

# Project 2

## CPSC 292 Section #02#

10/31/2025

### Project 1: Best-Selling Video Games of All Time

#### Loading And Cleaning Data

```
game.data <- read.csv("game.data/best-selling video games of all time.csv")  
game.data
```

##	Rank	Title	Sales
## 1	1	Minecraft	238000000
## 2	2	Grand Theft Auto V	175000000
## 3	3	Tetris (EA)	100000000
## 4	4	Wii Sports	82900000
## 5	5	PUBG: Battlegrounds	75000000
## 6	6	Mario Kart 8 / Deluxe	60460000
## 7	7	Super Mario Bros.	58000000
## 8	8	Red Dead Redemption 2	50000000
## 9	9	Pokémon Red / Green / Blue / Yellow	47520000
## 10	10	Terraria	44500000
## 11	11	Wii Fit / Plus	43800000
## 12	12	Tetris (1989)	43000000
## 13	13	Pac-Man	42071635
## 14	14	Animal Crossing: New Horizons	41590000
## 15	15	Human: Fall Flat	40000000
## 16	15	The Witcher 3 / Hearts of Stone / Blood and Wine	40000000
## 17	17	Mario Kart Wii	37380000
## 18	18	Wii Sports Resort	33140000
## 19	19	New Super Mario Bros.	30800000
## 20	20	The Legend of Zelda: Breath of the Wild	30700000
## 21	21	Super Smash Bros. Ultimate	30440000
## 22	22	New Super Mario Bros. Wii	30320000
## 23	23	Call of Duty: Modern Warfare	30000000
## 24	23	Diablo III / Reaper of Souls	30000000
## 25	23	The Elder Scrolls V: Skyrim	30000000
## 26	26	Pokémon Gold / Silver / Crystal	29490000
## 27	27	Duck Hunt	28300000
## 28	28	Wii Play	28020000
## 29	29	The Walking Dead	28000000
## 30	30	Grand Theft Auto: San Andreas	27500000
## 31	31	Super Mario World	26662500
## 32	32	Call of Duty: Modern Warfare 3	26500000

## 33	33		Call of Duty: Black Ops	26200000
## 34	34		Borderlands 2	27000000
## 35	35		Pokémon Sword / Shield	25680000
## 36	36	Pokémon Sun / Moon / Ultra Sun / Ultra Moon	25410000	
## 37	37		Super Mario Odyssey	25120000
## 38	38		Grand Theft Auto IV	25000000
## 39	39	Pokémon Diamond / Pearl / Platinum	24730000	
## 40	40		Super Mario Bros. 3	24430000
## 41	41	Call of Duty: Black Ops II	24200000	
## 42	42		FIFA 18	24000000
## 43	42		Kinect Adventures!	24000000
## 44	44		Sonic the Hedgehog	23982960
## 45	45		Nintendogs	23960000
## 46	46	New Super Mario Bros. U / Luigi U / Deluxe	23640000	
## 47	47		Mario Kart DS	23600000
## 48	48	Pokémon Ruby / Sapphire / Emerald	23280000	
## 49	49		God of War	23000000
## 50	49		Red Dead Redemption	23000000
##		Series	Platform.s. Initial.release.date	
## 1		Minecraft	Multi-platform	November 18, 2011
## 2		Grand Theft Auto	Multi-platform	September 17, 2013
## 3		Tetris	Multi-platform	September 12, 2006
## 4		Wii	Wii	November 19, 2006
## 5		PUBG Universe	Multi-platform	December 20, 2017
## 6		Mario Kart	Wii U / Switch	May 29, 2014
## 7		Super Mario	Multi-platform	September 13, 1985
## 8		Red Dead	Multi-platform	October 26, 2018
## 9		Pokémon	Multi-platform	February 27, 1996
## 10		None	Multi-platform	May 16, 2011
## 11		Wii	Wii	December 1, 2007
## 12		Tetris	Game Boy / NES	June 14, 1989
## 13		Pac-Man	Multi-platform	May 22, 1980
## 14		Animal Crossing	Nintendo Switch	March 20, 2020
## 15		None	Multi-platform	July 22, 2016
## 16		The Witcher	Multi-platform	May 19, 2015
## 17		Mario Kart	Wii	April 10, 2008
## 18		Wii	Wii	June 25, 2009
## 19		Super Mario	Nintendo DS	May 15, 2006
## 20		The Legend of Zelda	Wii U / Switch	March 3, 2017
## 21		Super Smash Bros.	Nintendo Switch	December 7, 2018
## 22		Super Mario	Wii	November 11, 2009
## 23		Call of Duty	Multi-platform	October 25, 2019
## 24		Diablo	Multi-platform	May 16, 2012
## 25		The Elder Scrolls	Multi-platform	November 11, 2011
## 26		Pokémon	Game Boy Color	November 21, 1999
## 27		None	NES	April 21, 1984
## 28		Wii	Wii	December 2, 2006
## 29		The Walking Dead	Multi-platform	April 24, 2012
## 30		Grand Theft Auto	Multi-platform	October 26, 2004
## 31		Super Mario	Multi-platform	November 21, 1990
## 32		Call of Duty	Multi-platform	November 8, 2011
## 33		Call of Duty	Multi-platform	November 9, 2010
## 34		Borderlands	Multi-platform	September 18, 2012
## 35		Pokémon	Nintendo Switch	November 15, 2019

