The Use of Generative AI in the Videogames Industry

June 20, 2024

1 Survey results

1.1 Introduction

Here we will analyze and visualize the survey data.

1.2 Initial setup

Install and load the needed libraries and the survey data.

[ ]:
```
# List of packages to install
packages <- c("tidyverse", "syuzhet", "wordcloud", "tidytext", "readxl", "tm")

# Function to check and install packages if not already installed
install_if_missing <- function(p) {
  if (!requireNamespace(p, quietly = TRUE)) {
    install.packages(p)
  }
}

# Install necessary packages
invisible(sapply(packages, install_if_missing))

# Load necessary libraries
library(tidyverse) # for data manipulation
library(syuzhet) # for sentiment analysis
library(wordcloud) # for word clouds
library(tidytext) # for text mining
library(readxl) # for reading excel files
library(tm) # for text mining

# Load the provided survey data
file_path <- "data/cleanSurveyData20240514.xlsx"

# this line can be repeated later to reset the data
data <- read_excel(file_path)

# Suppress warnings (this is fine)
options(warn = -1)
```

1.2.1 Show the column names + index number (survey questions)

```
[ ]: # Display the column names
print(colnames(data))
```

```
 [1] "ID"
 [2] "Start time"
 [3] "Completion time"
 [4] "Email"
 [5] "Do you consider yourself a professional or a hobbyist in game
development?"
 [6] "Primary area of work?"
 [7] "Years of experience in game development?"
 [8] "Are you in a lead role?"
 [9] "Team size?"
[10] "Overall stance on Generative AI?2"
[11] "Which areas do you think are less<U+00A0>"
[12] "Art & Assets"
[13] "Level Design"
[14] "Storytelling"
[15] "Sound Design"
[16] "Voice Overs & Acting"
[17] "Programming"
[18] "Game Design"
[19] "Marketing & PR"
[20] "Music"
[21] "Community management"
[22] "Initial prototyping"
[23] "Do you use Generative AI in your work?"
[24] "Was it your own idea to begin using Generative AI or your employers?"
[25] "Efficiency?"
[26] "Quality?"
[27] "Enjoyment?"
[28] "Do you think of the ability to use Generative AI as an actual and useful
competence in your area of work?"
[29] "Do your coworkers use Generative AI in their work?"
[30] "Do your peers in the industry use Generative AI in their work?"
[31] "Do you disclose your use of Generative AI internally?"
[32] "Do you disclose your use of Generative AI externally?"
[33] "Do you perceive any stigma associated with the use of Generative AI
internally?"
[34] "Do you perceive any stigma associated with the use of Generative AI
externally?"
[35] "Would you care to elaborate?5"
[36] "Would you care to elaborate?4"
[37] "It will help shorten development timelines"
[38] "It will lead to more individualized gaming experiences"
[39] "It will impact staffing decisions"
```

```
[40] "It will lead to smaller team sizes"
[41] "It will democratize game development"
[42] "It will make it cheaper to develop games"
[43] "It will lead to lower quality games"
[44] "It will lead to better games"
[45] "What do you think will be the most promising innovations from Generative
AI in game development?"
[46] "What do you think will be the most negative consequences of Generative AI
in game development?"
[47] "Statement 1"
[48] "Statement 23"
[49] "Question4"
[50] "What would be your ideal future Generative AI driven tool, that could help
you in your area of work?"
[51] "Creativity?"
[52] "Anything else we should know / feedback?"
```

Syntax note From here on we will use the index numbers to refer to the questions.

Example:

To return the contents of the fifth column "Do you consider yourself a professional or a hobbyist in game development?"

```
data[5] # Returns a data frame with the fifth column

data[[5]] # Returns the raw contents of the fifth column
```

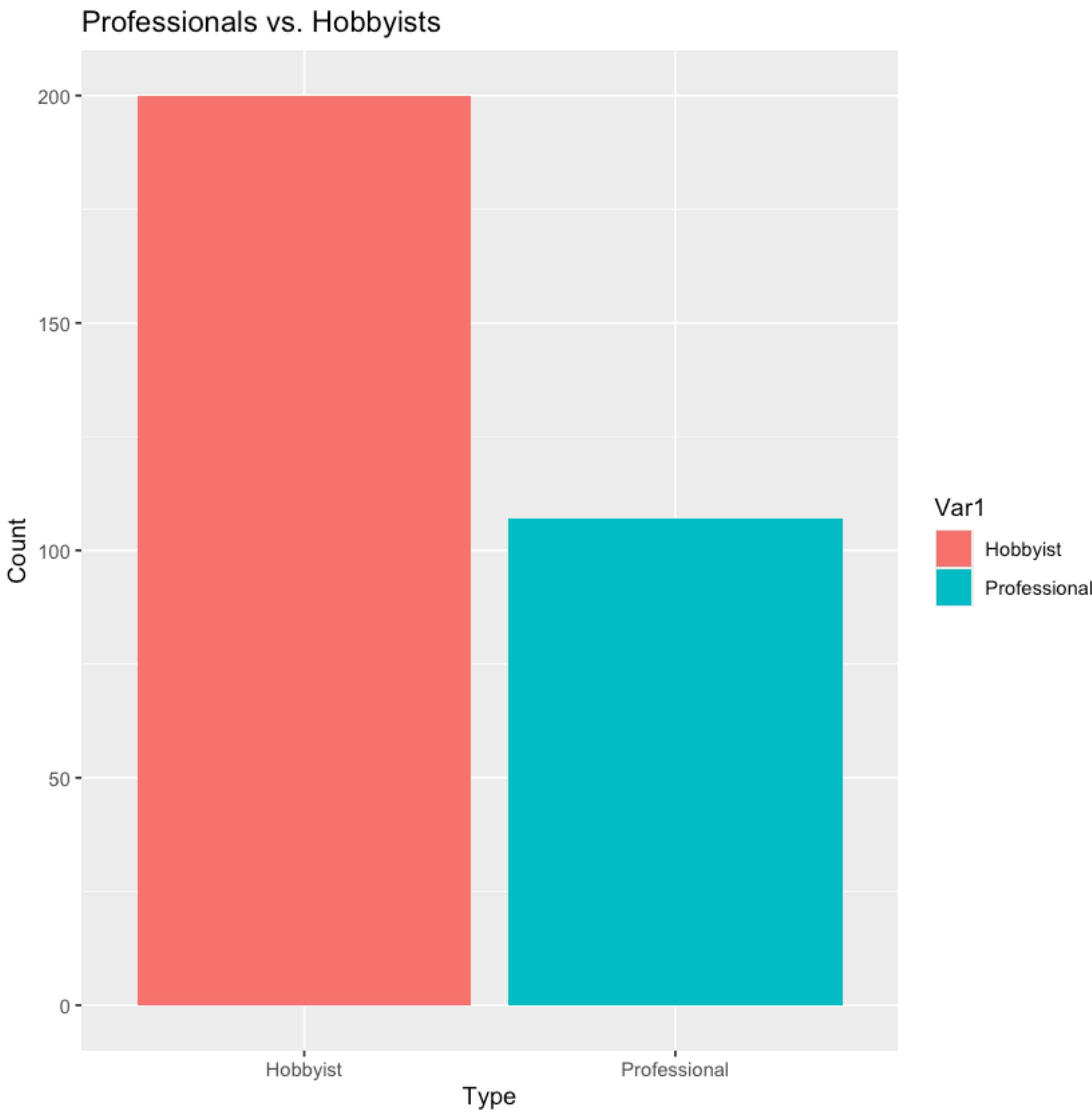
1.3 Count of Professionals vs. Hobbyists

Here we'll access column [5] "Do you consider yourself a professional or a hobbyist in game development?"

[ ]:
```
# Print the count of professionals vs. hobbyists
table(data[[5]])

# Plotting the count of professionals vs. hobbyists
ggplot(
  as.data.frame(table(data[[5]])),
  aes(x = Var1, y = Freq, fill = Var1)
) +
  geom_bar(stat = "identity") +
  labs(
    title = "Professionals vs. Hobbyists",
    x = "Type",
    y = "Count"
  )
```

```
    Hobbyist Professional
```

```
200                107
```



1.4 Primary area of work

Here it's column [6] "Primary area of work?"

[ ]:
```r
# Show the distribution of 'Primary area of work?' in number of respondents
primary_area_count <- table(data[6])

# Censor abusive language in [6]
names(primary_area_count)[6] <- "Censored"

# Print the raw count of respondents in each primary area of work
```

```
primary_area_count
```

```
                                   Art & Assets
                                             35
                                  Audio & Music
                                              3
                                 Auto body, lol
                                              1
                                        Defense
                                              1
                            Design & Production
                                             13
                                       Censored
                                              1
                                    Generalist
                                             10
                 Generalist (also solo developer)
                                            125
I work a full-time job and do game dev as a hobby.
                                              1
                                 Marketing & PR
                                              1
              Project Lead, Programmer & Designer
                                              1
                  Solo developer - I do everything
                                              1
                        Technical & Programming
                                            112
                     Travel & Customer Service
                                              1
                                       Whatever
                                              1
```

1.4.1 Manual clean up of categories

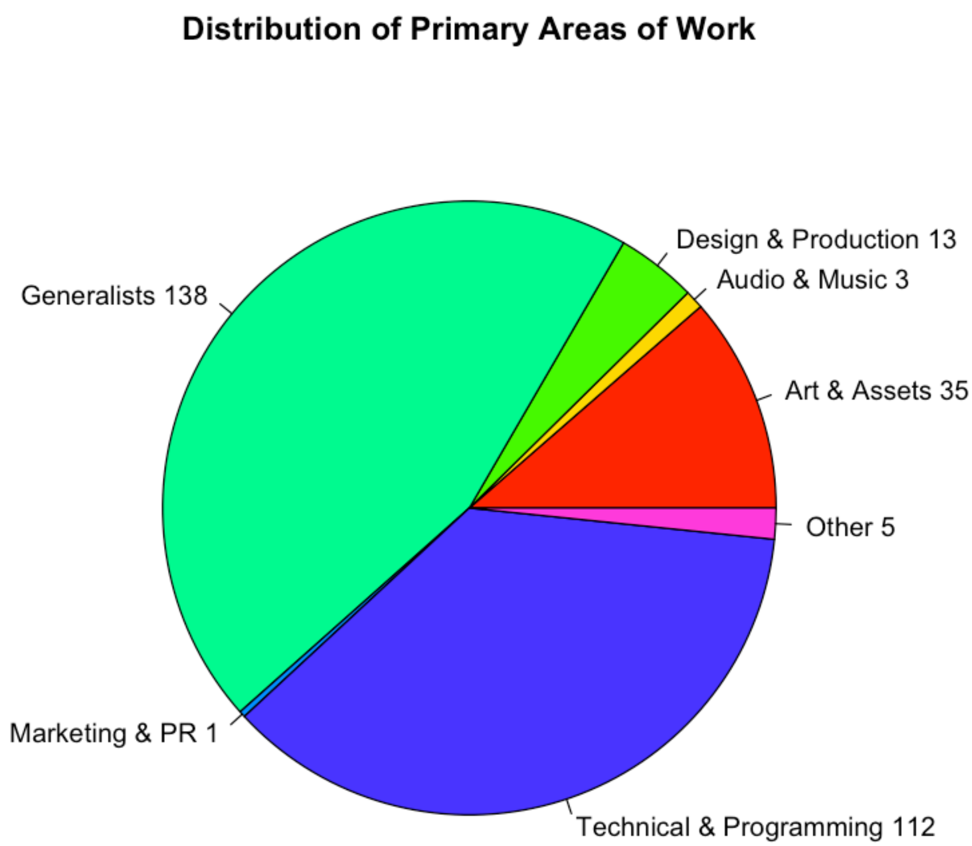
[ ]:
```r
# Generalists
for (i in c(7, 9, 11, 12)) { # Combine the categories
  primary_area_count[8] <- primary_area_count[8] + primary_area_count[i]
}

# Rename to Generalists
names(primary_area_count)[8] <- "Generalists"

# Other
for (i in c(3, 4, 6, 14)) { # Combine the categories
  primary_area_count[15] <- primary_area_count[15] + primary_area_count[i]
}
```

```
# Rename to Other
names(primary_area_count)[15] <- "Other"

# Remove the categories that were combined
primary_area_count <- primary_area_count[-c(7, 9, 11, 12, 3, 4, 6, 14)]

# Output the cleaned up categories
primary_area_count
```

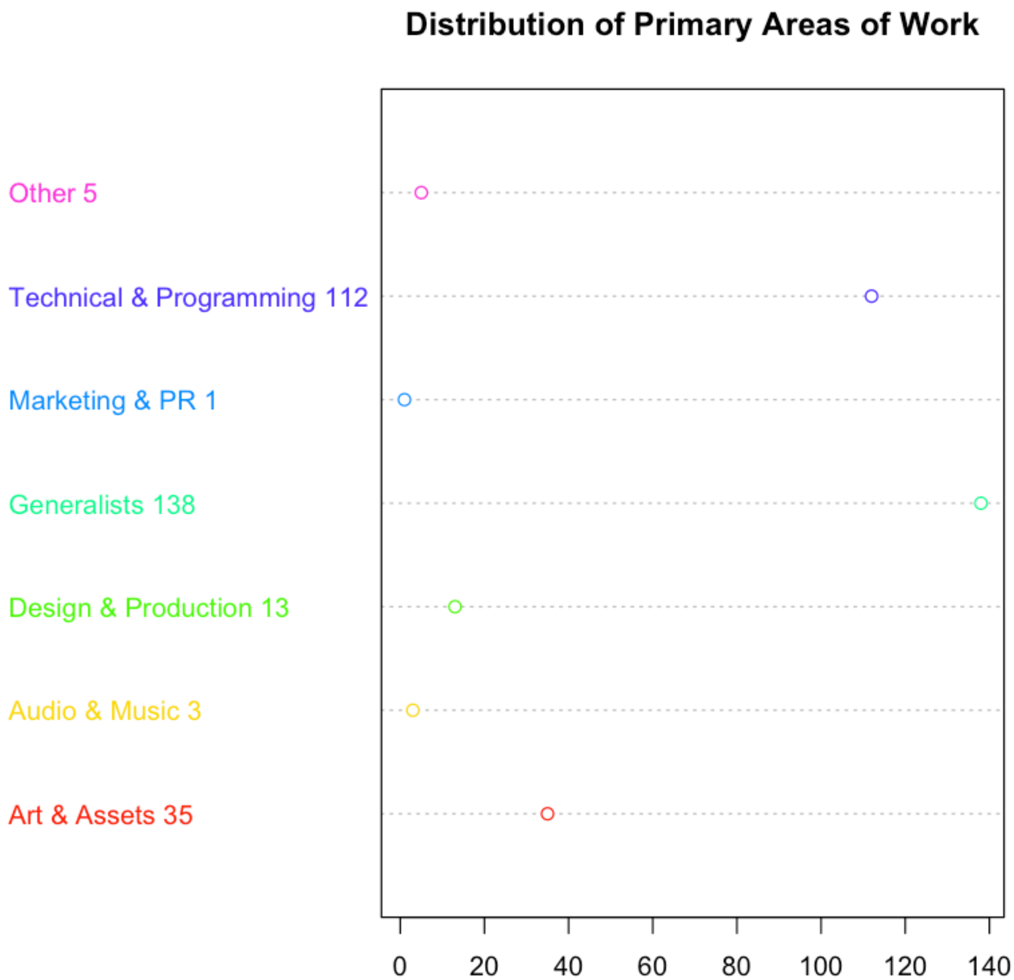
```
          Art & Assets          Audio & Music      Design & Production
                    35                      3                       13
          Generalists         Marketing & PR Technical & Programming
                   138                      1                      112
                 Other
                     5
```

1.4.2 Visualizing the data

[ ]:
```
par(bg = "white") # White background

# Distribution of primary areas of work
pie(
  primary_area_count,
  labels = paste(names(primary_area_count), primary_area_count),
  col = rainbow(length(primary_area_count)),
  main = "Distribution of Primary Areas of Work"
)

# And as a dotchart
dotchart(
  primary_area_count,
  labels = paste(names(primary_area_count), primary_area_count),
  col = rainbow(length(primary_area_count)),
  main = "Distribution of Primary Areas of Work"
)

primary_area_count
```




```
      Art & Assets           Audio & Music     Design & Production
                35                       3                      13
       Generalists          Marketing & PR Technical & Programming
               138                       1                     112
             Other
                 5
```

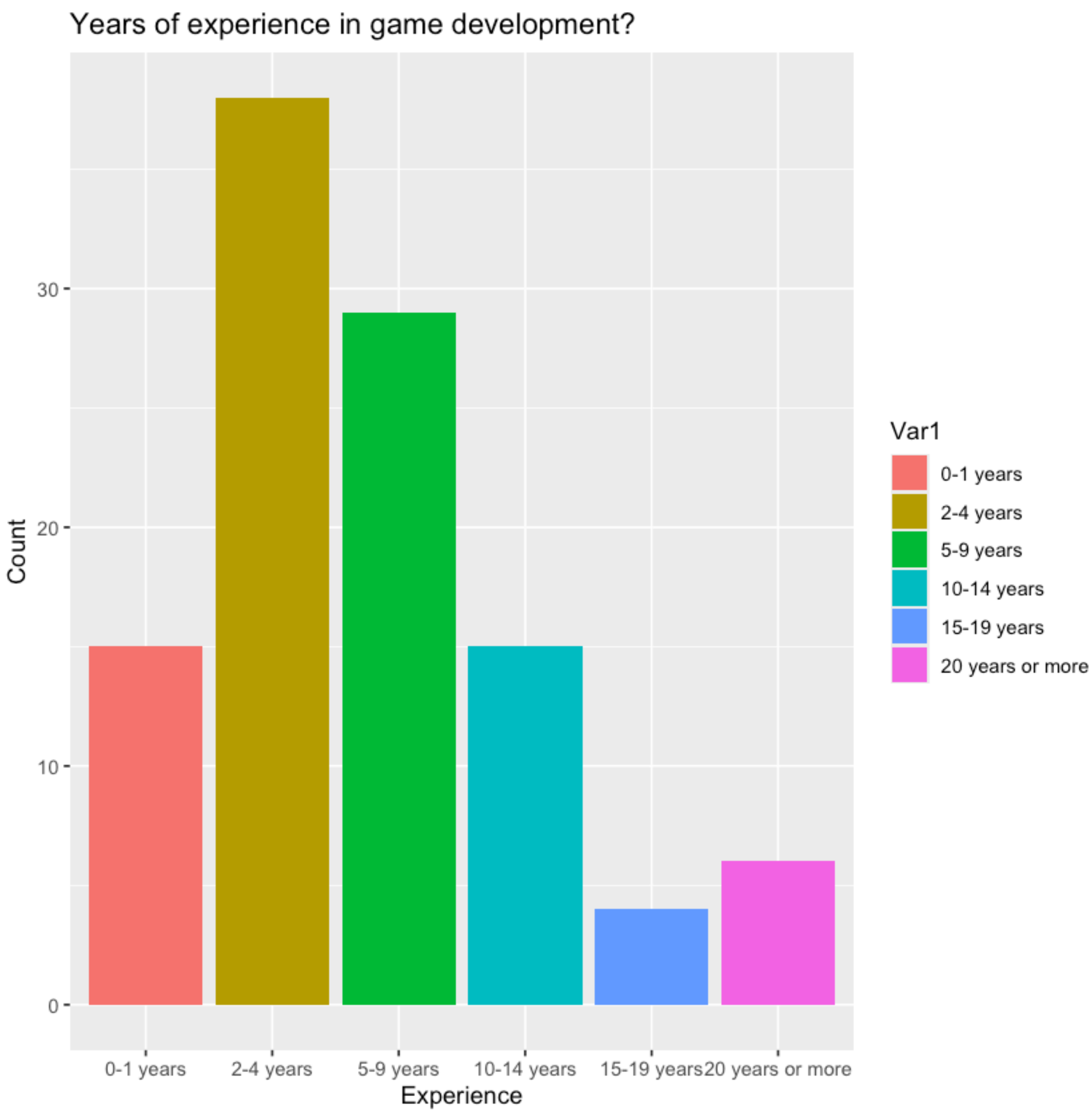


1.5 Distribution of Years of Experience

Here we're workin with column [7] "Years of experience in game development?"

