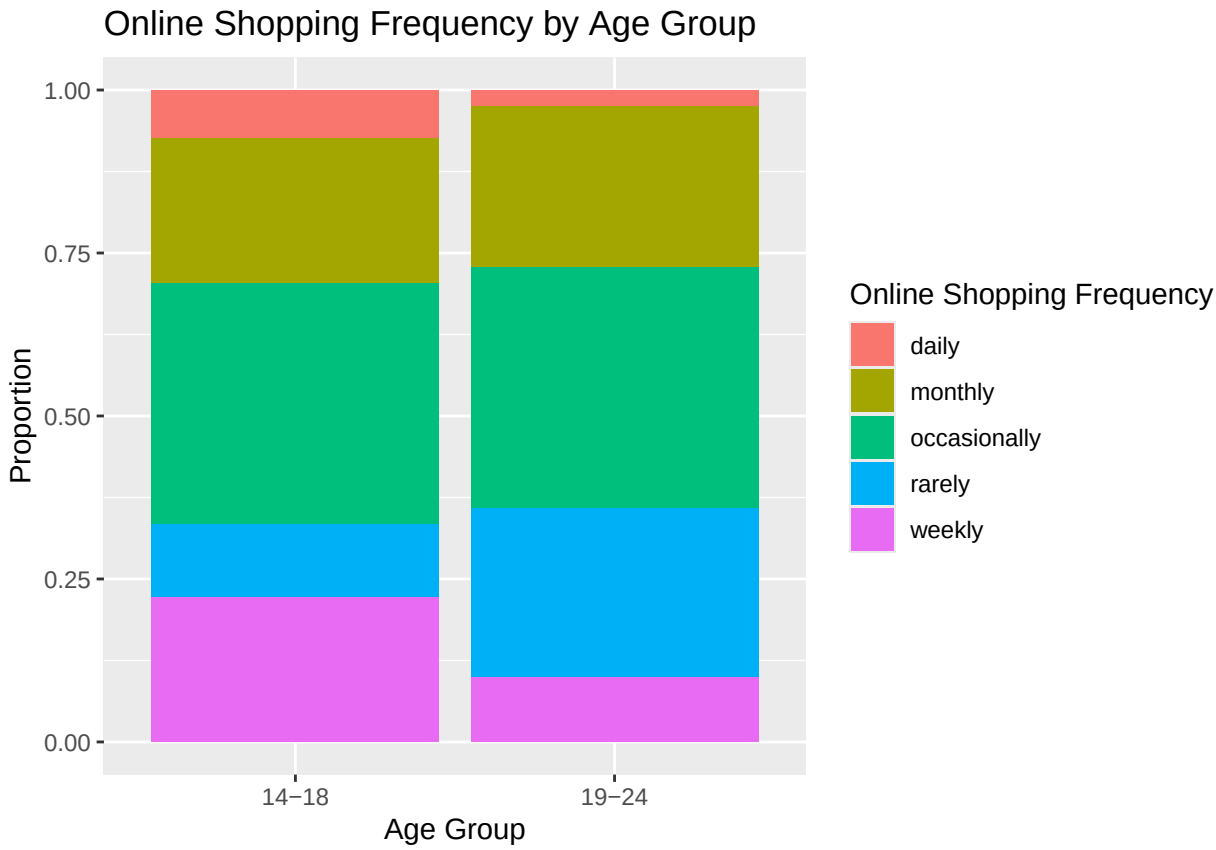
```
       fill = "Online Shopping Frequency")
ageShoppingFreq_plot
```




```
# Bar plot for online shopping frequency by age group
ageShoppingFreq_plot <- ggplot(cleaned_demographics, aes(x = age_group, fill = online_shopping_freq)) +
  geom_bar(position = "fill") +
  labs(title = "Online Shopping Frequency by Age Group",
       x = "Age Group",
       y = "Proportion",
       fill = "Online Shopping Frequency")

#ggsave("/cloud/project/CS_102_Bagilidad_Olivo_Talon/OnlineShoppingFrequency_Plot.png", ageShoppingFreq

ageShoppingFreq_plot
```




```
#When compared to other age groups, those aged 14 to 18 are the most active in online shopping.