## 36	Pokémon	Nintendo 3DS	November 18, 2016
## 37	Super Mario	Nintendo Switch	October 27, 2017
## 38	Grand Theft Auto	Multi-platform	April 29, 2008
## 39	Pokémon	Nintendo DS	September 28, 2006
## 40	Super Mario	Multi-platform	October 23, 1988
## 41	Call of Duty	Multi-platform	November 12, 2012
## 42	FIFA	Multi-platform	September 29, 2017
## 43	None	Xbox 360	November 4, 2010
## 44	Sonic the Hedgehog	Multi-platform	June 23, 1991
## 45	None	Nintendo DS	April 21, 2005
## 46	Super Mario	Wii U / Switch	November 18, 2012
## 47	Mario Kart	Nintendo DS	November 14, 2005
## 48	Pokémon	Game Boy Advance	November 21, 2002
## 49	God of War	PlayStation 4 / Windows	April 20, 2018
## 50	Red Dead	PS3 / Xbox 360	May 18, 2010
##		Developer.s.	Publisher.s.
## 1		Mojang Studios	Xbox Game Studios
## 2		Rockstar North	Rockstar Games
## 3		EA Mobile	Electronic Arts
## 4		Nintendo EAD	Nintendo
## 5		PUBG Corporation	PUBG Corporation
## 6		Nintendo EAD	Nintendo
## 7		Nintendo R&D4	Nintendo
## 8		Rockstar Studios	Rockstar Games
## 9		Game Freak	Nintendo
## 10		Re-Logic	Re-Logic / 505 Games
## 11		Nintendo EAD	Nintendo
## 12		Nintendo R&D1	Nintendo
## 13		Namco	Namco
## 14		Nintendo EPD	Nintendo
## 15		No Brakes Games	Curve Digital
## 16		CD Projekt Red	CD Projekt
## 17		Nintendo EAD	Nintendo
## 18		Nintendo EAD	Nintendo
## 19		Nintendo EAD	Nintendo
## 20		Nintendo EPD	Nintendo
## 21	Bandai Namco Studios / Sora Ltd.		Nintendo
## 22		Nintendo EAD	Nintendo
## 23		Infinity Ward	Activision
## 24	Blizzard Entertainment		Blizzard Entertainment
## 25	Bethesda Game Studios		Bethesda Softworks
## 26		Game Freak	Nintendo
## 27		Nintendo R&D1	Nintendo
## 28		Nintendo EAD	Nintendo
## 29		Telltale Games	Telltale Games
## 30		Rockstar North	Rockstar Games
## 31		Nintendo EAD	Nintendo
## 32	Infinity Ward / Sledgehammer		Activision
## 33		Treyarch	Activision
## 34		Gearbox Software	2K Games
## 35		Game Freak	Nintendo / The Pokémon Company
## 36		Nintendo	The Pokémon Company
## 37		Nintendo EPD	Nintendo
## 38	Rockstar North		Rockstar Games

```

## 39          Game Freak Nintendo / The Pokémon Company
## 40          Nintendo EAD                      Nintendo
## 41          Treyarch                        Activision
## 42          EA Vancouver                     EA Sports
## 43          Good Science Studio            Xbox Game Studios
## 44          Sonic Team                      Sega
## 45          Nintendo EAD                      Nintendo
## 46          Nintendo EAD                      Nintendo
## 47          Nintendo EAD                      Nintendo
## 48          Game Freak Nintendo / The Pokémon Company
## 49          Santa Monica Studio Sony Interactive Entertainment
## 50          Rockstar San Diego             Rockstar Games

```

```

game.data.clean <- game.data %>%
  clean_names() %>%
  remove_empty(which = c("rows", "cols")) %>%
  na.omit(game.data) %>%
  mutate(sales = sales / 100000)
game.data.clean