[ ]:
```
# Define the correct order for the levels
year_levels <- c(
  "0-1 years",
  "2-4 years",
  "5-9 years",
  "10-14 years",
  "15-19 years",
  "20 years or more"
)
```

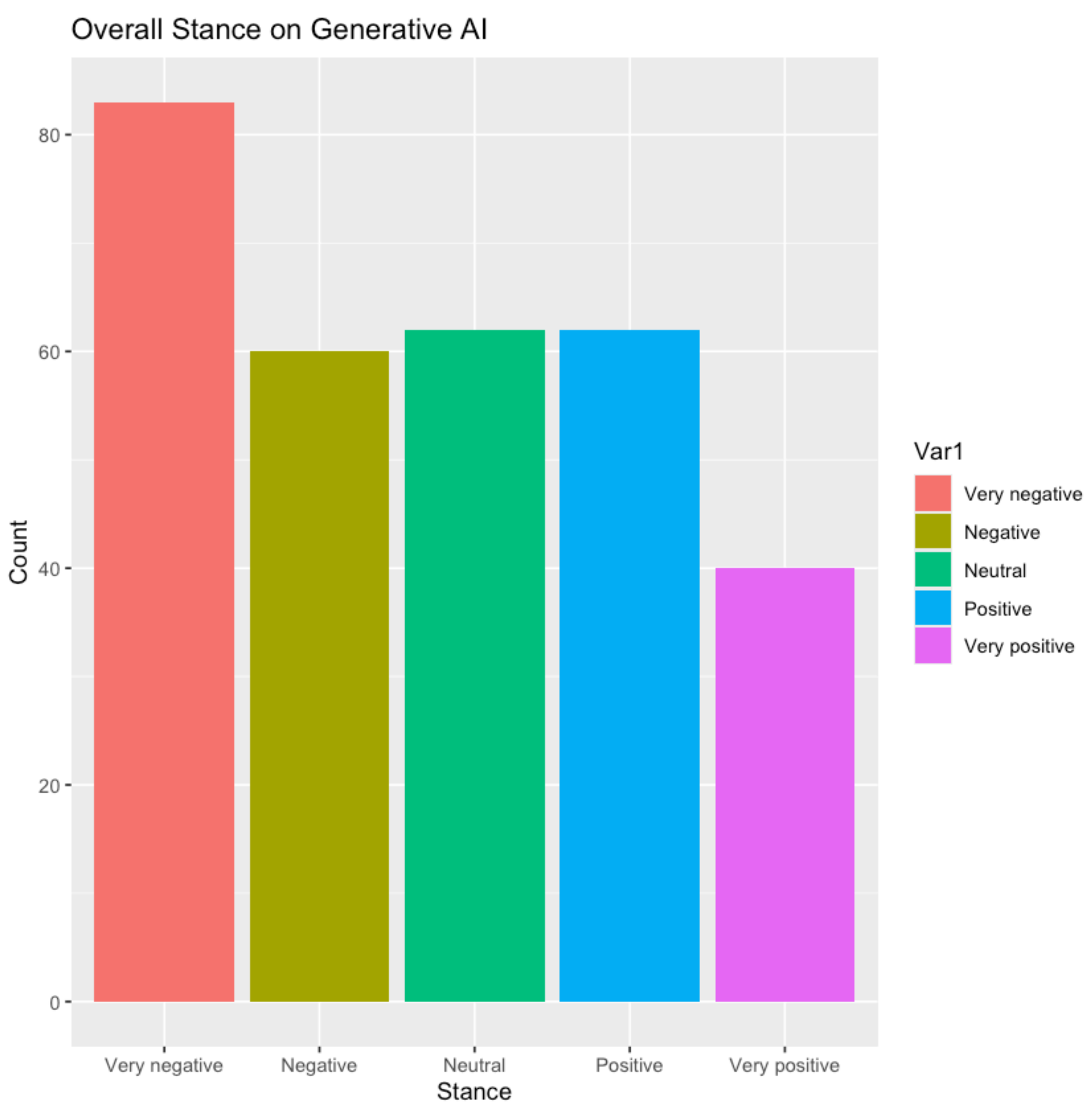
```r
# Convert the Years of experience column to a factor with specified levels
data[[7]] <- factor(data[[7]], levels = year_levels)

# Filter out 'Unknown' values
filtered_data <- data[!is.na(data[[7]]), ]

# Descriptive analysis: Distribution of years of experience
experience_distribution <- table(filtered_data[[7]])

# Plotting the distribution of years of experience
ggplot(
  as.data.frame(experience_distribution),
  aes(x = Var1, y = Freq, fill = Var1)
) +
  geom_bar(stat = "identity") +
  labs(
    title = "Years of experience in game development?",
    x = "Experience",
    y = "Count"
  )
```



1.6 Overall Stance on Generative AI

[ ]:
```
# Define the correct order for the levels
stance_levels <- c(
  "Very negative",
  "Negative",
  "Neutral",
  "Positive",
  "Very positive"
)

# Convert the 'Overall stance on Generative AI?2'
# column to a factor with specified levels
```

```r
data[[10]] <- factor(data[[10]], levels = stance_levels)

# Exclude 'Unknown' values
filtered_data <- data[!is.na(data[[10]]), ]

# Descriptive analysis: Overall stance on Generative AI
stance_distribution <- table(filtered_data[[10]])

# Plotting the overall stance on Generative AI
ggplot(
  as.data.frame(stance_distribution),
  aes(x = Var1, y = Freq, fill = Var1)
) +
  geom_bar(stat = "identity") +
  labs(title = "Overall Stance on Generative AI", x = "Stance", y = "Count")
```



1.7 Correlation Analysis

[ ]:
```
# Convert categorical data to numeric for correlation analysis
data_numeric <- data %>%
  mutate(
    YearsExperience = case_when(
      .[[7]] == "0-1 years" ~ 1,
      .[[7]] == "2-4 years" ~ 2,
      .[[7]] == "5-9 years" ~ 3,
      .[[7]] == "10-14 years" ~ 4,
      .[[7]] == "15-19 years" ~ 5,
      .[[7]] == "20 years or more" ~ 6,
      TRUE ~ 0
    ),
    StanceOnGenAI = case_when(
      .[[10]] == "Very positive" ~ 5,
      .[[10]] == "Positive" ~ 4,
      .[[10]] == "Neutral" ~ 3,
      .[[10]] == "Negative" ~ 2,
      .[[10]] == "Very negative" ~ 1,
      TRUE ~ 0
    )
  )

# Calculate correlation
correlation <- cor(
  data_numeric$YearsExperience,
  data_numeric$StanceOnGenAI,
  method = "spearman",
  use = "complete.obs"
)

print(correlation)
```

```
[1] -0.08107992
```

[ ]:
```
# Definer niveauerne for erfaring i industrien
year_levels <- c(
  "0-1 years",
  "2-4 years",
  "5-9 years",
  "10-14 years",
  "15-19 years",
  "20 years or more"
)
```

```r
# Definer niveauerne for holdninger til generativ AI
stance_levels <- c(
  "Very negative",
  "Negative",
  "Neutral",
  "Positive",
  "Very positive"
)

# Konverter kolonnerne til passende formater
data <- data %>%
  mutate(
    YearsExperience = factor(`Years of experience in game development?`, levels␣
 ↪= year_levels),
    StanceOnGenAI = case_when(
      `Overall stance on Generative AI?2` == "Very positive" ~ 5,
      `Overall stance on Generative AI?2` == "Positive" ~ 4,
      `Overall stance on Generative AI?2` == "Neutral" ~ 3,
      `Overall stance on Generative AI?2` == "Negative" ~ 2,
      `Overall stance on Generative AI?2` == "Very negative" ~ 1,
      TRUE ~ 0
    )
  )

# Filtrer data for at fjerne 'Unknown' værdier
filtered_data <- data %>%
  filter(!is.na(YearsExperience) & StanceOnGenAI != 0)

# Udfør ANOVA-testen
anova_result <- aov(StanceOnGenAI ~ YearsExperience, data = filtered_data)

# Opsummering af ANOVA-resultaterne
summary(anova_result)

# Udfør Kruskal-Wallis test som en ikke-parametrisk alternativ
kruskal_result <- kruskal.test(StanceOnGenAI ~ YearsExperience, data =␣
 ↪filtered_data)

# Opsummering af Kruskal-Wallis test resultater
print(kruskal_result)
```

```
                 Df Sum Sq Mean Sq F value Pr(>F)
YearsExperience   5   4.11   0.823   0.397   0.85
Residuals       101 209.60   2.075


        Kruskal-Wallis rank sum test
```

```
data:  StanceOnGenAI by YearsExperience
Kruskal-Wallis chi-squared = 1.8417, df = 5, p-value = 0.8706
```

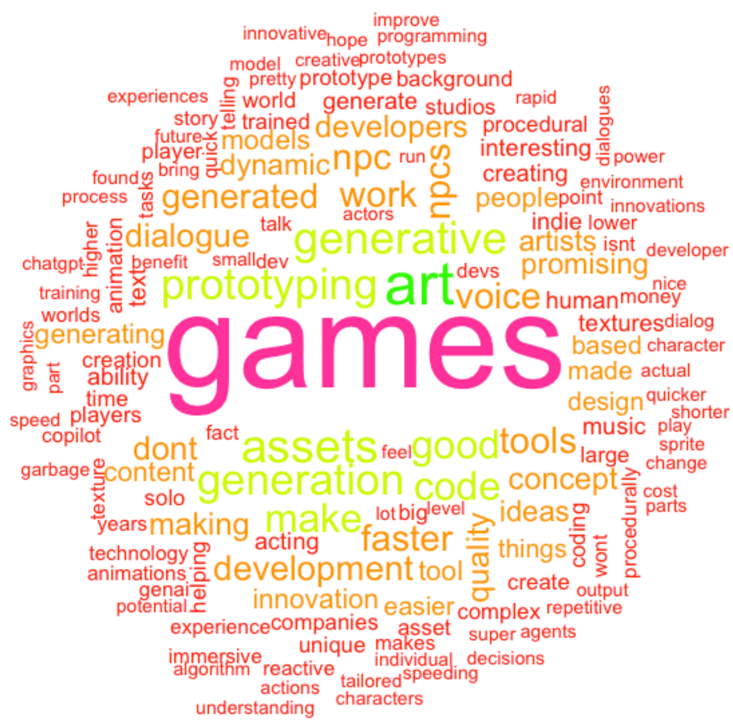
1.8 Sentiment Analysis

1.8.1 Wordcloud

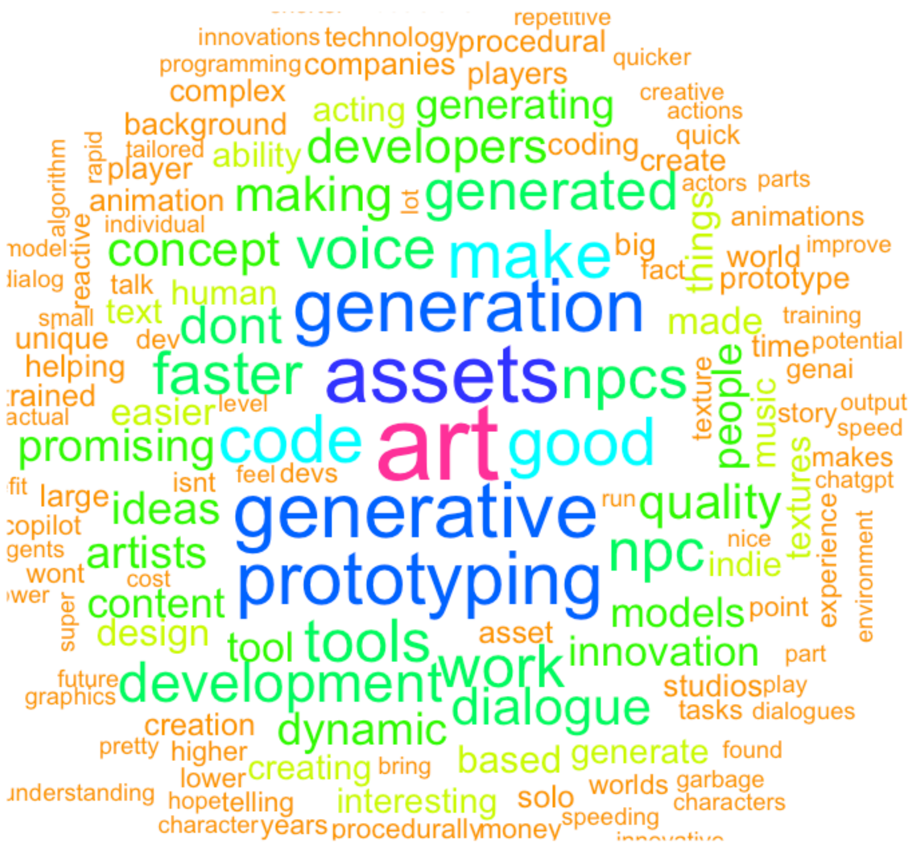
"What do you think will be the most promising innovations from Generative AI in game development?"

[ ]:
```
# Preprocess the text data
data[[45]] <- iconv(data[[45]], "latin1", "UTF-8") # Convert to UTF-8
data[[45]] <- tolower(data[[45]]) # Convert to lowercase
data[[45]] <- removePunctuation(data[[45]]) # Remove punctuation
data[[45]] <- removeNumbers(data[[45]]) # Remove numbers
data[[45]] <- removeWords(data[[45]], stopwords("smart")) # Remove stopwords
data[[45]] <- gsub("\\bgame\\b", "games", data[[45]]) # turn game into games
data[[45]] <- stripWhitespace(data[[45]]) # Remove extra whitespaces

par(bg = "white") # White background

# Create a wordcloud
wordcloud(
  data[[45]],
  colors = rainbow(10),
  random.order = FALSE,
  scale = c(5, 0.5),
  max.words = 250
)

# Add a title to the wordcloud
title(main = "Most promising innovations from GenAI?")

# now withouth "games"
data[[45]] <- removeWords(data[[45]], "games")

wordcloud(
  data[[45]],
  colors = rainbow(10),
  random.order = FALSE,
  scale = c(4, 0.5),
  max.words = 250
)

# Add a title to the wordcloud
title(main = "Most promising innovations from GenAI? (-games)")
```

Most promising innovations from GenAI?



Most promising innovations from GenAI? (-games)

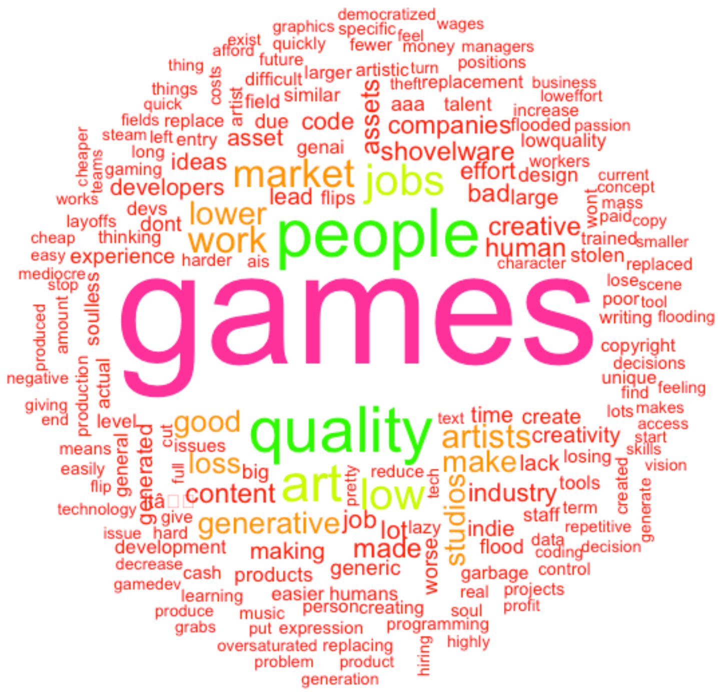


“What do you think will be the most negative consequences of Generative AI in game development?”

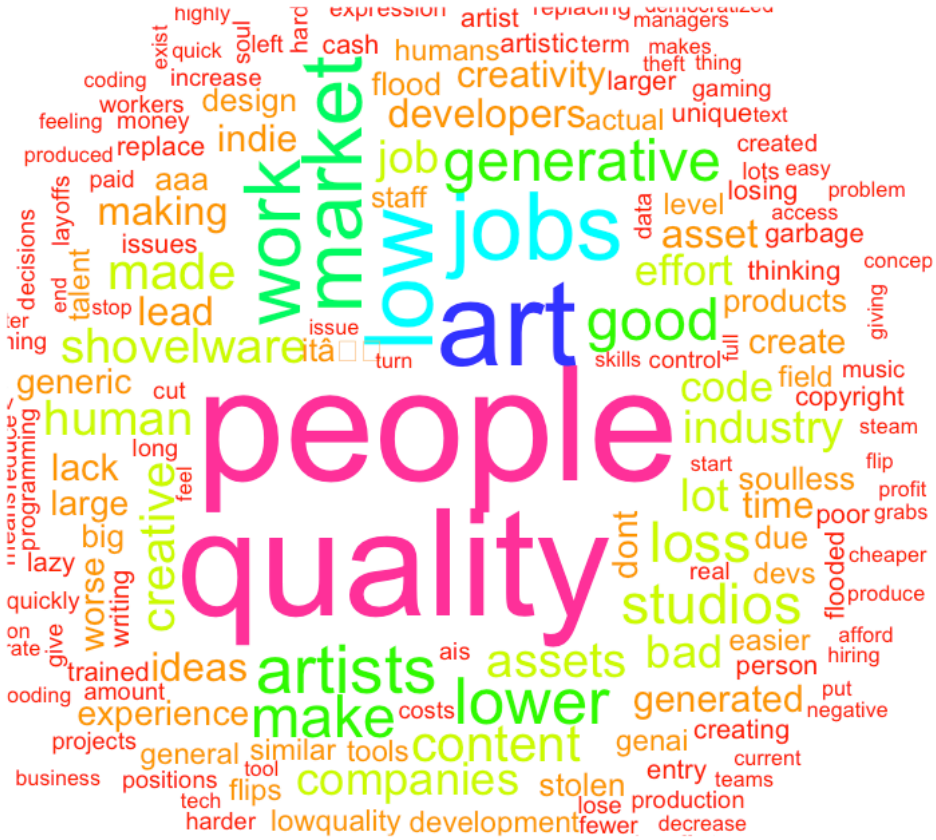
[ ]:
```
# wordcloud
# Preprocess the text data
data[[46]] <- iconv(data[[46]], "latin1", "UTF-8") # Convert to UTF-8
data[[46]] <- tolower(data[[46]]) # Convert to lowercase
data[[46]] <- removePunctuation(data[[46]]) # Remove punctuation
data[[46]] <- removeNumbers(data[[46]]) # Remove numbers
data[[46]] <- removeWords(data[[46]], stopwords("smart")) # Remove stopwords
data[[46]] <- gsub("\\bgame\\b", "games", data[[46]]) # turn game into games
data[[46]] <- stripWhitespace(data[[46]]) # Remove extra whitespaces
```

```r
par(bg = "white") # White background

# Create a wordcloud
wordcloud(
  data[[46]],
  colors = rainbow(10),
  random.order = FALSE,
  scale = c(6, 0.5),
  max.words = 250
)

# Add a title to the wordcloud
title(main = "Most negative consequences from GenAI?")

# now withouth "games"
data[[46]] <- removeWords(data[[46]], "games")

wordcloud(
  data[[46]],
  colors = rainbow(10),
  random.order = FALSE,
  scale = c(6, 0.5),
  max.words = 250
)

# Add a title to the wordcloud
title(main = "Most negative consequences from GenAI? (-games)")
```

Most negative consequences from GenAI?