```

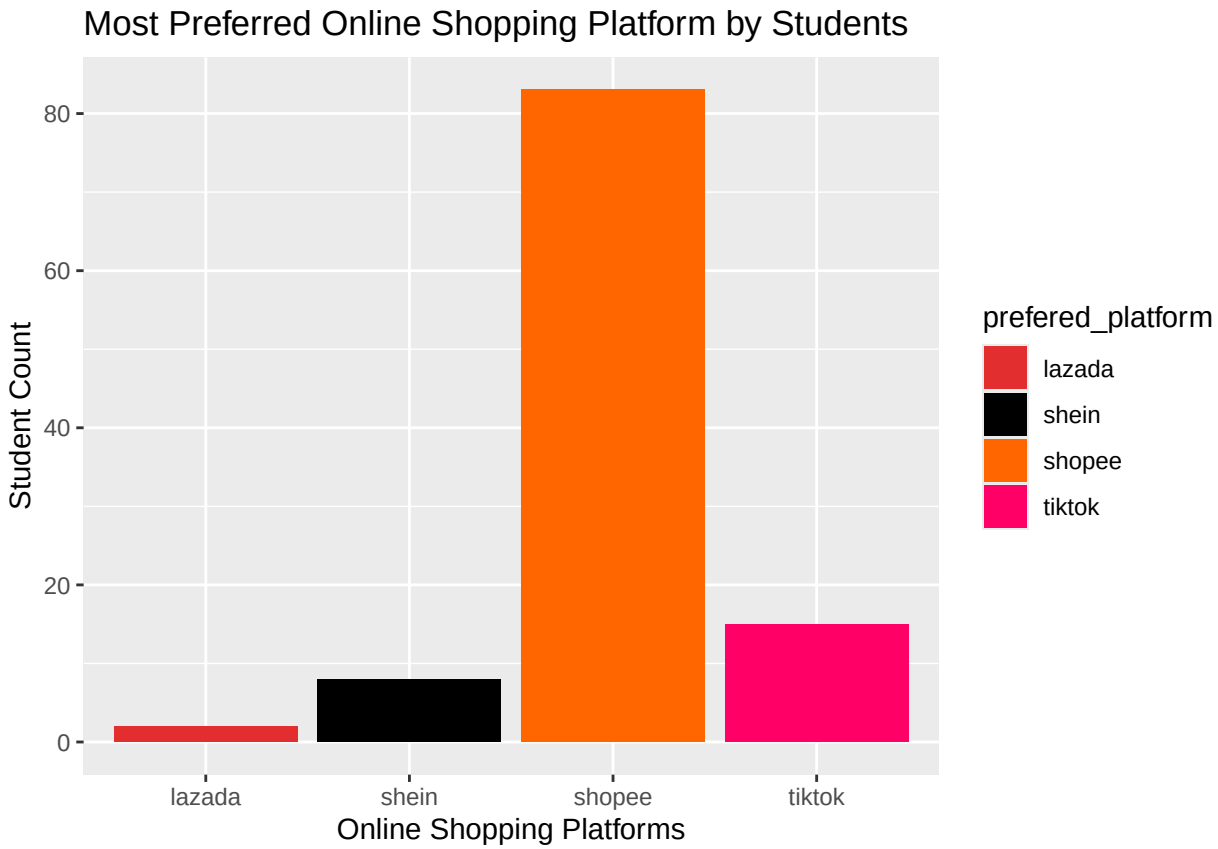
Most Used Online Shopping Platform by Students

```
platform_colors <- c("#E32E30", "#000000", "#FF6600", "#FF0066")

# Create the plot with custom colors
popularPlatform_plot <-
  ggplot(cleaned_demographics, aes(x = prefered_platform, fill = prefered_platform)) +
  geom_bar() +
  labs(title = "Most Preferred Online Shopping Platform by Students",
       x = "Online Shopping Platforms",
       y = "Student Count") +
  scale_fill_manual(values = platform_colors)

#ggsave("/cloud/project/CS_102_Bagilidad_Olivo_Talon/PopularPlatform_Plot.png", popularPlatform_plot, w

  popularPlatform_plot
```




```
#The most popular online shopping platform among students is Shopee.
```