```

##	rank	title	sales
## 1	1	Minecraft	2380.0000
## 2	2	Grand Theft Auto V	1750.0000
## 3	3	Tetris (EA)	1000.0000
## 4	4	Wii Sports	829.0000
## 5	5	PUBG: Battlegrounds	750.0000
## 6	6	Mario Kart 8 / Deluxe	604.6000
## 7	7	Super Mario Bros.	580.0000
## 8	8	Red Dead Redemption 2	500.0000
## 9	9	Pokémon Red / Green / Blue / Yellow	475.2000
## 10	10	Terraria	445.0000
## 11	11	Wii Fit / Plus	438.0000
## 12	12	Tetris (1989)	430.0000
## 13	13	Pac-Man	420.7163
## 14	14	Animal Crossing: New Horizons	415.9000
## 15	15	Human: Fall Flat	400.0000
## 16	15	The Witcher 3 / Hearts of Stone / Blood and Wine	400.0000
## 17	17	Mario Kart Wii	373.8000
## 18	18	Wii Sports Resort	331.4000
## 19	19	New Super Mario Bros.	308.0000
## 20	20	The Legend of Zelda: Breath of the Wild	307.0000
## 21	21	Super Smash Bros. Ultimate	304.4000
## 22	22	New Super Mario Bros. Wii	303.2000
## 23	23	Call of Duty: Modern Warfare	300.0000
## 24	23	Diablo III / Reaper of Souls	300.0000
## 25	23	The Elder Scrolls V: Skyrim	300.0000
## 26	26	Pokémon Gold / Silver / Crystal	294.9000
## 27	27	Duck Hunt	283.0000
## 28	28	Wii Play	280.2000
## 29	29	The Walking Dead	280.0000
## 30	30	Grand Theft Auto: San Andreas	275.0000
## 31	31	Super Mario World	266.6250
## 32	32	Call of Duty: Modern Warfare 3	265.0000
## 33	33	Call of Duty: Black Ops	262.0000

## 34	34		Borderlands 2	270.0000
## 35	35	Pokémon	Sword / Shield	256.8000
## 36	36	Sun / Moon	Ultra Sun / Ultra Moon	254.1000
## 37	37		Super Mario Odyssey	251.2000
## 38	38		Grand Theft Auto IV	250.0000
## 39	39		Pokémon Diamond / Pearl / Platinum	247.3000
## 40	40		Super Mario Bros. 3	244.3000
## 41	41		Call of Duty: Black Ops II	242.0000
## 42	42		FIFA 18	240.0000
## 43	42		Kinect Adventures!	240.0000
## 44	44		Sonic the Hedgehog	239.8296
## 45	45		Nintendogs	239.6000
## 46	46	New Super Mario Bros.	U / Luigi U / Deluxe	236.4000
## 47	47		Mario Kart DS	236.0000
## 48	48		Pokémon Ruby / Sapphire / Emerald	232.8000
## 49	49		God of War	230.0000
## 50	49		Red Dead Redemption	230.0000
##		series	platform_s	initial_release_date
## 1		Minecraft	Multi-platform	November 18, 2011
## 2		Grand Theft Auto	Multi-platform	September 17, 2013
## 3		Tetris	Multi-platform	September 12, 2006
## 4		Wii	Wii	November 19, 2006
## 5		PUBG Universe	Multi-platform	December 20, 2017
## 6		Mario Kart	Wii U / Switch	May 29, 2014
## 7		Super Mario	Multi-platform	September 13, 1985
## 8		Red Dead	Multi-platform	October 26, 2018
## 9		Pokémon	Multi-platform	February 27, 1996
## 10		None	Multi-platform	May 16, 2011
## 11		Wii	Wii	December 1, 2007
## 12		Tetris	Game Boy / NES	June 14, 1989
## 13		Pac-Man	Multi-platform	May 22, 1980
## 14		Animal Crossing	Nintendo Switch	March 20, 2020
## 15		None	Multi-platform	July 22, 2016
## 16		The Witcher	Multi-platform	May 19, 2015
## 17		Mario Kart	Wii	April 10, 2008
## 18		Wii	Wii	June 25, 2009
## 19		Super Mario	Nintendo DS	May 15, 2006
## 20		The Legend of Zelda	Wii U / Switch	March 3, 2017
## 21		Super Smash Bros.	Nintendo Switch	December 7, 2018
## 22		Super Mario	Wii	November 11, 2009
## 23		Call of Duty	Multi-platform	October 25, 2019
## 24		Diablo	Multi-platform	May 16, 2012
## 25		The Elder Scrolls	Multi-platform	November 11, 2011
## 26		Pokémon	Game Boy Color	November 21, 1999
## 27		None	NES	April 21, 1984
## 28		Wii	Wii	December 2, 2006
## 29		The Walking Dead	Multi-platform	April 24, 2012
## 30		Grand Theft Auto	Multi-platform	October 26, 2004
## 31		Super Mario	Multi-platform	November 21, 1990
## 32		Call of Duty	Multi-platform	November 8, 2011
## 33		Call of Duty	Multi-platform	November 9, 2010
## 34		Borderlands	Multi-platform	September 18, 2012
## 35		Pokémon	Nintendo Switch	November 15, 2019
## 36		Pokémon	Nintendo 3DS	November 18, 2016