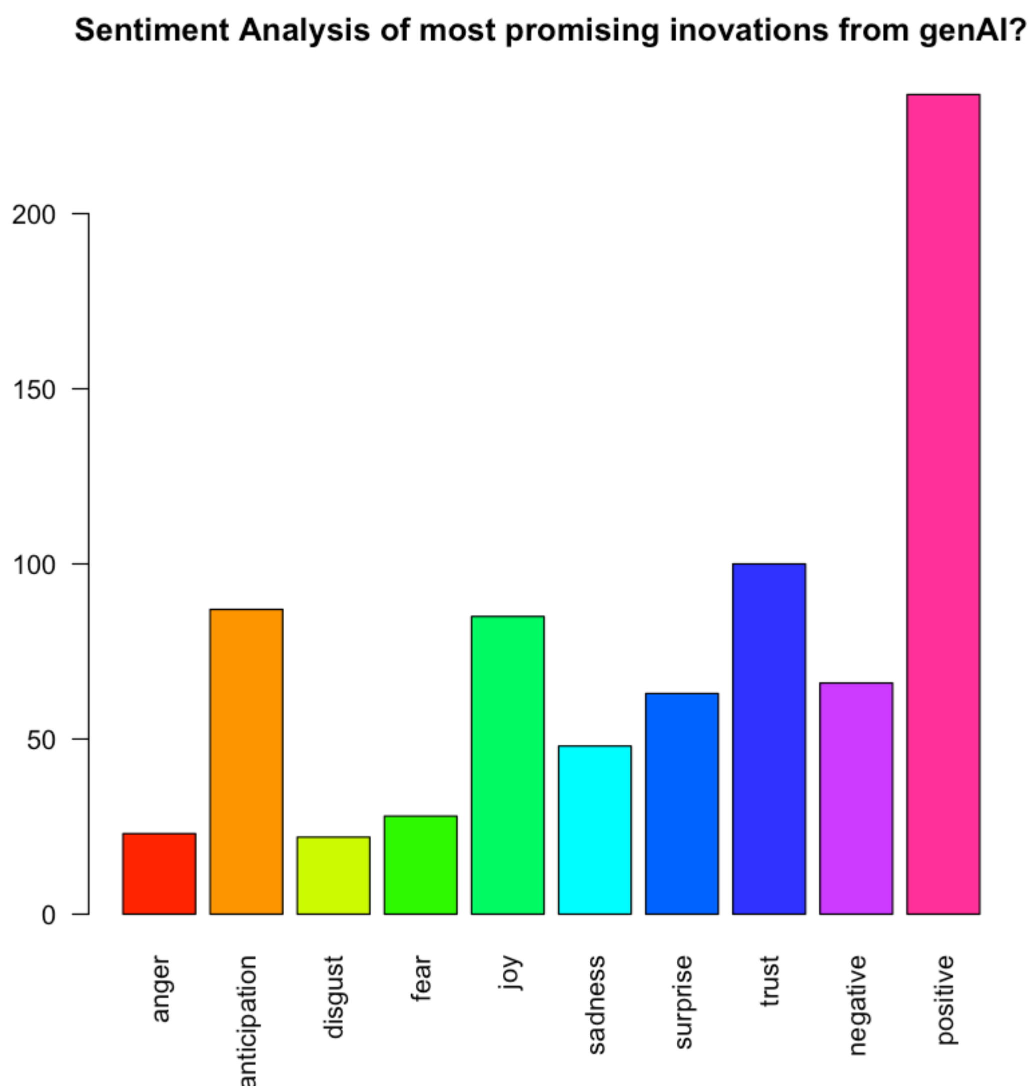
Most negative consequences from GenAI? (-games)




```
# Extract open-ended responses
open_ended_responses <- data[[45]]

# Perform sentiment analysis
sentiment_scores_0 <- get_nrc_sentiment(open_ended_responses)

# Summarize sentiment scores
sentiment_summary_0 <- colSums(sentiment_scores_0)
print(sentiment_summary_0)

par(bg = "white") # White background

# Plot sentiment scores
```

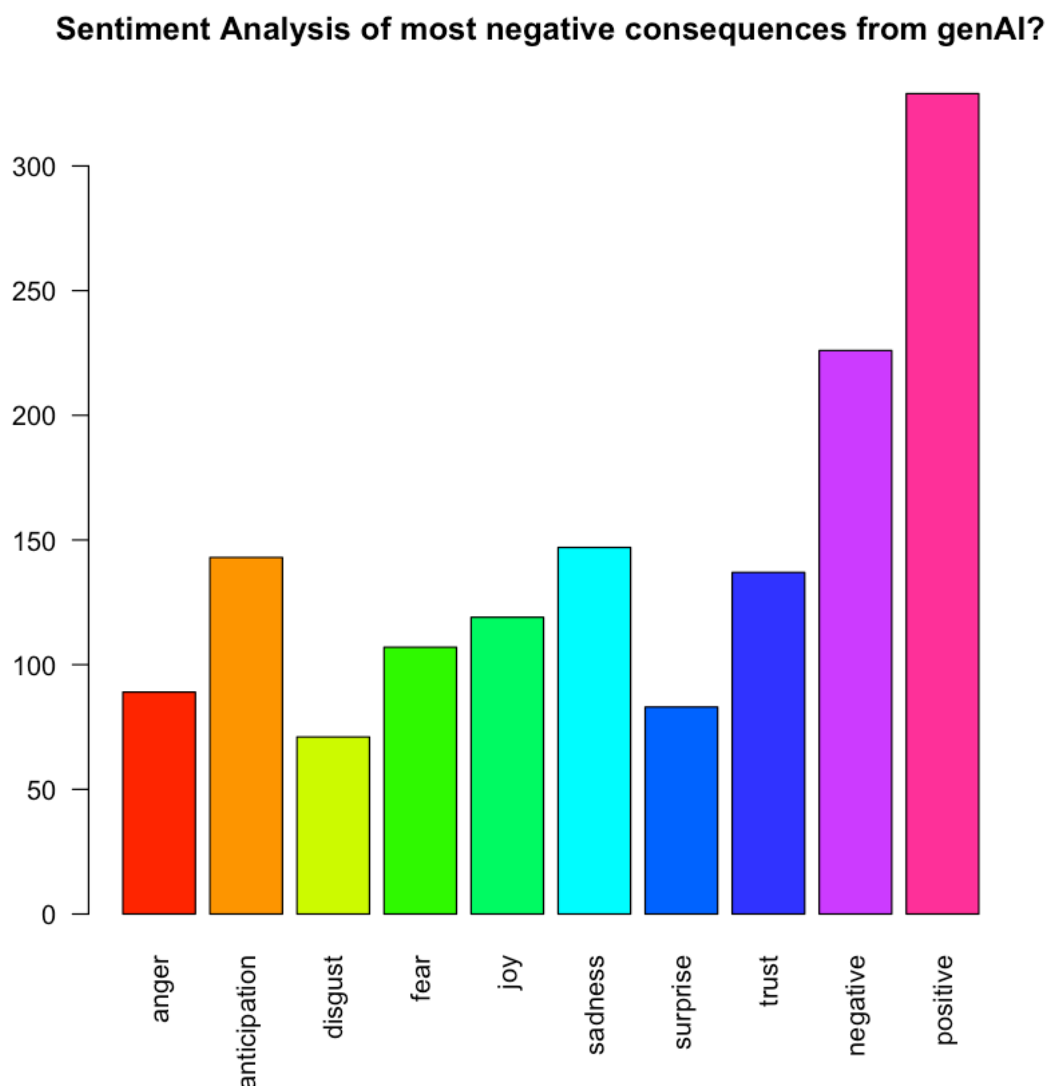
```r
barplot(
  sentiment_summary_0,
  las = 2,
  col = rainbow(10),
  main = "Sentiment Analysis of most promising inovations from genAI?"
)
```

```
       anger anticipation      disgust         fear          joy      sadness 
          23           87           22           28           85           48 
    surprise        trust     negative     positive 
          63          100           66          234 
```



[ ]:
```r
# Extract open-ended responses
open_ended_responses <- data[[46]]

# Perform sentiment analysis
sentiment_scores_1 <- get_nrc_sentiment(open_ended_responses)

# Summarize sentiment scores
sentiment_summary_1 <- colSums(sentiment_scores_1)
print(sentiment_summary_1)

par(bg = "white") # White background

# Plot sentiment scores
barplot(
  sentiment_summary_1,
  las = 2,
  col = rainbow(10),
  main = "Sentiment Analysis of most negative consequences from genAI?"
)
```

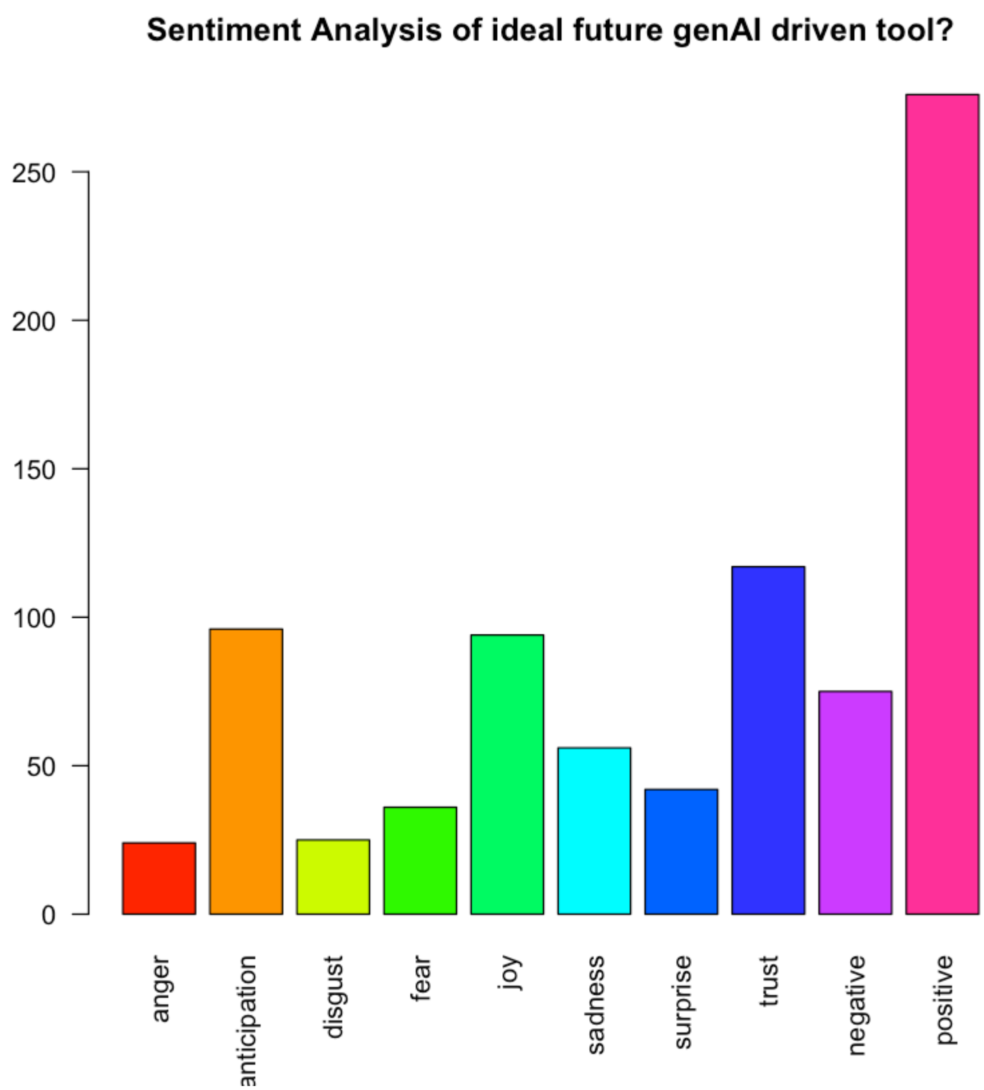
```
       anger anticipation      disgust         fear          joy      sadness 
          89          143           71          107          119          147 
    surprise        trust     negative     positive 
          83          137          226          329 
```



[ ]:
```
# Extract open-ended responses
open_ended_responses <- data[[50]]

# Perform sentiment analysis
sentiment_scores_2 <- get_nrc_sentiment(open_ended_responses)

# Summarize sentiment scores
sentiment_summary_2 <- colSums(sentiment_scores_2)
print(sentiment_summary_2)

par(bg = "white") # White background

# Plot sentiment scores
```

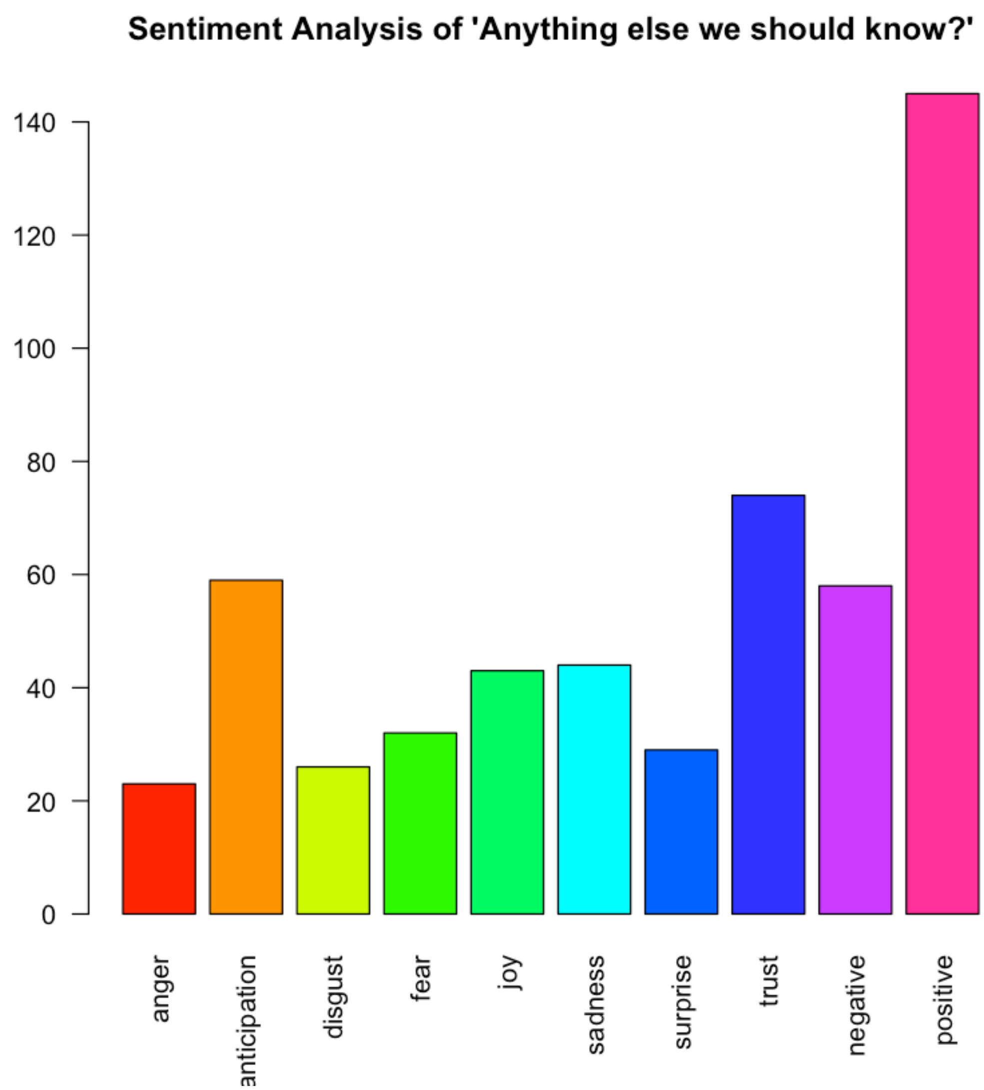
```r
barplot(
  sentiment_summary_2,
  las = 2,
  col = rainbow(10),
  main = "Sentiment Analysis of ideal future genAI driven tool?"
)
```

```
       anger anticipation      disgust         fear          joy      sadness 
          24           96           25           36           94           56 
    surprise        trust     negative     positive 
          42          117           75          276 
```



[ ]:
```
# Extract open-ended responses
open_ended_responses <- data[[52]]

# Perform sentiment analysis
sentiment_scores_3 <- get_nrc_sentiment(open_ended_responses)

# Summarize sentiment scores
sentiment_summary_3 <- colSums(sentiment_scores_3)
print(sentiment_summary_3)

par(bg = "white") # White background

# Plot sentiment scores
barplot(
  sentiment_summary_3,
  las = 2,
  col = rainbow(10),
  main = "Sentiment Analysis of 'Anything else we should know?'"
)
```

```
       anger anticipation      disgust         fear          joy      sadness
          23           59           26           32           43           44
    surprise        trust     negative     positive
          29           74           58          145
```