## 37	Super Mario	Nintendo Switch	October 27, 2017
## 38	Grand Theft Auto	Multi-platform	April 29, 2008
## 39	Pokémon	Nintendo DS	September 28, 2006
## 40	Super Mario	Multi-platform	October 23, 1988
## 41	Call of Duty	Multi-platform	November 12, 2012
## 42	FIFA	Multi-platform	September 29, 2017
## 43	None	Xbox 360	November 4, 2010
## 44	Sonic the Hedgehog	Multi-platform	June 23, 1991
## 45	None	Nintendo DS	April 21, 2005
## 46	Super Mario	Wii U / Switch	November 18, 2012
## 47	Mario Kart	Nintendo DS	November 14, 2005
## 48	Pokémon	Game Boy Advance	November 21, 2002
## 49	God of War	PlayStation 4 / Windows	April 20, 2018
## 50	Red Dead	PS3 / Xbox 360	May 18, 2010
##	developer_s		publisher_s
## 1	Mojang Studios		Xbox Game Studios
## 2	Rockstar North		Rockstar Games
## 3	EA Mobile		Electronic Arts
## 4	Nintendo EAD		Nintendo
## 5	PUBG Corporation		PUBG Corporation
## 6	Nintendo EAD		Nintendo
## 7	Nintendo R&D4		Nintendo
## 8	Rockstar Studios		Rockstar Games
## 9	Game Freak		Nintendo
## 10	Re-Logic		Re-Logic / 505 Games
## 11	Nintendo EAD		Nintendo
## 12	Nintendo R&D1		Nintendo
## 13	Namco		Namco
## 14	Nintendo EPD		Nintendo
## 15	No Brakes Games		Curve Digital
## 16	CD Projekt Red		CD Projekt
## 17	Nintendo EAD		Nintendo
## 18	Nintendo EAD		Nintendo
## 19	Nintendo EAD		Nintendo
## 20	Nintendo EPD		Nintendo
## 21	Bandai Namco Studios / Sora Ltd.		Nintendo
## 22	Nintendo EAD		Nintendo
## 23	Infinity Ward		Activision
## 24	Blizzard Entertainment		Blizzard Entertainment
## 25	Bethesda Game Studios		Bethesda Softworks
## 26	Game Freak		Nintendo
## 27	Nintendo R&D1		Nintendo
## 28	Nintendo EAD		Nintendo
## 29	Telltale Games		Telltale Games
## 30	Rockstar North		Rockstar Games
## 31	Nintendo EAD		Nintendo
## 32	Infinity Ward / Sledgehammer		Activision
## 33	Treyarch		Activision
## 34	Gearbox Software		2K Games
## 35	Game Freak	Nintendo / The Pokémon Company	
## 36	Game Freak	Nintendo / The Pokémon Company	
## 37	Nintendo EPD		Nintendo
## 38	Rockstar North		Rockstar Games
## 39	Game Freak	Nintendo / The Pokémon Company	

```

## 40             Nintendo EAD           Nintendo
## 41             Treyarch            Activision
## 42             EA Vancouver        EA Sports
## 43             Good Science Studio Xbox Game Studios
## 44             Sonic Team          Sega
## 45             Nintendo EAD        Nintendo
## 46             Nintendo EAD        Nintendo
## 47             Nintendo EAD        Nintendo
## 48             Game Freak          Nintendo / The Pok  mon Company
## 49             Santa Monica Studio Sony Interactive Entertainment
## 50             Rockstar San Diego    Rockstar Games

platforms <- sort(unique(game.data.clean$platform_s))
label_df <- data.frame(platform_s = platforms, median_sales = NA)

```

### Cleaning Steps Description:

This cleans the data names, removes any empty columns or rows, and omits any NA data.

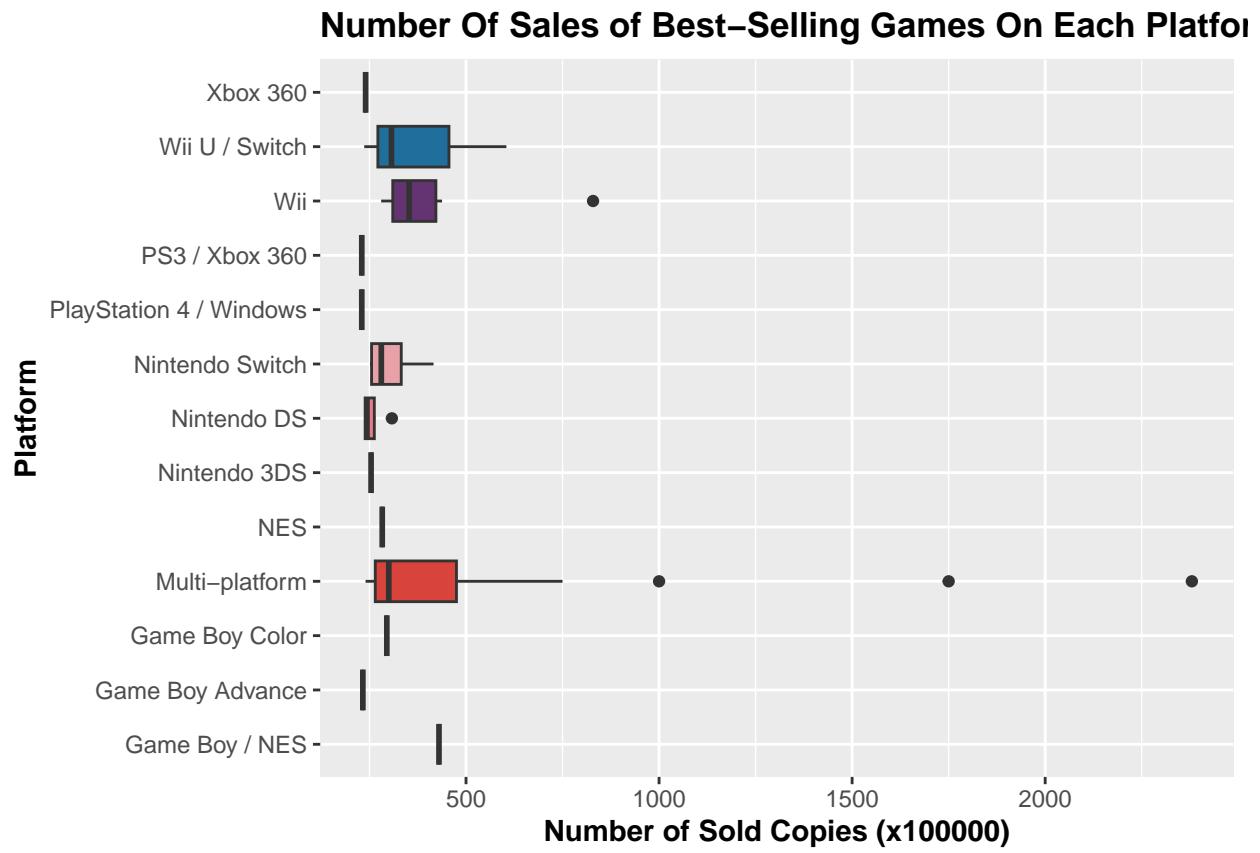
## Visualizations

### Original Plot 1:

```

plot1 <- ggplot(game.data.clean) + geom_boxplot(aes(x = platform_s, y = sales, fill = platform_s)) + the
plot1