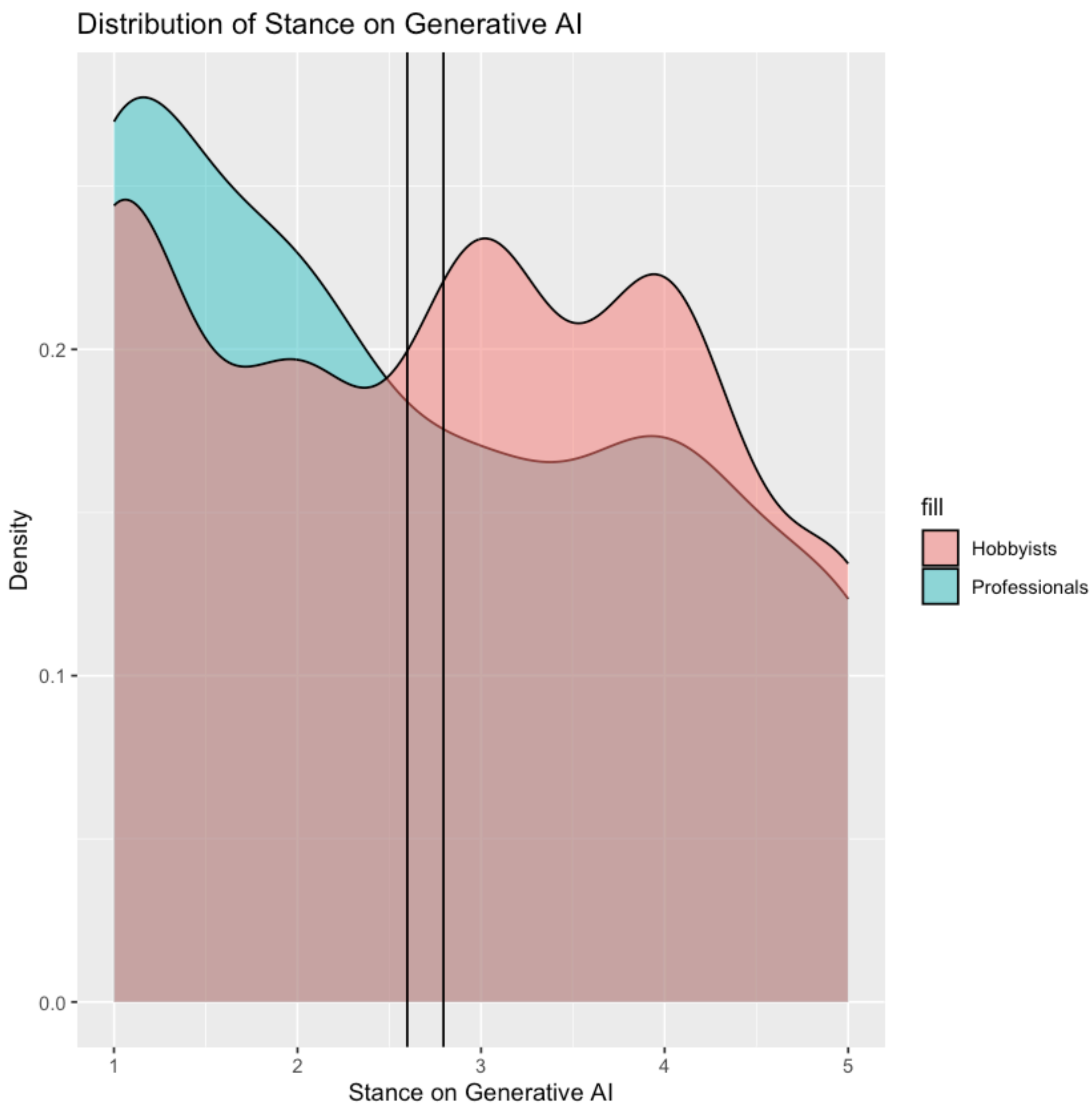
1.9 Group Comparisons

[ ]:
```
# Define the correct order for the levels
stance_levels <- c(
  "Very negative",
  "Negative",
  "Neutral",
  "Positive",
  "Very positive"
)

# Convert the 'Overall stance on GenAI' column to a factor with specified levels
data[[10]] <- factor(data[[10]], levels = stance_levels)
```

```r
# Convert categorical data to numeric for stance on Generative AI
data <- data %>%
  mutate(
    StanceOnGenAI = case_when(
      .[[10]] == "Very positive" ~ 5,
      .[[10]] == "Positive" ~ 4,
      .[[10]] == "Neutral" ~ 3,
      .[[10]] == "Negative" ~ 2,
      .[[10]] == "Very negative" ~ 1,
      TRUE ~ NA_real_
    )
  )

# Filter data for professionals and hobbyists
professionals <- data %>% filter(data[[5]] == "Professional")
hobbyists <- data %>% filter(data[[5]] == "Hobbyist")

# Calculate average stance on Generative AI
avg_stance_professionals <- mean(professionals$StanceOnGenAI, na.rm = TRUE)
avg_stance_hobbyists <- mean(hobbyists$StanceOnGenAI, na.rm = TRUE)

print(
  paste(
    "Average stance on GenAI for professionals:",
    avg_stance_professionals
  )
)
print(
  paste(
    "Average stance on GenAI for hobbyists:",
    avg_stance_hobbyists
  )
)

# Perform a t-test to compare the average stance
# on Generative AI between professionals and hobbyists
t_test_result <- t.test(
  professionals$StanceOnGenAI,
  hobbyists$StanceOnGenAI,
  alternative = "two.sided",
  mu = 0,
  conf.level = 0.95
)

# Print the t-test results
print(t_test_result)
```

```r
# visualize the t-test results
ggplot() +
  geom_density(
    aes(x = professionals$StanceOnGenAI, fill = "Professionals"),
    alpha = 0.5
  ) +
  geom_density(
    aes(x = hobbyists$StanceOnGenAI, fill = "Hobbyists"),
    alpha = 0.5
  ) +
  geom_vline(
    xintercept = t_test_result$estimate,
  ) +
  labs(
    title = "Distribution of Stance on Generative AI",
    x = "Stance on Generative AI",
    y = "Density"
  )
```

```
[1] "Average stance on GenAI for professionals: 2.5981308411215"
[1] "Average stance on GenAI for hobbyists: 2.795"

	Welch Two Sample t-test

data:  professionals$StanceOnGenAI and hobbyists$StanceOnGenAI
t = -1.1712, df = 210.38, p-value = 0.2428
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.5282309  0.1344926
sample estimates:
mean of x mean of y
 2.598131  2.795000
```



1.9.1 Stance on Generative AI vs. Years of Experience

We'll be working with [7] "Years of experience in game development?" and [10] "Overall stance on Generative AI?2"

[ ]:
```
# Factorize the 'Years of experience' and 'Stance on GenAI' columns
data <- data %>%
  mutate(
    ExperienceGroup = factor(data[[7]]),
    StanceOnGenAI = as.numeric(data[[10]])
  )
```

```
[ ]: # Boxplot for Stance on GenAI vs. Experience Group
ggplot(
  data, aes(
    x = ExperienceGroup,
    y = StanceOnGenAI,
    fill = ExperienceGroup
  )
) +
  geom_boxplot() +
  labs(
    title = "Stance on Generative AI vs. Years of Experience",
    x = "Years of Experience",
    y = "Stance on Generative AI"
  )
```

```
[ ]: # ANOVA test for Stance on GenAI vs. Experience Group
anova_result <- aov(StanceOnGenAI ~ ExperienceGroup, data = data)
summary(anova_result)
```

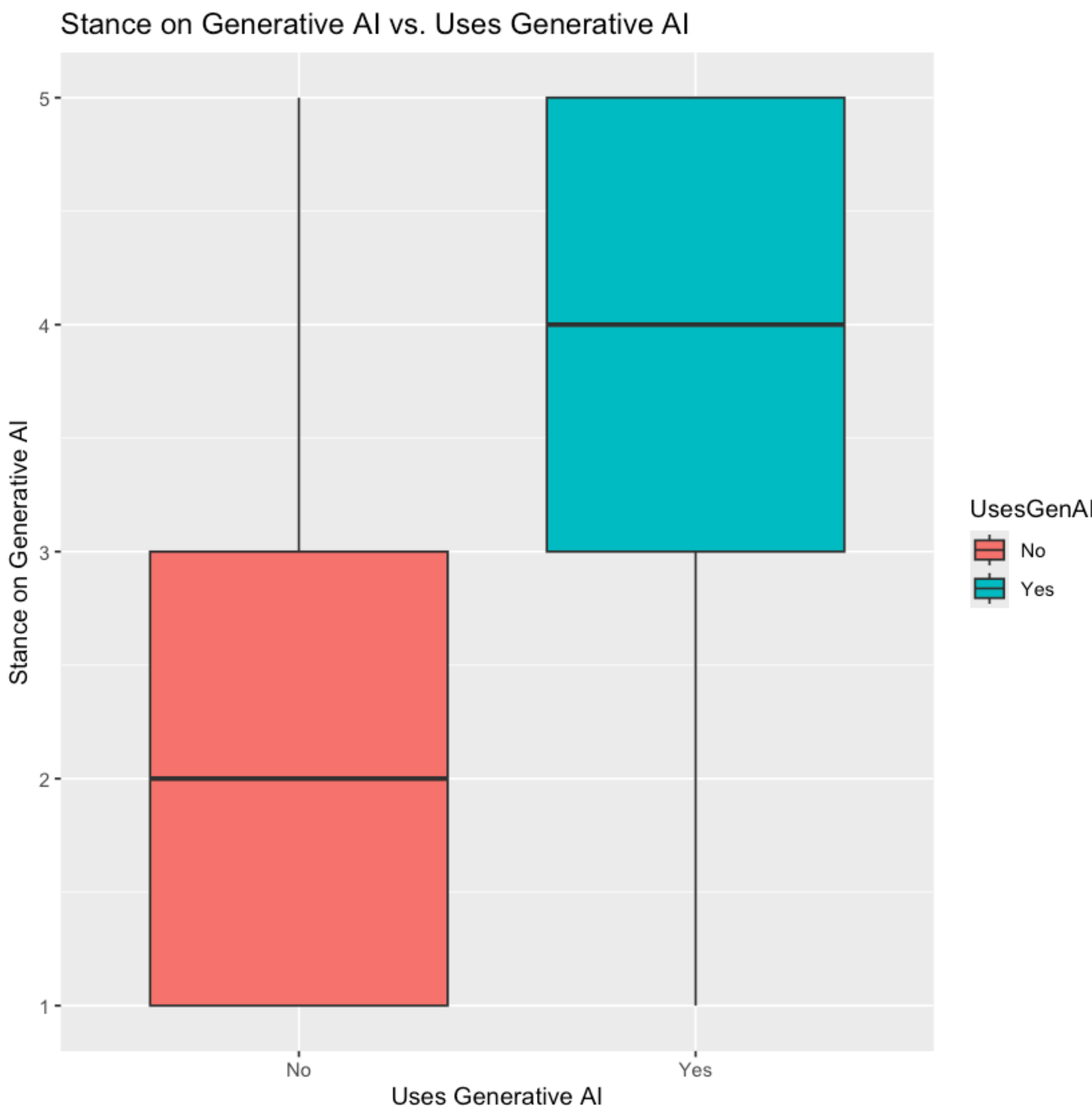
```
                 Df Sum Sq Mean Sq F value Pr(>F)
ExperienceGroup   5   4.11   0.823   0.397   0.85
Residuals       101 209.60   2.075
200 observations deleted due to missingness
```

1.9.2 Main area of work VS Stance on GenAI

Here it's [6] "Primary area of work?" and [10] "Overall stance on Generative AI?2"

```
[ ]: # Konverter relevante kolonner til faktorer
data <- data %>%
  mutate(
    UsesGenAI = factor(`Do you use Generative AI in your work?`),
    StanceOnGenAI = as.numeric(`Overall stance on Generative AI?2`)
  )

# Boxplot for Stance on GenAI vs. Uses GenAI
ggplot(data, aes(x = UsesGenAI, y = StanceOnGenAI, fill = UsesGenAI)) +
  geom_boxplot() +
  labs(
    title = "Stance on Generative AI vs. Uses Generative AI",
    x = "Uses Generative AI",
    y = "Stance on Generative AI"
  )

# T-test for Stance on GenAI vs. Uses GenAI
t_test_result <- t.test(StanceOnGenAI ~ UsesGenAI, data = data)
print(t_test_result)
```

```
        Welch Two Sample t-test

data:  StanceOnGenAI by UsesGenAI
t = -12.196, df = 251.95, p-value < 2.2e-16
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.891231 -1.365338
sample estimates:
 mean in group No mean in group Yes
         2.100529          3.728814
```



1.9.3 Users vs non-users of GenAI in different areas

[ ]:
```
# Define the levels for the factor
agree_levels <- c(
  "Strongly disagree",
  "Disagree",
  "Neutral",
  "Agree",
  "Strongly agree"
)
```

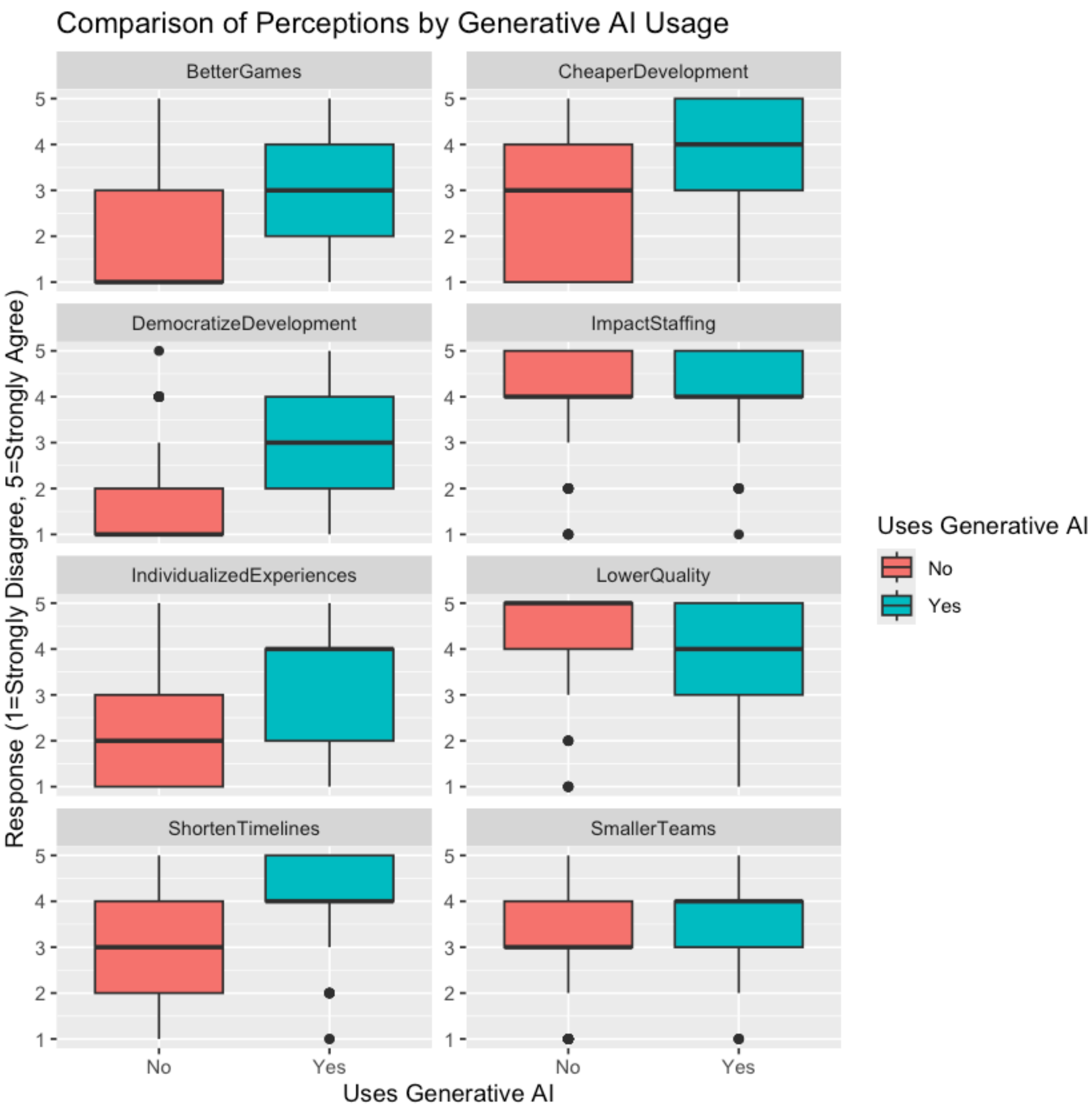
[ ]:
```
# Convert relevant columns to numeric
data <- data %>%
  mutate(
    UsesGenAI = factor(`Do you use Generative AI in your work?`),
    ShortenTimelines = as.numeric(factor(
      `It will help shorten development timelines`,
      agree_levels
    )),
    IndividualizedExperiences = as.numeric(factor(
      `It will lead to more individualized gaming experiences`,
      agree_levels
    )),
    ImpactStaffing = as.numeric(factor(
      `It will impact staffing decisions`,
      agree_levels
    )),
    SmallerTeams = as.numeric(factor(
      `It will lead to smaller team sizes`,
      agree_levels
    )),
    DemocratizeDevelopment = as.numeric(factor(
      `It will democratize game development`,
      agree_levels
    )),
    CheaperDevelopment = as.numeric(factor(
      `It will make it cheaper to develop games`,
      agree_levels
    )),
    LowerQuality = as.numeric(factor(
      `It will lead to lower quality games`,
      agree_levels
    )),
    BetterGames = as.numeric(factor(
      `It will lead to better games`,
      agree_levels
    ))
  )

# Calculate mean responses for each question grouped by UsesGenAI
mean_responses <- data %>%
  group_by(UsesGenAI) %>%
  summarise(
    MeanShortenTimelines = mean(
      ShortenTimelines,
      na.rm = TRUE
    ),
    MeanIndividualizedExperiences = mean(
```

```
      IndividualizedExperiences,
      na.rm = TRUE
    ),
    MeanImpactStaffing = mean(
      ImpactStaffing,
      na.rm = TRUE
    ),
    MeanSmallerTeams = mean(
      SmallerTeams,
      na.rm = TRUE
    ),
    MeanDemocratizeDevelopment = mean(
      DemocratizeDevelopment,
      na.rm = TRUE
    ),
    MeanCheaperDevelopment = mean(
      CheaperDevelopment,
      na.rm = TRUE
    ),
    MeanLowerQuality = mean(
      LowerQuality,
      na.rm = TRUE
    ),
    MeanBetterGames = mean(
      BetterGames,
      na.rm = TRUE
    )
  )

mean_responses

# Pivot the data to a long format for plotting
data_long <- data %>%
  pivot_longer(
    cols = starts_with("ShortenTimelines"):starts_with("BetterGames"),
    names_to = "Question",
    values_to = "Response"
  )

# Improve the plot layout and labels
ggplot(data_long, aes(x = UsesGenAI, y = Response, fill = UsesGenAI)) +
  geom_boxplot() +
  facet_wrap(~Question, scales = "free_y", ncol = 2) +
  labs(
    title = "Comparison of Perceptions by Generative AI Usage",
    x = "Uses Generative AI",
    y = "Response (1=Strongly Disagree, 5=Strongly Agree)",
```

```
  fill = "Uses Generative AI"
)
```

A tibble: 2 x 9

UsesGenAI <fct>	MeanShortenTimelines <dbl>	MeanIndividualizedExperiences <dbl>	MeanImpactStaffing <dbl>	M <
No	2.851852	2.137566	4.121693	3.
Yes	4.008475	3.364407	3.991525	3.




```
[ ]: # Perform t-tests for each question
t_test_results <- list()

questions <- c(
  "ShortenTimelines",
```

```r
  "IndividualizedExperiences",
  "ImpactStaffing",
  "SmallerTeams",
  "DemocratizeDevelopment",
  "CheaperDevelopment",
  "LowerQuality",
  "BetterGames"
)

for (question in questions) {
  t_test_result <- t.test(get(question) ~ UsesGenAI, data = data)
  t_test_results[[question]] <- t_test_result
}

# Print t-test results
for (question in questions) {
  print(paste("T-test for", question))
  print(t_test_results[[question]])
}
```

```
[1] "T-test for ShortenTimelines"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -9.3595, df = 295.77, p-value < 2.2e-16
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.3998252 -0.9134202
sample estimates:
 mean in group No mean in group Yes
         2.851852          4.008475

[1] "T-test for IndividualizedExperiences"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -8.3172, df = 253.16, p-value = 5.597e-15
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.5173360 -0.9363453
sample estimates:
 mean in group No mean in group Yes
         2.137566          3.364407
```

```
[1] "T-test for ImpactStaffing"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = 1.1843, df = 278.51, p-value = 0.2373
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.0861925  0.3465279
sample estimates:
 mean in group No mean in group Yes
         4.121693          3.991525

[1] "T-test for SmallerTeams"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -1.3938, df = 278.46, p-value = 0.1645
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.43527137  0.07440687
sample estimates:
 mean in group No mean in group Yes
         3.328042          3.508475

[1] "T-test for DemocratizeDevelopment"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -9.1581, df = 194.75, p-value < 2.2e-16
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.616711 -1.043767
sample estimates:
 mean in group No mean in group Yes
         1.746032          3.076271

[1] "T-test for CheaperDevelopment"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -6.4659, df = 260.41, p-value = 4.944e-10
```

```
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.2570992 -0.6701719
sample estimates:
 mean in group No mean in group Yes
         2.671958          3.635593

[1] "T-test for LowerQuality"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = 6.0497, df = 225.21, p-value = 5.988e-09
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 0.5161216 1.0147725
sample estimates:
 mean in group No mean in group Yes
         4.417989          3.652542

[1] "T-test for BetterGames"

        Welch Two Sample t-test

data:  get(question) by UsesGenAI
t = -9.8995, df = 237.71, p-value < 2.2e-16
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -1.579796 -1.055393
sample estimates:
 mean in group No mean in group Yes
         1.809524          3.127119
```

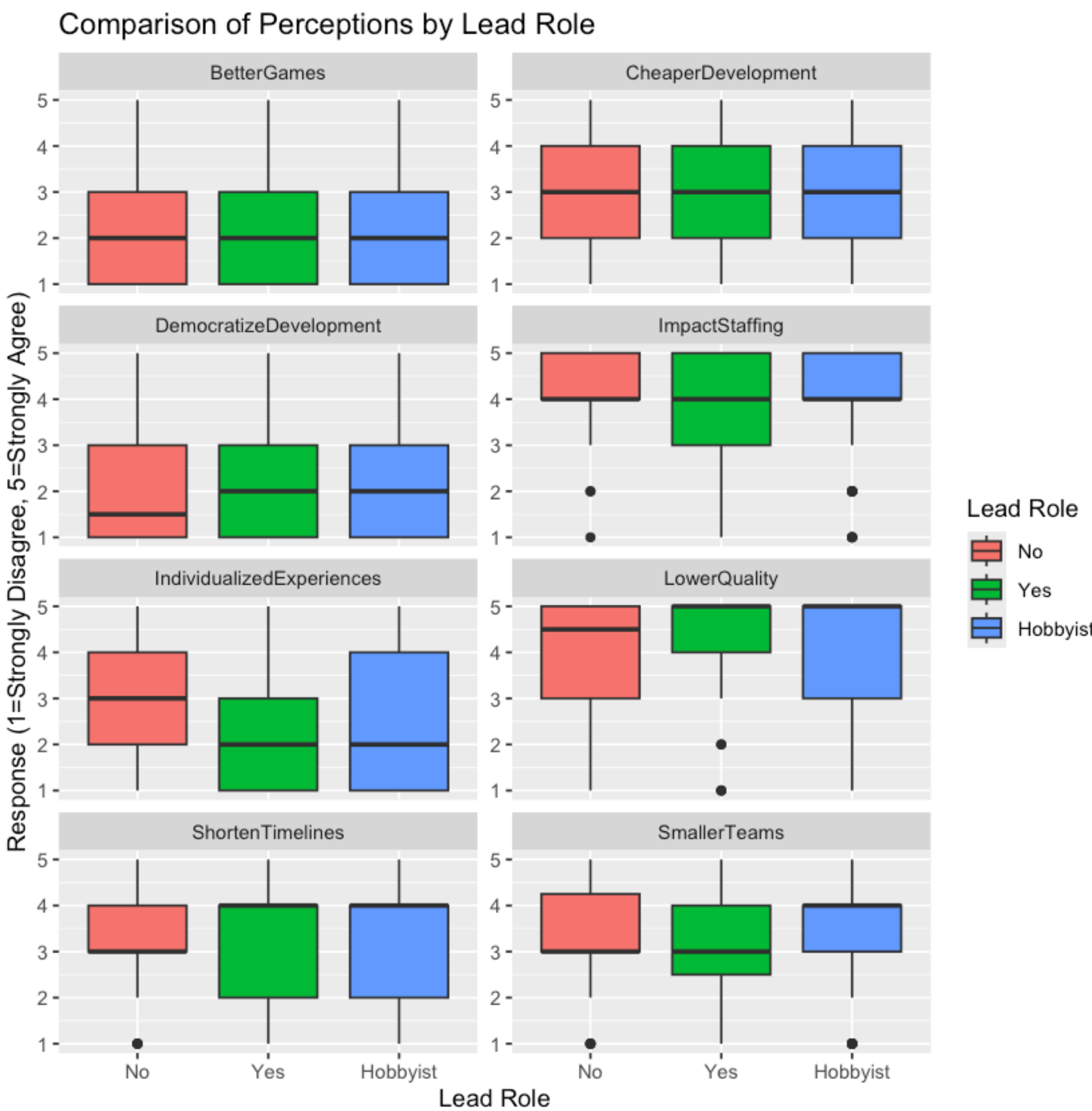
[ ]:
```
# Custom function to convert columns to numeric factor levels
convert_to_numeric <- function(column, levels) {
  as.numeric(factor(column, levels = levels))
}

# Convert relevant columns to factors and numeric
data <- data %>%
  mutate(
    LeadRole = ifelse(
      is.na(`Are you in a lead role?`),
```

```r
      "Hobbyist", as.character(`Are you in a lead role?`)
    ),
    LeadRole = factor(LeadRole, levels = c("No", "Yes", "Hobbyist")),
    ShortenTimelines = convert_to_numeric(
      `It will help shorten development timelines`,
      agree_levels
    ),
    IndividualizedExperiences = convert_to_numeric(
      `It will lead to more individualized gaming experiences`,
      agree_levels
    ),
    ImpactStaffing = convert_to_numeric(
      `It will impact staffing decisions`,
      agree_levels
    ),
    SmallerTeams = convert_to_numeric(
      `It will lead to smaller team sizes`,
      agree_levels
    ),
    DemocratizeDevelopment = convert_to_numeric(
      `It will democratize game development`,
      agree_levels
    ),
    CheaperDevelopment = convert_to_numeric(
      `It will make it cheaper to develop games`,
      agree_levels
    ),
    LowerQuality = convert_to_numeric(
      `It will lead to lower quality games`,
      agree_levels
    ),
    BetterGames = convert_to_numeric(
      `It will lead to better games`,
      agree_levels
    )
  )

# Calculate mean responses for each question grouped by LeadRole
mean_responses_lead <- data %>%
  group_by(LeadRole) %>%
  summarise(
    MeanShortenTimelines = mean(
      ShortenTimelines,
      na.rm = TRUE
    ),
    MeanIndividualizedExperiences = mean(
      IndividualizedExperiences,
```

```r
      na.rm = TRUE
    ),
    MeanImpactStaffing = mean(
      ImpactStaffing,
      na.rm = TRUE
    ),
    MeanSmallerTeams = mean(
      SmallerTeams,
      na.rm = TRUE
    ),
    MeanDemocratizeDevelopment = mean(
      DemocratizeDevelopment,
      na.rm = TRUE
    ),
    MeanCheaperDevelopment = mean(
      CheaperDevelopment,
      na.rm = TRUE
    ),
    MeanLowerQuality = mean(
      LowerQuality,
      na.rm = TRUE
    ),
    MeanBetterGames = mean(
      BetterGames,
      na.rm = TRUE
    )
  )

print(mean_responses_lead)

# Pivot the data to a long format for plotting
data_long_lead <- data %>%
  pivot_longer(
    cols = ShortenTimelines:BetterGames,
    names_to = "Question",
    values_to = "Response"
  )

# Plot each question in a facet grid
ggplot(data_long_lead, aes(x = LeadRole, y = Response, fill = LeadRole)) +
  geom_boxplot() +
  facet_wrap(~Question, scales = "free_y", ncol = 2) +
  labs(
    title = "Comparison of Perceptions by Lead Role",
    x = "Lead Role",
    y = "Response (1=Strongly Disagree, 5=Strongly Agree)",
    fill = "Lead Role"
```

```
)
```

```
# A tibble: 3 x 9
  LeadRole MeanShortenTimelines MeanIndividualizedExperiences MeanImpactStaffing
  <fct>                   <dbl>
<dbl>              <dbl>
1 No                       3.36                          2.89
4.20
2 Yes                      3.14                          2.32
3.86
3 Hobbyist                 3.33                          2.64
4.11
# i 5 more variables: MeanSmallerTeams <dbl>, MeanDemocratizeDevelopment

<dbl>,
#   MeanCheaperDevelopment <dbl>, MeanLowerQuality <dbl>, MeanBetterGames

<dbl>
```




```
[ ]: # Filter out hobbyists for the t-tests
data_filtered <- data %>%
  filter(LeadRole %in% c("No", "Yes"))

# Perform t-tests for each question
t_test_results <- list()

questions <- c(
  "ShortenTimelines",
  "IndividualizedExperiences",
  "ImpactStaffing",
  "SmallerTeams",
  "DemocratizeDevelopment",
```

```r
  "CheaperDevelopment",
  "LowerQuality",
  "BetterGames"
)

for (question in questions) {
  t_test_result <- t.test(get(question) ~ LeadRole, data = data_filtered)
  t_test_results[[question]] <- t_test_result
}

# Print t-test results
for (question in questions) {
  print(paste("T-test for", question))
  print(t_test_results[[question]])
}
```

```
[1] "T-test for ShortenTimelines"

	Welch Two Sample t-test

data:  get(question) by LeadRole
t = 0.90523, df = 92.772, p-value = 0.3677
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.2635614  0.7051199
sample estimates:
 mean in group No mean in group Yes
         3.363636          3.142857

[1] "T-test for IndividualizedExperiences"

	Welch Two Sample t-test

data:  get(question) by LeadRole
t = 2.2615, df = 90.679, p-value = 0.02612
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 0.06918259 1.06862405
sample estimates:
 mean in group No mean in group Yes
         2.886364          2.317460

[1] "T-test for ImpactStaffing"

	Welch Two Sample t-test
```

```
data:  get(question) by LeadRole
t = 1.7029, df = 101.76, p-value = 0.09163
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.05724882  0.75205402
sample estimates:
 mean in group No mean in group Yes
         4.204545          3.857143

[1] "T-test for SmallerTeams"

        Welch Two Sample t-test

data:  get(question) by LeadRole
t = 0.57107, df = 87.702, p-value = 0.5694
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.3453515  0.6238507
sample estimates:
 mean in group No mean in group Yes
         3.409091          3.269841

[1] "T-test for DemocratizeDevelopment"

        Welch Two Sample t-test

data:  get(question) by LeadRole
t = -0.63141, df = 97.143, p-value = 0.5293
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.6486929  0.3355615
sample estimates:
 mean in group No mean in group Yes
         1.954545          2.111111

[1] "T-test for CheaperDevelopment"

        Welch Two Sample t-test

data:  get(question) by LeadRole
t = 0.35169, df = 94.569, p-value = 0.7259
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.4323495  0.6184967
```

```
sample estimates:
 mean in group No mean in group Yes
         3.045455          2.952381

[1] "T-test for LowerQuality"

        Welch Two Sample t-test

data:  get(question) by LeadRole
t = -0.67785, df = 91.141, p-value = 0.4996
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.5784907  0.2841184
sample estimates:
 mean in group No mean in group Yes
         4.090909          4.238095

[1] "T-test for BetterGames"

        Welch Two Sample t-test

data:  get(question) by LeadRole
t = 0.5885, df = 89.019, p-value = 0.5577
alternative hypothesis: true difference in means between group No and group Yes
is not equal to 0
95 percent confidence interval:
 -0.3351935  0.6173003
sample estimates:
 mean in group No mean in group Yes
         2.204545          2.063492
```

[ ]:

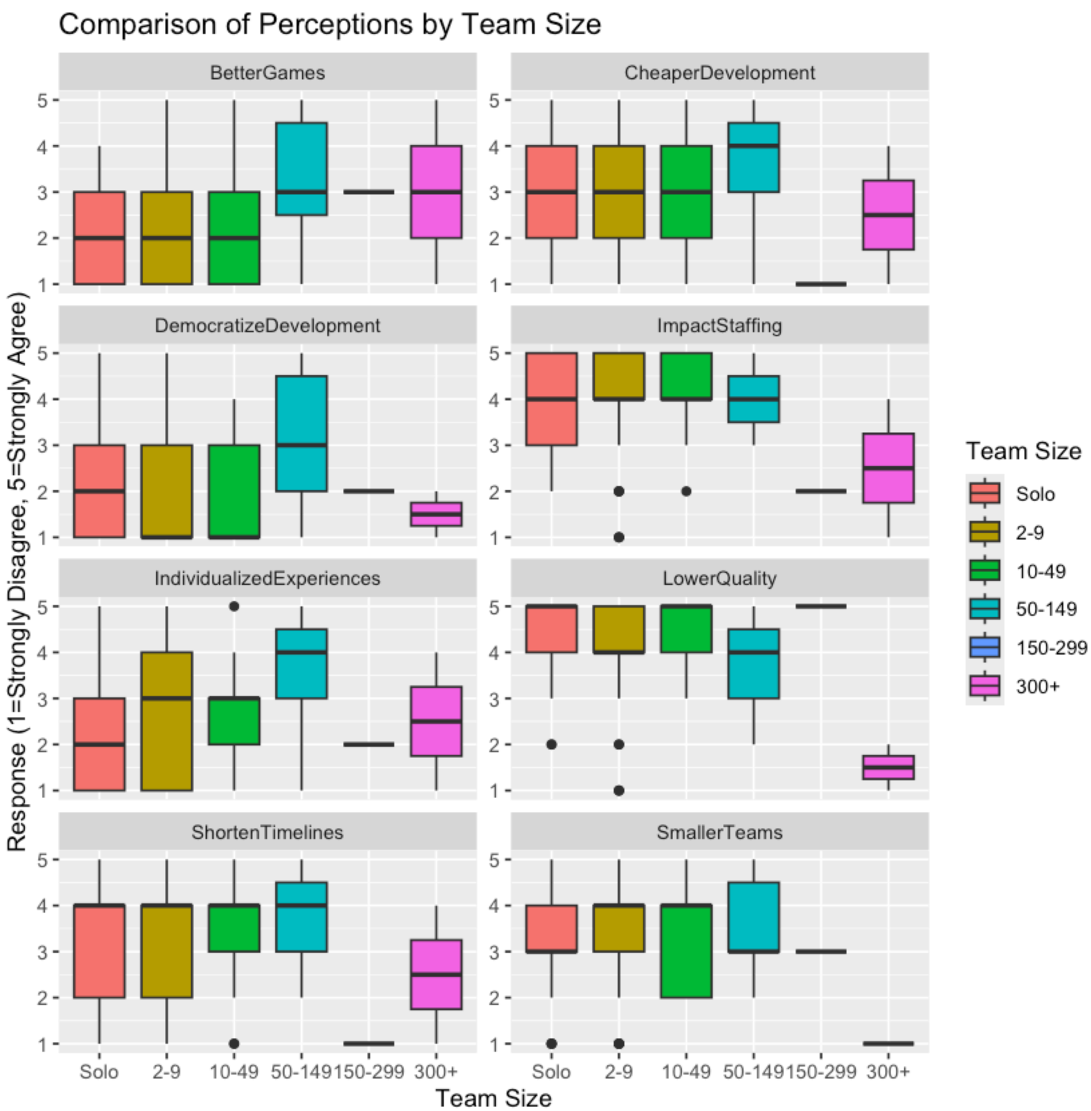
```
# Convert relevant columns to factors and numeric, and filter out hobbyists
data <- data %>%
  mutate(
    TeamSize = factor(
      `Team size?`,
      levels = c(
        "Solo",
        "2-9",
        "10-49",
        "50-149",
        "150-299",
        "300+"
      )
    ),
```

```r
    ShortenTimelines = as.numeric(factor(
      `It will help shorten development timelines`,
      agree_levels
    )),
    IndividualizedExperiences = as.numeric(factor(
      `It will lead to more individualized gaming experiences`,
      agree_levels
    )),
    ImpactStaffing = as.numeric(factor(
      `It will impact staffing decisions`,
      agree_levels
    )),
    SmallerTeams = as.numeric(factor(
      `It will lead to smaller team sizes`,
      agree_levels
    )),
    DemocratizeDevelopment = as.numeric(factor(
      `It will democratize game development`,
      agree_levels
    )),
    CheaperDevelopment = as.numeric(factor(
      `It will make it cheaper to develop games`,
      agree_levels
    )),
    LowerQuality = as.numeric(factor(
      `It will lead to lower quality games`,
      agree_levels
    )),
    BetterGames = as.numeric(factor(
      `It will lead to better games`,
      agree_levels
    ))
  ) %>%
  filter(!is.na(TeamSize))

# Perform ANOVA for each question
anova_results <- list()

questions <- c(
  "ShortenTimelines",
  "IndividualizedExperiences",
  "ImpactStaffing",
  "SmallerTeams",
  "DemocratizeDevelopment",
  "CheaperDevelopment",
  "LowerQuality",
  "BetterGames"
```

```r
)

for (question in questions) {
  anova_result <- aov(get(question) ~ TeamSize, data = data)
  anova_results[[question]] <- summary(anova_result)
}

# Print ANOVA results
for (question in questions) {
  print(paste("ANOVA for", question))
  print(anova_results[[question]])
}

# Pivot the data to a long format for plotting
data_long_team <- data %>%
  pivot_longer(
    cols = starts_with("ShortenTimelines"):starts_with("BetterGames"),
    names_to = "Question",
    values_to = "Response"
  )

# Plot each question in a facet grid
ggplot(data_long_team, aes(x = TeamSize, y = Response, fill = TeamSize)) +
  geom_boxplot() +
  facet_wrap(~Question, scales = "free_y", ncol = 2) +
  labs(
    title = "Comparison of Perceptions by Team Size",
    x = "Team Size",
    y = "Response (1=Strongly Disagree, 5=Strongly Agree)",
    fill = "Team Size"
  )
```

```
[1] "ANOVA for ShortenTimelines"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5   7.83   1.566   1.019  0.411
Residuals   101 155.33   1.538
[1] "ANOVA for IndividualizedExperiences"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5  12.56   2.512   1.529  0.187
Residuals   101 165.91   1.643
[1] "ANOVA for ImpactStaffing"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5   9.38   1.876   1.653  0.153
Residuals   101 114.62   1.135
[1] "ANOVA for SmallerTeams"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5  12.69   2.538   1.769  0.126
Residuals   101 144.86   1.434
```

```
[1] "ANOVA for DemocratizeDevelopment"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5   9.87   1.975   1.225  0.303
Residuals   101 162.89   1.613
[1] "ANOVA for CheaperDevelopment"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5   6.94   1.389   0.754  0.585
Residuals   101 186.05   1.842
[1] "ANOVA for LowerQuality"
             Df Sum Sq Mean Sq F value  Pr(>F)
TeamSize      5  21.07   4.214   3.994 0.00239 **
Residuals   101 106.56   1.055
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
[1] "ANOVA for BetterGames"
             Df Sum Sq Mean Sq F value Pr(>F)
TeamSize      5  13.26   2.652   1.911  0.099 .
Residuals   101 140.16   1.388
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



1.10 How useful GenAI are in different areas

Prepare data

[ ]:
```
# Define usefulness columns
usefulness_columns <- c(
  "Art & Assets",
  "Level Design",
  "Storytelling",
  "Sound Design",
  "Voice Overs & Acting",
  "Programming",
  "Game Design",
  "Marketing & PR",
```

```r
  "Music",
  "Community management",
  "Initial prototyping"
)

# Convert usefulness columns to factors with specific levels
data <- data %>%
  mutate(across(
    all_of(usefulness_columns),
    ~ factor(., levels = c(
      "Not useful",
      "Somewhat useful",
      "Very useful"
    ))
  ))