```

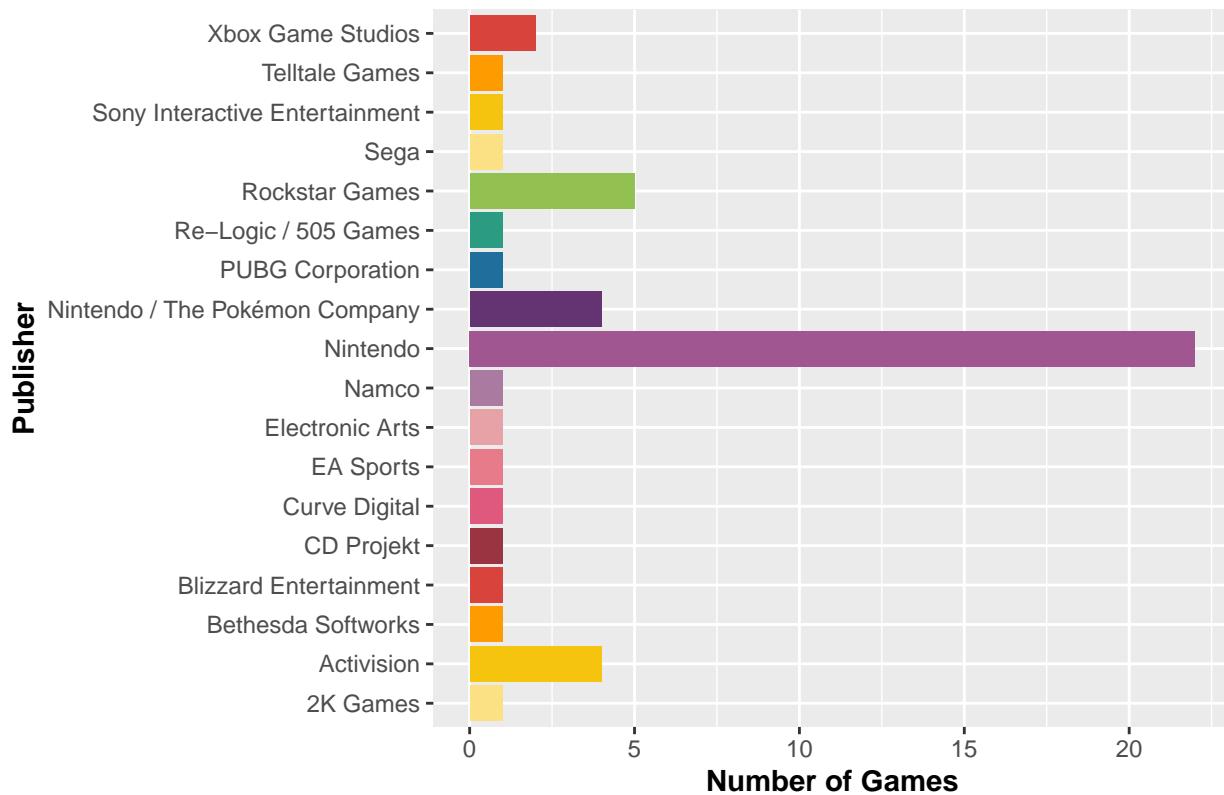


### Description of Plot 1: This plots shows us different platforms that the most sold video games of all time uses.

#### Original Plot 2:

```
color.base <- paletteer::paletteer_d("MetBrewer::Signac")
color <- rep(color.base, length.out = 18)
plot2 <- ggplot(game.data.clean) + geom_bar(aes(x = publisher_s, fill = publisher_s)) + theme(legend.position = "none")
plot2
```

## How Many Best–Selling Games Sold By Each Puk



### Description of Plot 2: These plots show us how many of the best selling video games of all time belong to each publisher.

### Plot 1 with Function and Loop

```
make_plot <- function(data, x_var, y_var, geom_layer) {
  ggplot(data, aes_string(x = x_var, y = y_var, fill = x_var)) +
    geom_layer(width = 0.35) +
    theme(
      legend.position = "none",
      axis.title.x = element_text(face = "bold"),
      axis.title.y = element_text(face = "bold"),
      plot.title = element_text(face = "bold")
    ) +
    coord_flip()
}

plot1 <- make_plot(game.data.clean, "platform_s", "sales", geom_boxplot)

## Warning: `aes_string()` was deprecated in ggplot2 3.0.0.
## i Please use tidy evaluation idioms with `aes()`.
## i See also `vignette("ggplot2-in-packages")` for more information.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

```

plot1 <- plot1 +
  labs(title = "Number Of Sales of Best-Selling Games On Each Platform",
       x = "Platform",
       y = "Number of Sold Copies (x100000)") +
  scale_fill_palleteer_d("MetBrewer::Signac") +
  scale_x_discrete(expand = expansion(mult = c(0.05, 0.1)))

for (i in seq_along(platforms)) {
  p <- platforms[i]
  label_df$median_sales[i] <- median(
    game.data.clean$sales[game.data.clean$platform_s == p],
    na.rm = TRUE
  )
}