# Map categorical responses to numeric values
usefulness_mapping <- c(
  "Not useful" = 1,
  "Somewhat useful" = 2,
  "Very useful" = 3
)

data <- data %>%
  mutate(across(
    all_of(usefulness_columns),
    ~ usefulness_mapping[as.character(.)]
  ))
```

Calculate Average Usefulness Scores

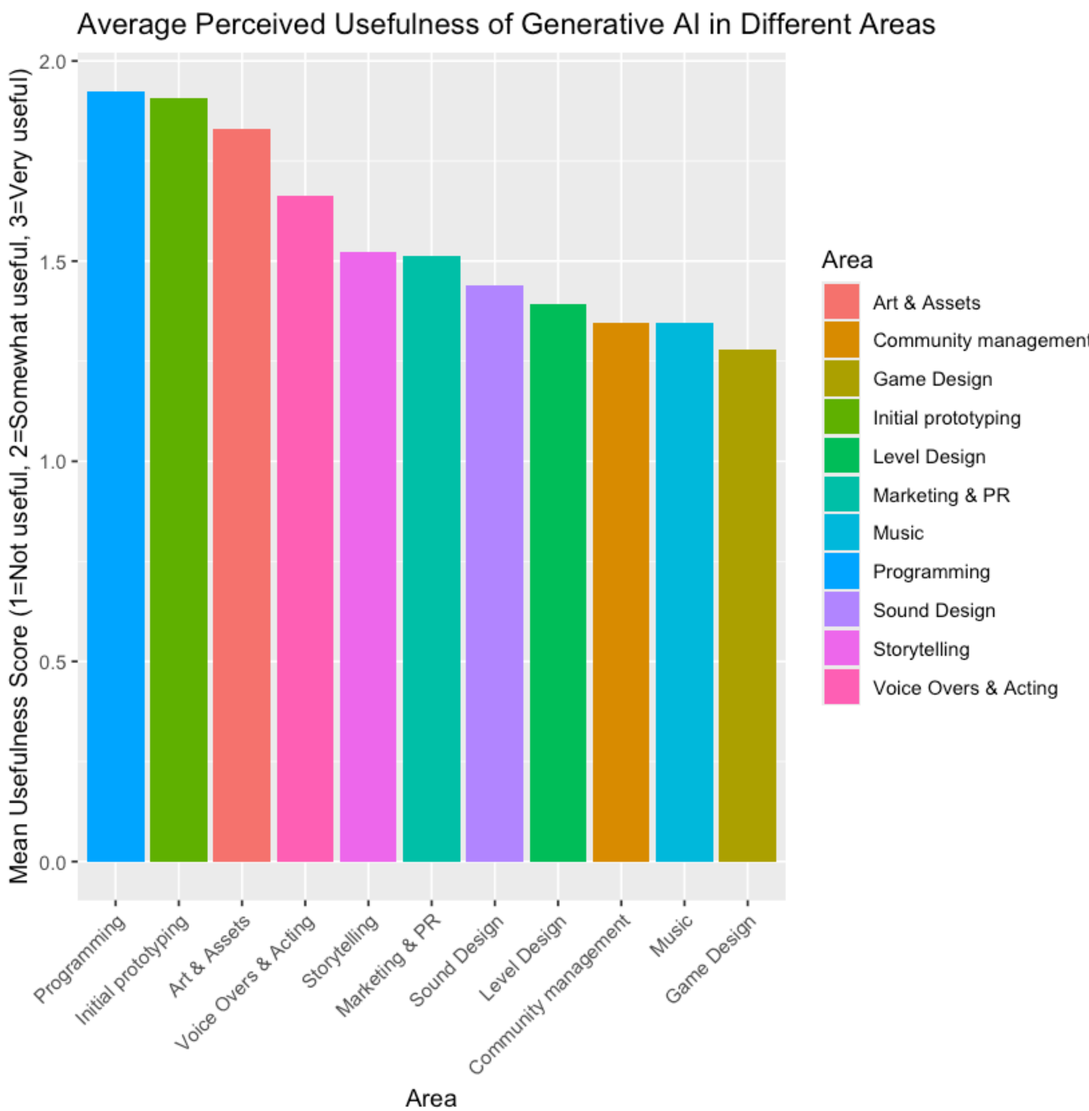
[ ]:
```r
# Calculate mean usefulness scores for each area using updated syntax
mean_usefulness_scores <- data %>%
  summarise(across(
    all_of(usefulness_columns),
    \(x) mean(x, na.rm = TRUE)
  )) %>%
  pivot_longer(
    cols = everything(),
    names_to = "Area",
    values_to = "MeanScore"
  )

# Print mean usefulness scores to check for anomalies
print(mean_usefulness_scores)
```

```
# A tibble: 11 x 2
   Area                     MeanScore
```

```
   <chr>                    <dbl>
 1 Art & Assets              1.83
 2 Level Design              1.39
 3 Storytelling              1.52
 4 Sound Design              1.44
 5 Voice Overs & Acting      1.66
 6 Programming               1.93
 7 Game Design               1.28
 8 Marketing & PR            1.51
 9 Music                     1.35
10 Community management      1.35
11 Initial prototyping       1.91
```

Visualization

[ ]:
```
# Bar plot of average usefulness scores with y-axis fixed
ggplot(
  mean_usefulness_scores,
  aes(x = reorder(Area, -MeanScore), y = MeanScore, fill = Area)
) +
  geom_bar(stat = "identity") +
  labs(
    title = "Average Perceived Usefulness of Generative AI in Different Areas",
    x = "Area",
    y = "Mean Usefulness Score (1=Not useful, 2=Somewhat useful, 3=Very useful)"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```



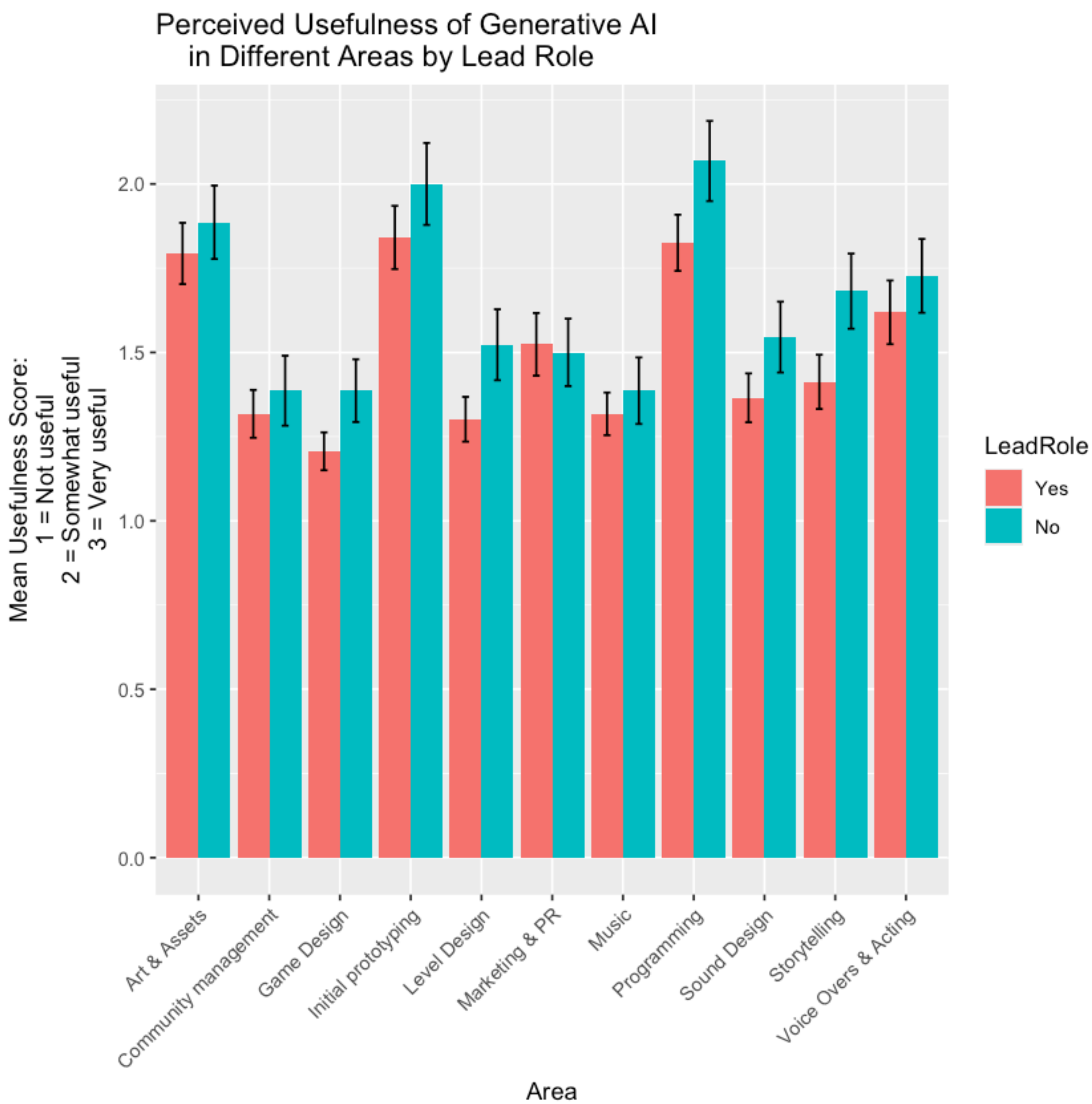
Perceived Usefulness of Generative AI in Different Areas by Lead Role

[ ]:
```
# Ensure the lead role column is correctly labeled
data <- data %>%
  mutate(LeadRole = factor(
    data[[8]],
    levels = c("Yes", "No")
  ))

# Remove rows with all NA values in usefulness columns
data <- data %>%
  filter(rowSums(!is.na(select(., all_of(usefulness_columns)))) > 0)
```

```r
# Pivot the data to a long format for ggplot2
usefulness_long <- data %>%
  pivot_longer(
    cols = all_of(usefulness_columns),
    names_to = "Area",
    values_to = "UsefulnessScore"
  )

# Remove rows with NA values in UsefulnessScore or LeadRole
usefulness_long <- usefulness_long %>%
  filter(
    !is.na(UsefulnessScore),
    !is.na(LeadRole)
  )

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, LeadRole) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n())
  )

# Bar plot with error bars side by side
ggplot(usefulness_summary, aes(
  x = Area,
  y = MeanScore,
  fill = LeadRole
)) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
      ymax = MeanScore + SE
    ),
    width = 0.2,
    position = position_dodge(width = 0.9)
  ) +
  labs(
    title = "Perceived Usefulness of Generative AI
    in Different Areas by Lead Role",
    x = "Area",
    y = "Mean Usefulness Score:
      1 = Not useful
```

```
    2 = Somewhat useful
    3 = Very useful"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```

```
`summarise()` has grouped output by 'Area'. You can override using the
`.groups` argument.
```



Perceived Usefulness of Generative AI in Different Areas by Professional or hobbyist

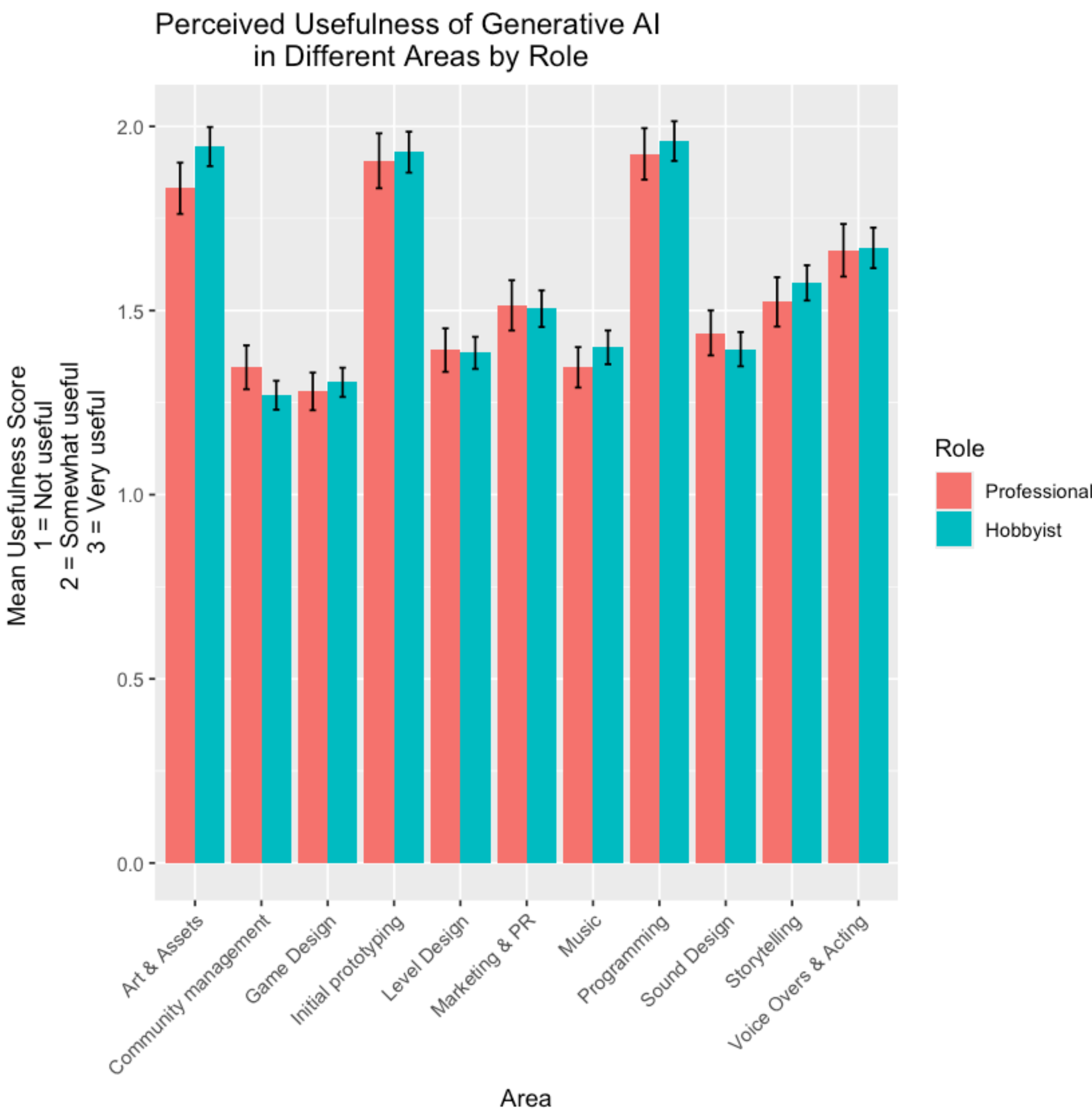
[ ]:
```
# Reset to source data
data <- read_excel(file_path)

data <- data %>%
```

```r
  mutate(across(
    all_of(usefulness_columns),
    ~ usefulness_mapping[as.character(.)]
  ))

# Ensure the role column is correctly labeled
data <- data %>%
  mutate(Role = factor(
    data[[5]],
    levels = c("Professional", "Hobbyist")
  ))

# Remove rows with all NA values in usefulness columns
data <- data %>%
  filter(rowSums(!is.na(select(., all_of(usefulness_columns)))) > 0)

# Pivot the data to a long format for ggplot2
usefulness_long <- data %>%
  pivot_longer(
    cols = all_of(usefulness_columns),
    names_to = "Area",
    values_to = "UsefulnessScore"
  )

# Remove rows with NA values in UsefulnessScore or Role
usefulness_long <- usefulness_long %>%
  filter(!is.na(UsefulnessScore), !is.na(Role))

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, Role) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop" # Explicitly drop the grouping
  )

# Bar plot with error bars side by side
ggplot(usefulness_summary, aes(
  x = Area,
  y = MeanScore,
  fill = Role
)) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
```

```r
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
      ymax = MeanScore + SE
    ),
    width = 0.2,
    position = position_dodge(width = 0.9)
  ) +
  labs(
    title = "Perceived Usefulness of Generative AI
            in Different Areas by Role",
    x = "Area",
    y = "Mean Usefulness Score
      1 = Not useful
      2 = Somewhat useful
      3 = Very useful"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))

# Print summary
usefulness_summary
```

A tibble: 22 x 4

Area <chr>	Role <fct>	MeanScore <dbl>	SE <dbl>
Art & Assets	Professional	1.831776	0.06961868
Art & Assets	Hobbyist	1.945000	0.05314127
Community management	Professional	1.345794	0.05953858
Community management	Hobbyist	1.270000	0.03928379
Game Design	Professional	1.280374	0.05107622
Game Design	Hobbyist	1.305000	0.03959436
Initial prototyping	Professional	1.906542	0.07456771
Initial prototyping	Hobbyist	1.930000	0.05559636
Level Design	Professional	1.392523	0.05902429
Level Design	Hobbyist	1.385000	0.04351255
Marketing & PR	Professional	1.514019	0.06818358
Marketing & PR	Hobbyist	1.505000	0.04962042
Music	Professional	1.345794	0.05491662
Music	Hobbyist	1.400000	0.04594075
Programming	Professional	1.925234	0.06989038
Programming	Hobbyist	1.960000	0.05391227
Sound Design	Professional	1.439252	0.06110943
Sound Design	Hobbyist	1.395000	0.04642901
Storytelling	Professional	1.523364	0.06685334
Storytelling	Hobbyist	1.575000	0.04778380
Voice Overs & Acting	Professional	1.663551	0.07144122
Voice Overs & Acting	Hobbyist	1.670000	0.05496001



Perceived Usefulness of Generative AI in Different Areas by Usage

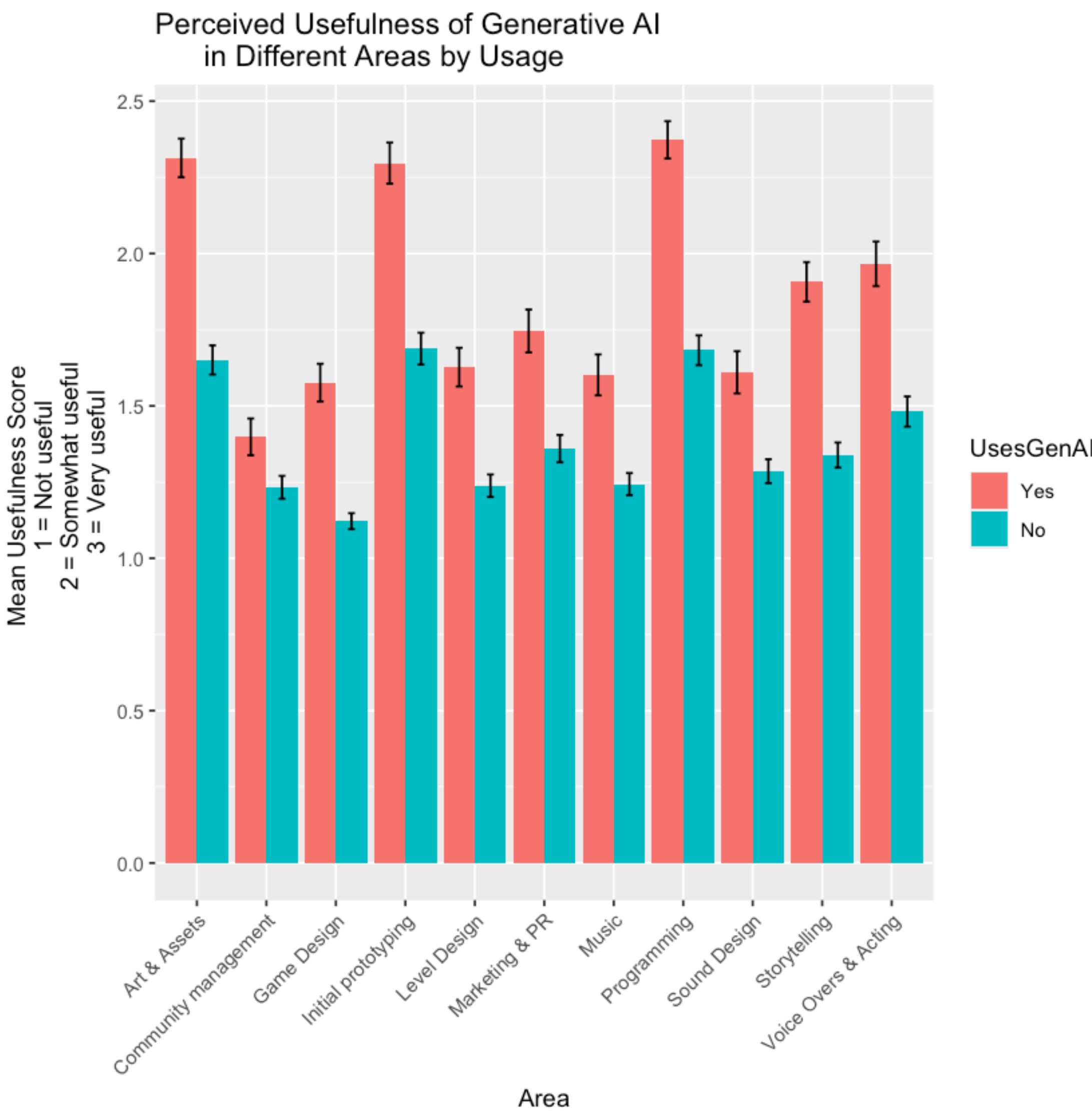
[ ]:
```
# Reset to source data
data <- read_excel(file_path)

data <- data %>%
  mutate(across(
    all_of(usefulness_columns),
    ~ usefulness_mapping[as.character(.)]
  ))

# Ensure the usage of Generative AI column is correctly labeled
data <- data %>%
```

```r
  mutate(UsesGenAI = factor(
    data[[23]],
    levels = c("Yes", "No")
  ))

# Remove rows with all NA values in usefulness columns
data <- data %>%
  filter(rowSums(!is.na(select(., all_of(usefulness_columns)))) > 0)

# Pivot the data to a long format for ggplot2
usefulness_long <- data %>%
  pivot_longer(
    cols = all_of(usefulness_columns),
    names_to = "Area",
    values_to = "UsefulnessScore"
  )

# Remove rows with NA values in UsefulnessScore or UsesGenAI
usefulness_long <- usefulness_long %>%
  filter(!is.na(UsefulnessScore), !is.na(UsesGenAI))

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, UsesGenAI) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop"
  )

# Bar plot with error bars side by side
ggplot(usefulness_summary, aes(
  x = Area,
  y = MeanScore,
  fill = UsesGenAI
)) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
      ymax = MeanScore + SE
    ),
    width = 0.2,
    position = position_dodge(width = 0.9)
```

```r
  ) +
  labs(
    title = "Perceived Usefulness of Generative AI
      in Different Areas by Usage",
    x = "Area",
    y = "Mean Usefulness Score
      1 = Not useful
      2 = Somewhat useful
      3 = Very useful"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, UsesGenAI) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop"
  )

# Print the summarized data
usefulness_summary
```

A tibble: 22 x 4

Area <chr>	UsesGenAI <fct>	MeanScore <dbl>	SE <dbl>
Art & Assets	Yes	2.313559	0.06334529
Art & Assets	No	1.650794	0.04773149
Community management	Yes	1.398305	0.06034791
Community management	No	1.232804	0.03742102
Game Design	Yes	1.576271	0.06184987
Game Design	No	1.121693	0.02609801
Initial prototyping	Yes	2.296610	0.06734694
Initial prototyping	No	1.687831	0.05213607
Level Design	Yes	1.627119	0.06345663
Level Design	No	1.238095	0.03686375
Marketing & PR	Yes	1.745763	0.07037331
Marketing & PR	No	1.359788	0.04486913
Music	Yes	1.601695	0.06716441
Music	No	1.243386	0.03629382
Programming	Yes	2.372881	0.06113112
Programming	No	1.682540	0.04889652
Sound Design	Yes	1.610169	0.06917688
Sound Design	No	1.285714	0.03918978
Storytelling	Yes	1.906780	0.06480147
Storytelling	No	1.338624	0.04120499
Voice Overs & Acting	Yes	1.966102	0.07314484
Voice Overs & Acting	No	1.481481	0.04953493



Perceived Usefulness of Generative AI in Different Areas by Internal Stigma Perception

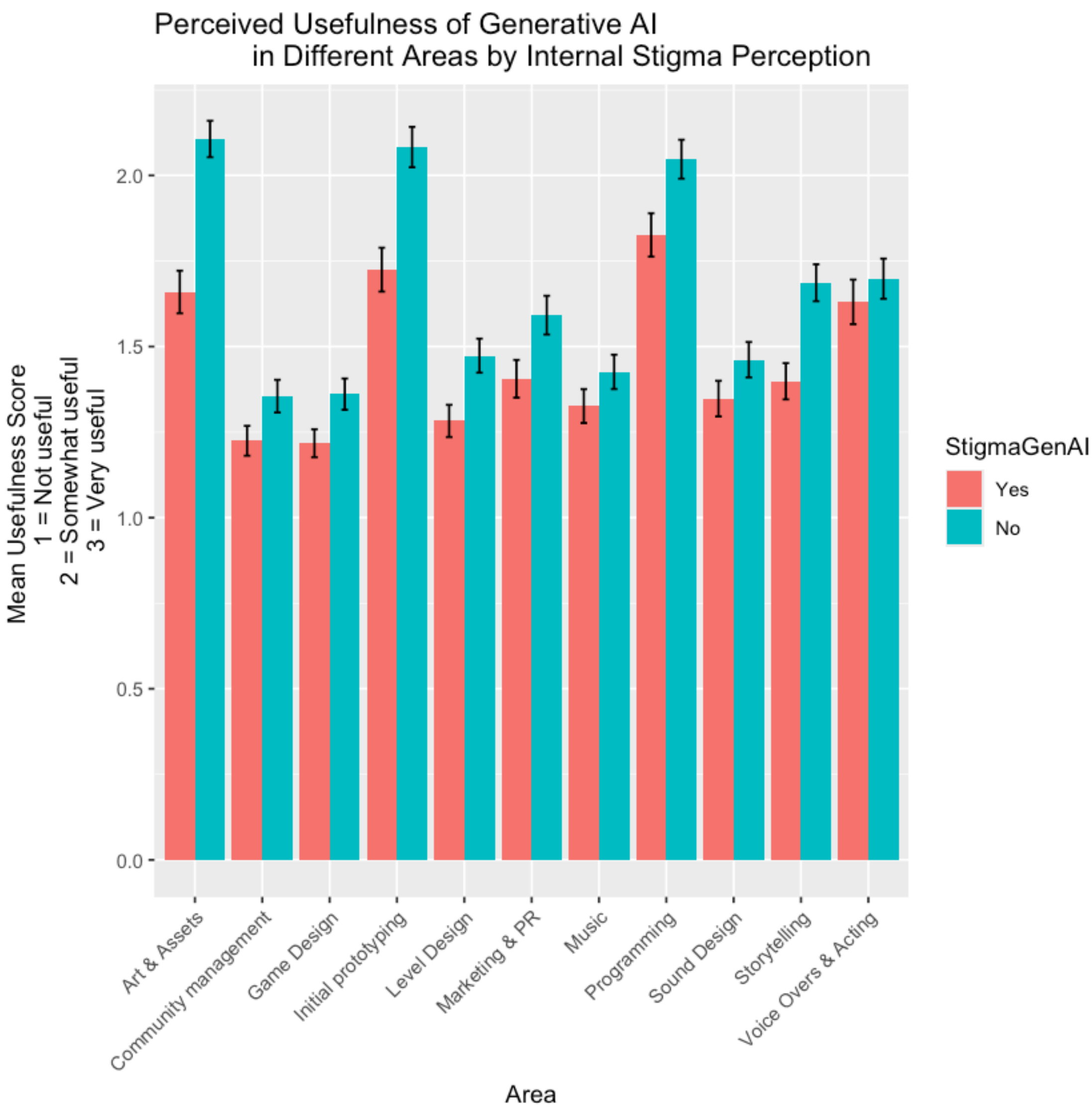
[ ]:
```
# Reset to source data
data <- read_excel(file_path)

data <- data %>%
  mutate(across(
    all_of(usefulness_columns),
    ~ usefulness_mapping[as.character(.)]
  ))

# Ensure the stigma column is correctly labeled
```

```r
data <- data %>%
  mutate(StigmaGenAI = factor(
    data[[33]],
    levels = c("Yes", "No")
  ))

# Remove rows with all NA values in usefulness columns
data <- data %>%
  filter(rowSums(!is.na(select(., all_of(usefulness_columns)))) > 0)

# Pivot the data to a long format for ggplot2
usefulness_long <- data %>%
  pivot_longer(
    cols = all_of(usefulness_columns),
    names_to = "Area",
    values_to = "UsefulnessScore"
  )

# Remove rows with NA values in UsefulnessScore or StigmaGenAI
usefulness_long <- usefulness_long %>%
  filter(!is.na(UsefulnessScore), !is.na(StigmaGenAI))

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, StigmaGenAI) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop"
  )

# Bar plot with error bars side by side
ggplot(usefulness_summary, aes(
  x = Area,
  y = MeanScore,
  fill = StigmaGenAI
)) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
      ymax = MeanScore + SE
    ),
    width = 0.2,
```

```r
    position = position_dodge(width = 0.9)
  ) +
  labs(
    title = "Perceived Usefulness of Generative AI
            in Different Areas by Internal Stigma Perception",
    x = "Area",
    y = "Mean Usefulness Score
      1 = Not useful
      2 = Somewhat useful
      3 = Very useful"
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))

# Print the usefulness summary to get results in text form
usefulness_summary
```

A tibble: 22 x 4

Area	StigmaGenAI	MeanScore	SE
<chr>	<fct>	<dbl>	<dbl>
Art & Assets	Yes	1.659420	0.06213554
Art & Assets	No	2.106509	0.05310944
Community management	Yes	1.224638	0.04365861
Community management	No	1.355030	0.04773624
Game Design	Yes	1.217391	0.04080426
Game Design	No	1.360947	0.04557878
Initial prototyping	Yes	1.724638	0.06404018
Initial prototyping	No	2.082840	0.05900229
Level Design	Yes	1.282609	0.04712077
Level Design	No	1.473373	0.04969978
Marketing & PR	Yes	1.405797	0.05504072
Marketing & PR	No	1.591716	0.05656045
Music	Yes	1.326087	0.04950089
Music	No	1.426036	0.05012152
Programming	Yes	1.826087	0.06333000
Programming	No	2.047337	0.05680679
Sound Design	Yes	1.347826	0.05209275
Sound Design	No	1.461538	0.05173790
Storytelling	Yes	1.398551	0.05298640
Storytelling	No	1.686391	0.05386535
Voice Overs & Acting	Yes	1.630435	0.06511152
Voice Overs & Acting	No	1.698225	0.05863379



Perceived Usefulness of Generative AI in Different Areas by External Stigma Perception

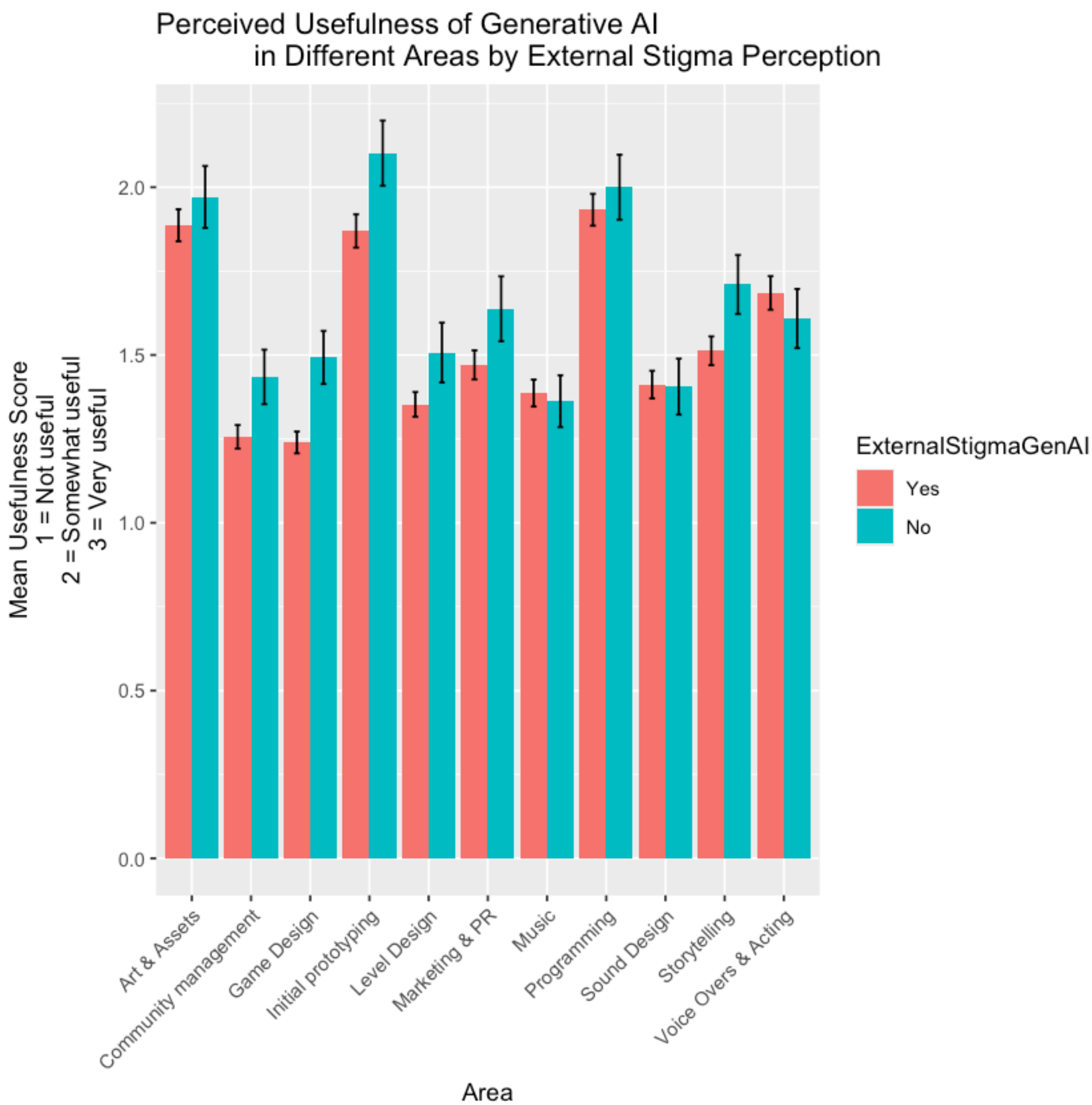
[ ]:
```
# Reset to source data
data <- read_excel(file_path)

data <- data %>%
  mutate(across(
    all_of(usefulness_columns),
    ~ usefulness_mapping[as.character(.)]
  ))

# Ensure the external stigma column is correctly labeled
```

```r
data <- data %>%
  mutate(ExternalStigmaGenAI = factor(
    data[[34]],
    levels = c("Yes", "No")
  ))

# Remove rows with all NA values in usefulness columns
data <- data %>%
  filter(rowSums(!is.na(select(., all_of(usefulness_columns)))) > 0)

# Pivot the data to a long format for ggplot2
usefulness_long <- data %>%
  pivot_longer(
    cols = all_of(usefulness_columns),
    names_to = "Area",
    values_to = "UsefulnessScore"
  )

# Remove rows with NA values in UsefulnessScore or ExternalStigmaGenAI
usefulness_long <- usefulness_long %>%
  filter(!is.na(UsefulnessScore), !is.na(ExternalStigmaGenAI))

# Calculate mean and standard error for each group
usefulness_summary <- usefulness_long %>%
  group_by(Area, ExternalStigmaGenAI) %>%
  summarise(
    MeanScore = mean(UsefulnessScore, na.rm = TRUE),
    SE = sd(UsefulnessScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop"
  )

# Bar plot with error bars side by side
ggplot(
  usefulness_summary,
  aes(
    x = Area,
    y = MeanScore,
    fill = ExternalStigmaGenAI
  )
) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
```

```r
    ymax = MeanScore + SE
  ),
  width = 0.2,
  position = position_dodge(width = 0.9)
) +
labs(
  title = "Perceived Usefulness of Generative AI
          in Different Areas by External Stigma Perception",
  x = "Area",
  y = "Mean Usefulness Score
    1 = Not useful
    2 = Somewhat useful
    3 = Very useful"
) +
theme(axis.text.x = element_text(angle = 45, hjust = 1))