label_df

```

	platform_s	median_sales
## 1	Game Boy / NES	430.00
## 2	Game Boy Advance	232.80
## 3	Game Boy Color	294.90
## 4	Multi-platform	300.00
## 5	NES	283.00
## 6	Nintendo 3DS	254.10
## 7	Nintendo DS	243.45
## 8	Nintendo Switch	280.60
## 9	PlayStation 4 / Windows	230.00
## 10	PS3 / Xbox 360	230.00
## 11	Wii	352.60
## 12	Wii U / Switch	307.00
## 13	Xbox 360	240.00

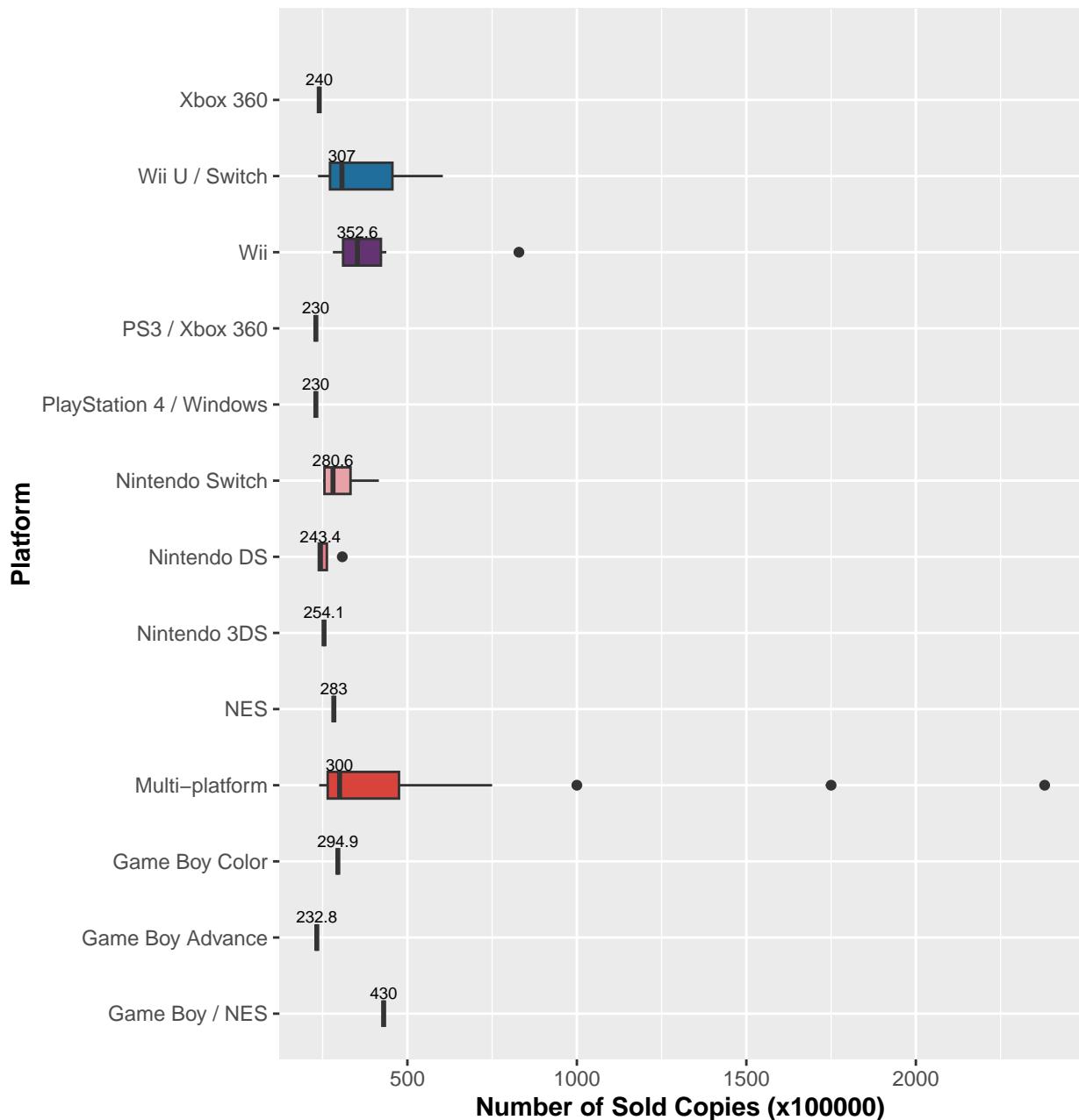
```

plot1_with_mediants <- plot1 +
  geom_text(
    data = label_df,
    aes(x = platform_s,
        y = median_sales,
        label = round(median_sales, 1)),
    color = "black",
    size = 2.5,
    vjust = -1.25,
    hjust = 0.50
  )