# Print the usefulness summary to get results in text form
usefulness_summary
```

A tibble: 22 x 4

Area <chr>	ExternalStigmaGenAI <fct>	MeanScore <dbl>	SE <dbl>
Art & Assets	Yes	1.886555	0.04762504
Art & Assets	No	1.971014	0.09226480
Community management	Yes	1.256303	0.03506786
Community management	No	1.434783	0.08122638
Game Design	Yes	1.239496	0.03243718
Game Design	No	1.492754	0.07895089
Initial prototyping	Yes	1.869748	0.04963473
Initial prototyping	No	2.101449	0.09715678
Level Design	Yes	1.352941	0.03679173
Level Design	No	1.507246	0.08909699
Marketing & PR	Yes	1.470588	0.04320554
Marketing & PR	No	1.637681	0.09677453
Music	Yes	1.386555	0.04004150
Music	No	1.362319	0.07717026
Programming	Yes	1.932773	0.04743620
Programming	No	2.000000	0.09683834
Sound Design	Yes	1.411765	0.04117875
Sound Design	No	1.405797	0.08340280
Storytelling	Yes	1.512605	0.04282804
Storytelling	No	1.710145	0.08784007
Voice Overs & Acting	Yes	1.684874	0.05006211
Voice Overs & Acting	No	1.608696	0.08812093



1.11 Some questions about how your use of Generative AI impact different areas of your work?

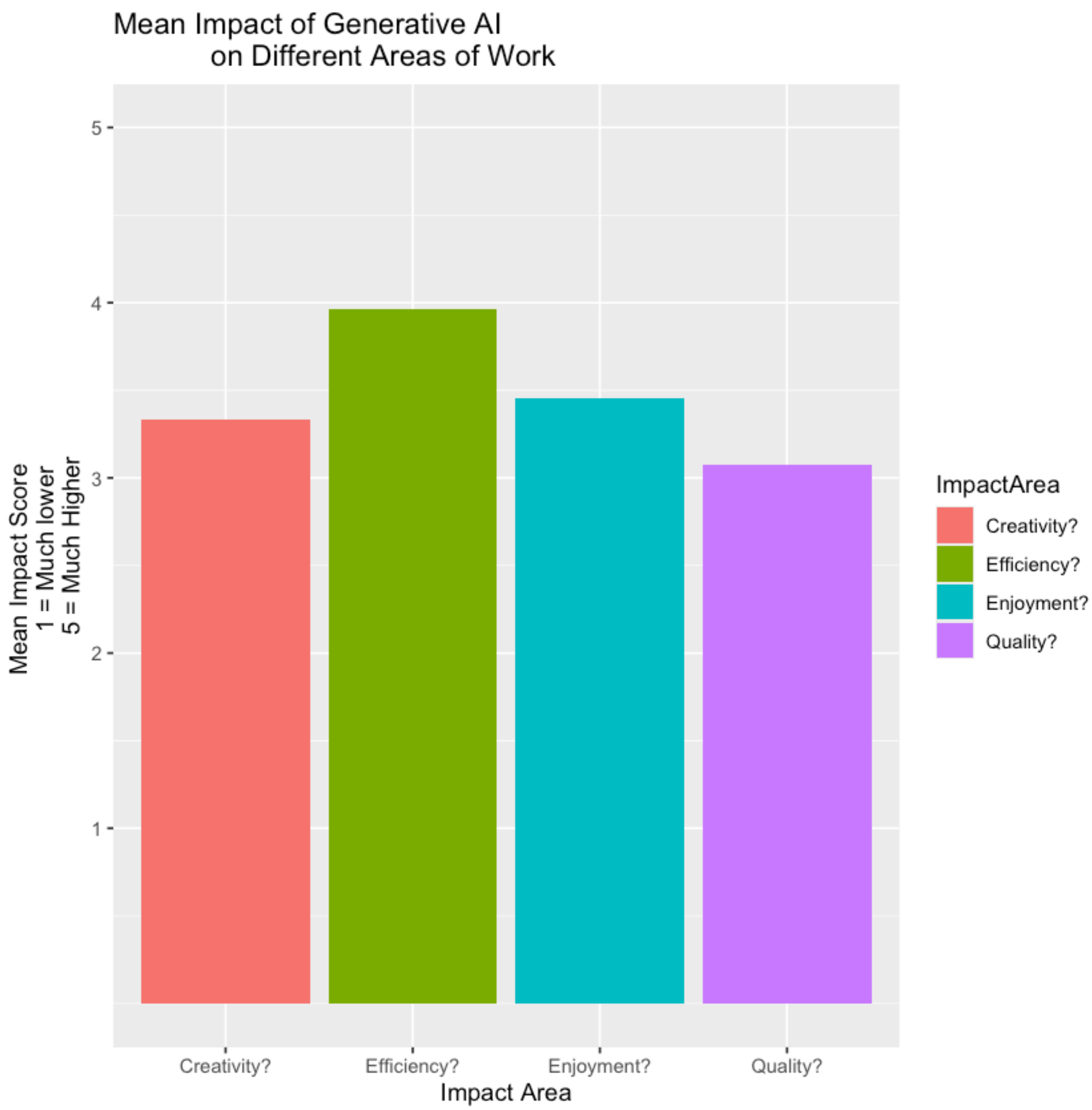
Impact of Generative AI on Different Areas of Work

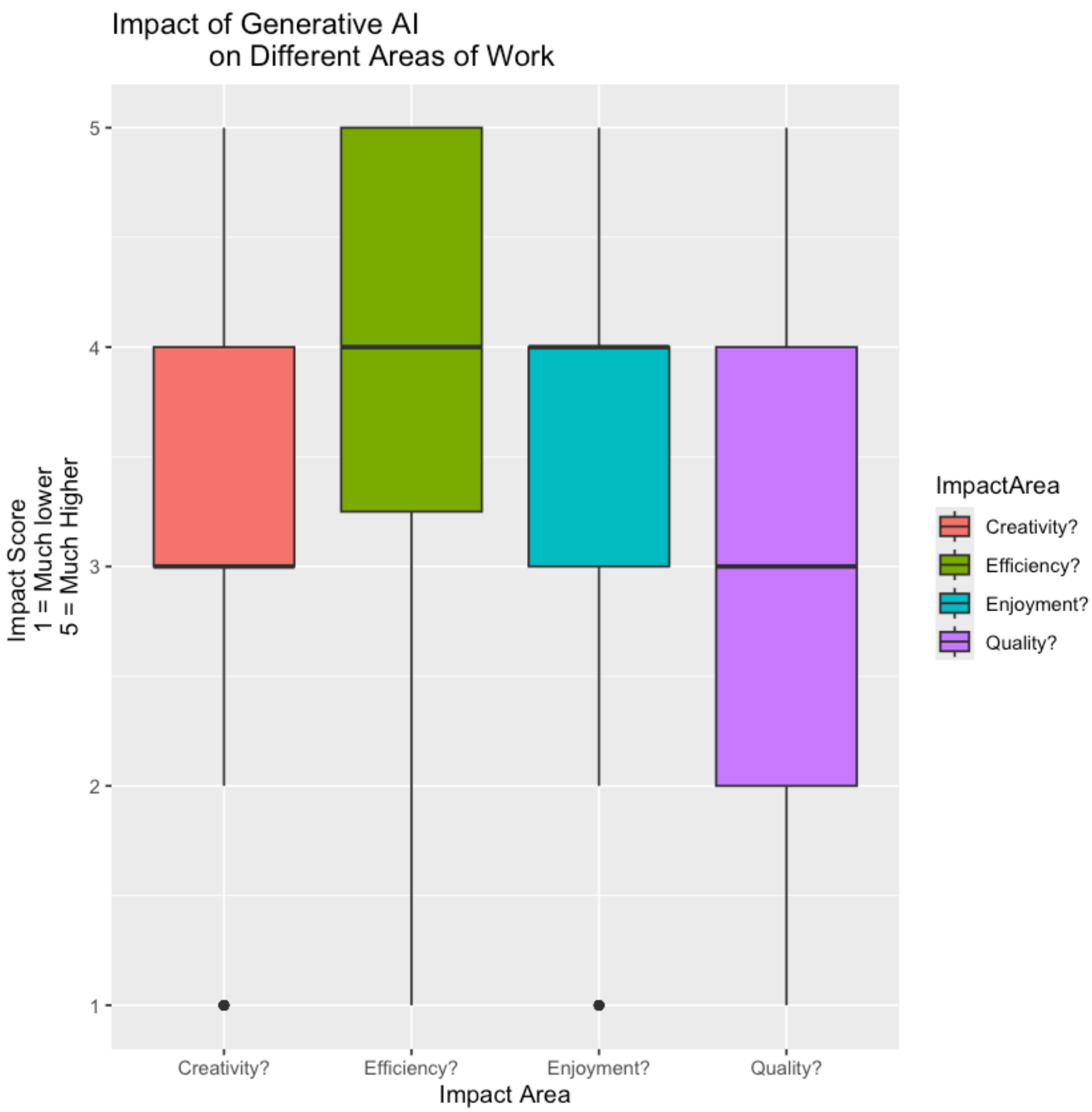
[ ]:
```
# Reset to source data
data <- read_excel(file_path)

# Define impact columns
impact_columns <- c("Efficiency?", "Quality?", "Enjoyment?", "Creativity?")

# Convert impact columns to factors with specific levels
data <- data %>%
  mutate(across(all_of(impact_columns), ~ factor(., levels = c(
```

```r
    "Much lower", "Lower", "Neutral", "Higher", "Much Higher"
  ))))

# Map categorical responses to numeric values
impact_mapping <- c(
  "Much lower" = 1,
  "Lower" = 2,
  "Neutral" = 3,
  "Higher" = 4,
  "Much Higher" = 5
)

data <- data %>%
  mutate(across(all_of(impact_columns), ~ impact_mapping[as.character(.)]))

# Calculate mean impact scores for each area
mean_impact_scores <- data %>%
  summarise(across(all_of(impact_columns), ~ mean(.x, na.rm = TRUE))) %>%
  pivot_longer(
    cols = everything(),
    names_to = "ImpactArea",
    values_to = "MeanScore"
  )

# Print mean impact scores to check for anomalies
print(mean_impact_scores)

# Bar plot of the mean impact scores
ggplot(
  mean_impact_scores,
  aes(x = ImpactArea, y = MeanScore, fill = ImpactArea)
) +
  geom_bar(stat = "identity") +
  labs(
    title = "Mean Impact of Generative AI
            on Different Areas of Work",
    x = "Impact Area",
    y = "Mean Impact Score
      1 = Much lower
      5 = Much Higher"
  ) +
  scale_y_continuous(limits = c(0, 5), breaks = 1:5)

# Here's the boxplot

# Pivot the data to a long format for ggplot2
impact_long <- data %>%
```

```
  pivot_longer(
    cols = all_of(impact_columns),
    names_to = "ImpactArea",
    values_to = "ImpactScore"
  )

# Remove rows with NA values in ImpactScore
impact_long <- impact_long %>%
  filter(!is.na(ImpactScore))

# Box plot of the impact of Generative AI on different areas
ggplot(impact_long, aes(x = ImpactArea, y = ImpactScore, fill = ImpactArea)) +
  geom_boxplot() +
  labs(
    title = "Impact of Generative AI
            on Different Areas of Work",
    x = "Impact Area",
    y = "Impact Score
      1 = Much lower
      5 = Much Higher"
  ) +
  scale_y_continuous(limits = c(1, 5), breaks = 1:5)
```

```
# A tibble: 4 x 2
  ImpactArea  MeanScore
  <chr>           <dbl>
1 Efficiency?      3.97
2 Quality?         3.08
3 Enjoyment?       3.46
4 Creativity?      3.33
```


Mean Impact of Generative AI
on Different Areas of Work
Mean Impact Score
1 = Much lower
5 = Much Higher
5
4
3
2
1
Creativity?
Efficiency?
Enjoyment?
Quality?
Impact Area
ImpactArea
Creativity?
Efficiency?
Enjoyment?
Quality?



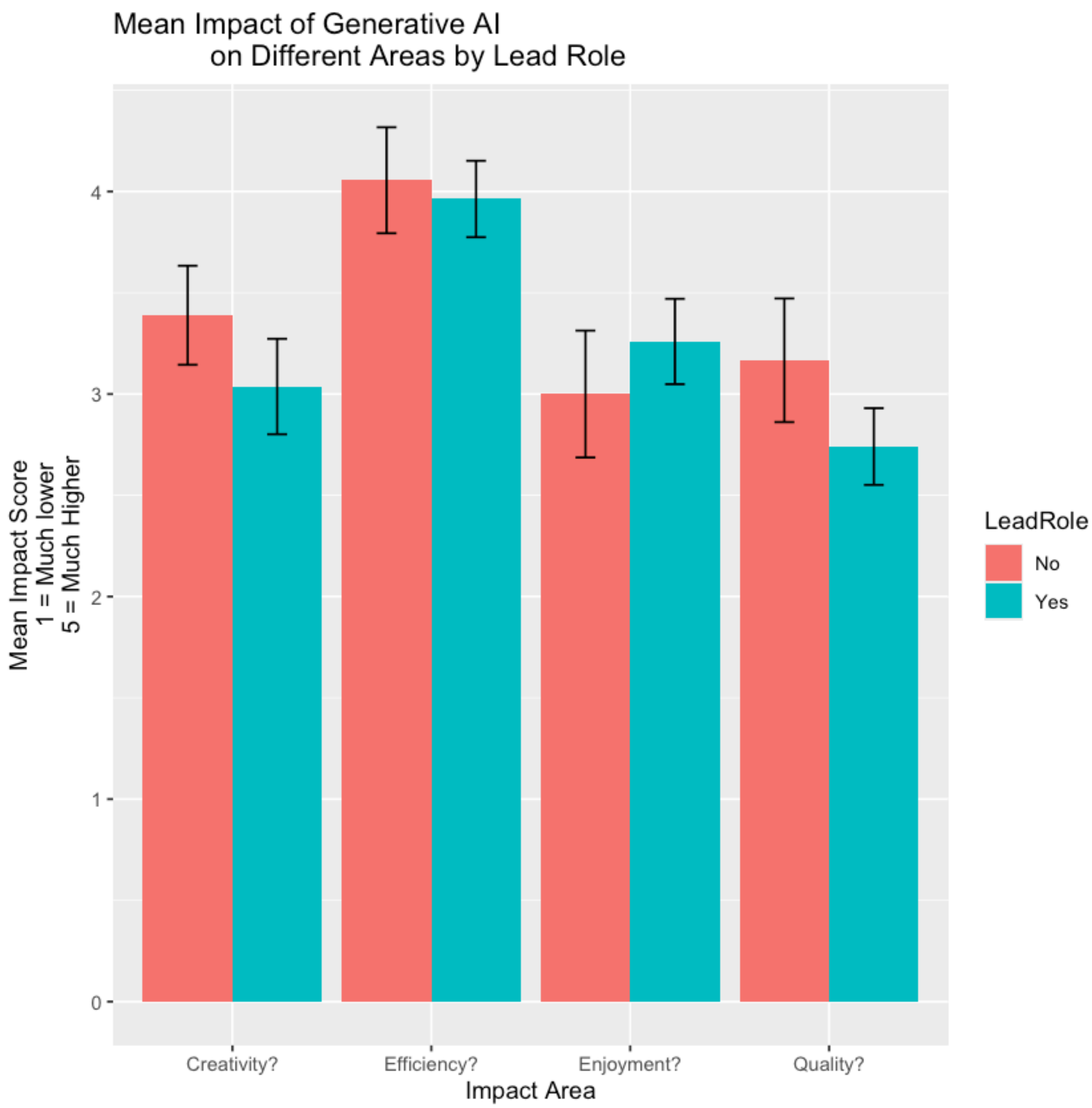
Impact of Generative AI on Different Areas by Lead Role

[ ]:
```
# Reset to source data
data <- read_excel(file_path)

data <- data %>%
  mutate(across(
    all_of(impact_columns),
    ~ impact_mapping[as.character(.)]
  ))

# Pivot the data to a long format for ggplot2
impact_long <- data %>%
```

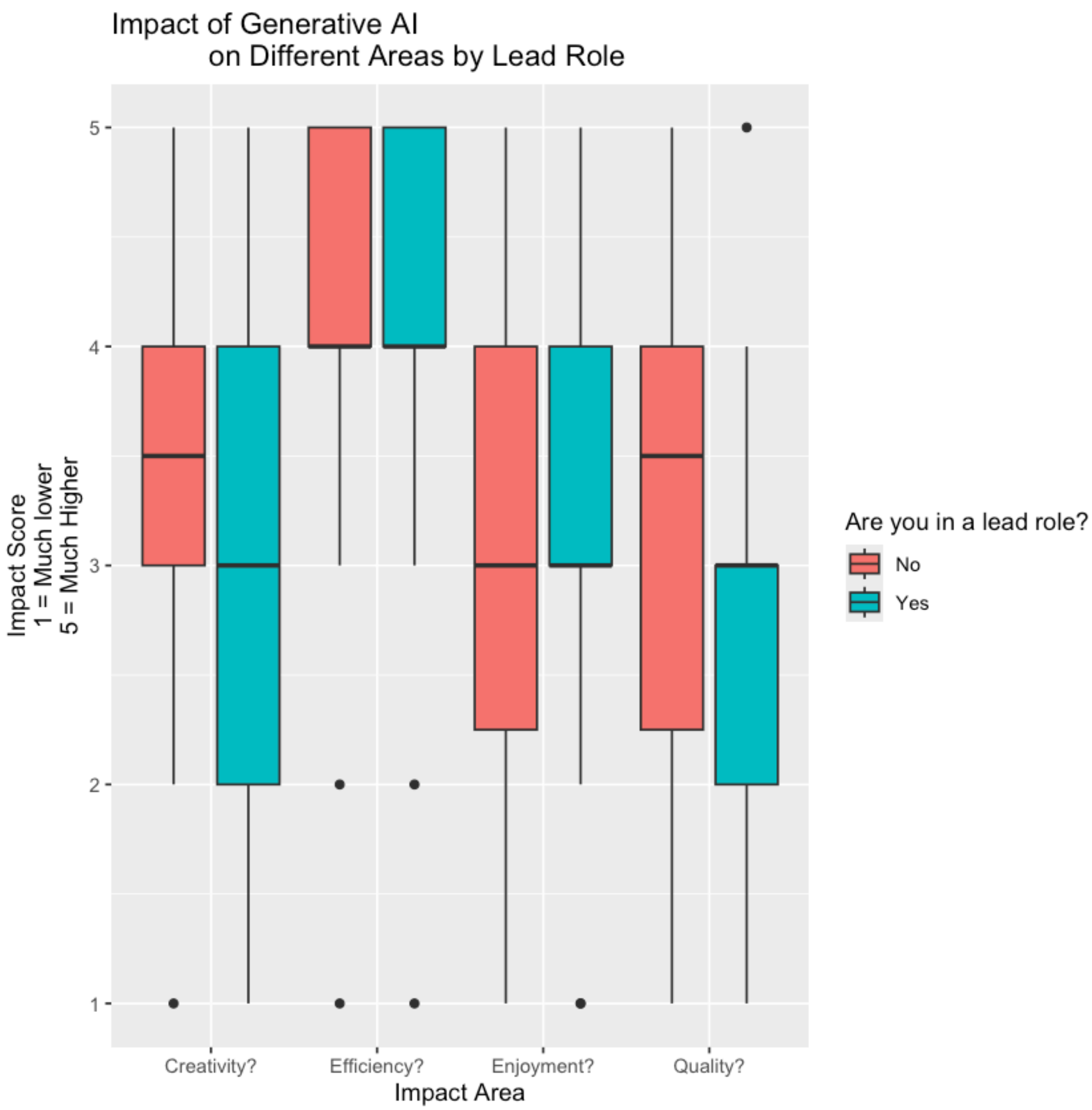
```r
  pivot_longer(
    cols = all_of(impact_columns),
    names_to = "ImpactArea",
    values_to = "ImpactScore"
  )

# Remove rows with NA values in ImpactScore or LeadRole
impact_long <- impact_long %>%
  filter(!is.na(ImpactScore), !is.na(`Are you in a lead role?`))

# Calculate mean impact scores for each area and role
mean_impact_scores_by_role <- impact_long %>%
  group_by(ImpactArea, `Are you in a lead role?`) %>%
  summarise(
    MeanScore = mean(ImpactScore, na.rm = TRUE),
    SE = sd(ImpactScore, na.rm = TRUE) / sqrt(n()),
    .groups = "drop"
  )

# Rename the role column for better readability
colnames(mean_impact_scores_by_role)[2] <- "LeadRole"

# Print mean impact scores by role to check for anomalies
print(mean_impact_scores_by_role)

# Bar plot with error bars side by side
barplot <- ggplot(
  mean_impact_scores_by_role,
  aes(
    x = ImpactArea,
    y = MeanScore,
    fill = LeadRole
  )
) +
  geom_bar(
    stat = "identity",
    position = position_dodge(width = 0.9)
  ) +
  geom_errorbar(
    aes(
      ymin = MeanScore - SE,
      ymax = MeanScore + SE
    ),
    width = 0.2,
    position = position_dodge(width = 0.9)
  ) +
  labs(
```

```r
    title = "Mean Impact of Generative AI
            on Different Areas by Lead Role",
    x = "Impact Area",
    y = "Mean Impact Score
      1 = Much lower
      5 = Much Higher"
  )

# Box plot of the impact of Generative AI on different areas by lead role
boxplot <- ggplot(
  impact_long,
  aes(
    x = ImpactArea,
    y = ImpactScore,
    fill = `Are you in a lead role?`
  )
) +
  geom_boxplot(
    position = position_dodge(width = 0.9)
  ) +
  labs(
    title = "Impact of Generative AI
            on Different Areas by Lead Role",
    x = "Impact Area",
    y = "Impact Score
      1 = Much lower
      5 = Much Higher"
  )

# Print the plots
print(barplot)
print(boxplot)
```

```
# A tibble: 8 x 4
  ImpactArea  LeadRole MeanScore    SE
  <chr>       <chr>
<dbl> <dbl>
1 Creativity? No            3.39 0.244
2 Creativity? Yes           3.04 0.236
3 Efficiency? No            4.06 0.262
4 Efficiency? Yes           3.96 0.189
5 Enjoyment?  No            3    0.313
6 Enjoyment?  Yes           3.26 0.211
7 Quality?    No            3.17 0.305
8 Quality?    Yes           2.74 0.189
```



Mean Impact of Generative AI
on Different Areas by Lead Role
Mean Impact Score
1 = Much lower
5 = Much Higher
0
1
2
3
4
Creativity?
Efficiency?
Enjoyment?
Quality?
Impact Area
LeadRole
No
Yes



Impact of Generative AI
on Different Areas by Lead Role
Impact Score
1 = Much lower
5 = Much Higher
5
4
3
2
1
Creativity?
Efficiency?
Enjoyment?
Quality?
Impact Area
Are you in a lead role?
No
Yes