plot1_with_mediants

```

## Number Of Sales of Best-Selling Games On Each Platform



## Description of Plot 1 with Function and Loop This plot produces the same visualization as the original code. A “make\_plot” function was made to simplify the code and accept arguments including the data set, x variable, y variable, and geom layer style. A loop was used to create the median values of number of sold copies (x1000000) for each platform, providing a better understanding of which kind of platforms get more sales based on their games.

### Plot 2 with Function and Conditional

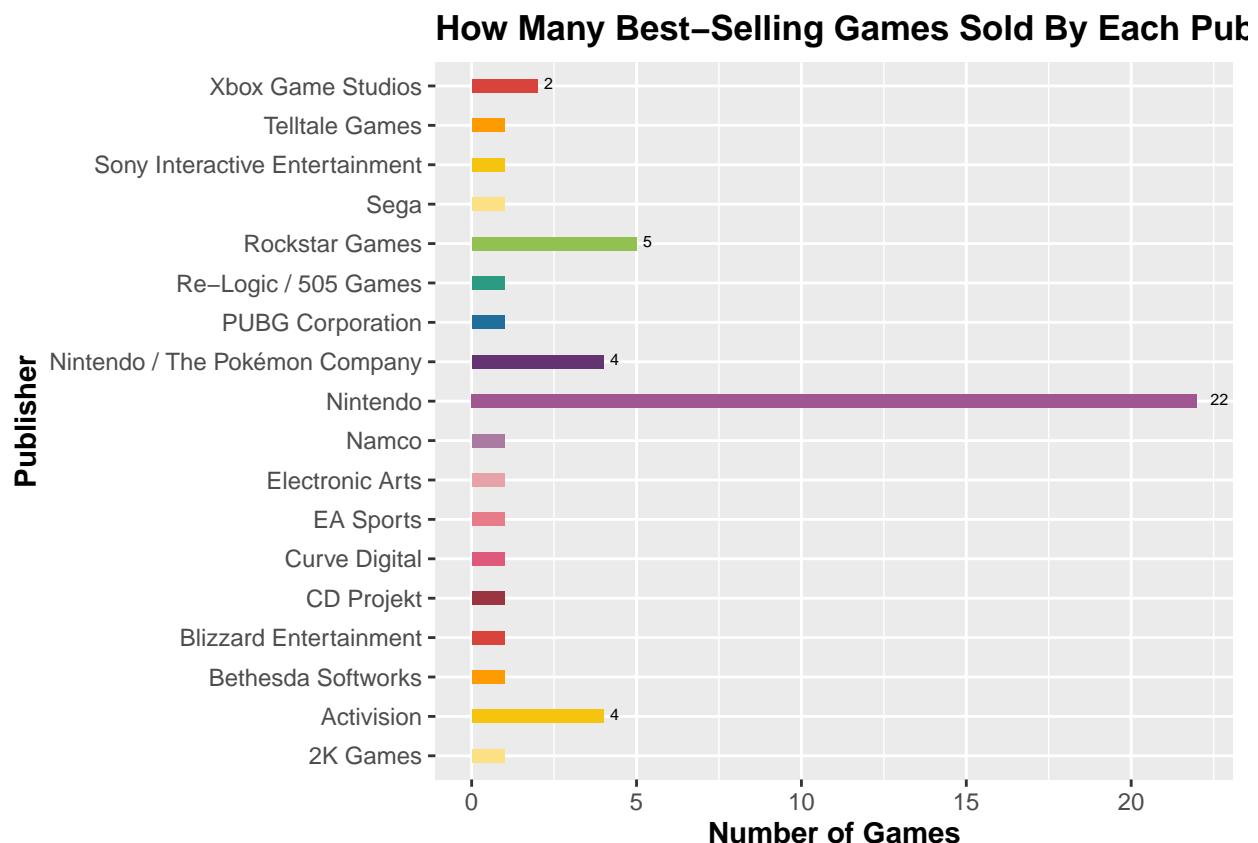
```
plot2 <- make_plot(game.data.clean, "publisher_s", geom_layer = geom_bar) +
  labs(
```

```

    title = "How Many Best-Selling Games Sold By Each Publisher",
    x = "Publisher",
    y = "Number of Games",
    fill = "Publisher"
) +
scale_fill_manual(values = color) +
geom_text(
  stat = "count",
  aes(label = ifelse(after_stat(count) > 1, after_stat(count), "")),
  vjust = 0.3,
  hjust = -0.75,
  size = 2
)

```

plot2



## Description of Plot 2 with Function and Conditional This plot produces the same visualization as the original code. The “make\_plot” function was used to create the visualization. A conditional was added to the geom text layer to include labels for the number of games sold by each publisher if the value was greater than 1. This feature adds an additional visual element that makes interpreting the data easier.

## References

<https://dplyr.tidyverse.org/> <https://ianadamsresearch.com/post/using-ggplot2-to-visualize-the-frequency-of-your-name/> <https://github.com/thomasp85/patchwork#patchwork> <https://www.sthda.com/english/>

[wiki/bar-plots-r-base-graphs](#)    <https://exts.ggplot2.tidyverse.org/gallery/>    [https://r-graph-gallery.com/ggplot2-color.html](#)