

SHETH L.U.J AND SIR M.V. COLLEGE

SUBJECT :- DATA ANALYSIS WITH SAS/SPSS/R

MODULE 2 - PRACTICAL – 6

AIM:- Performing paired t-tests using `t.test(paired=TRUE)` (R).

OUTPUT:-

raji - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Source

Console Terminal Background Jobs

```
R: R 4.1.2 - /n/a/
```

U: C:\Users\IT\Downloads\games.csv

Using a paired t-test compares two related rating measurements of the same variables. Since both observations come from the same subjects, the paired t-test is appropriate. The decision is made using the 5% significance level.

```
> library(dplyr)
```

```
> # 1. Load dataset
```

```
> df <- read.csv("C:\\Users\\IT\\Downloads\\games.csv")
```

```
> print("dataset loaded successfully")
```

```
[1] "dataset loaded successfully"
```

```
> # 2. Dataset Overview
```

```
head(df)
```

	X	Title	Release.Date	Team	Rating	Times.Listed	Number.of.Reviews
1	0	Elden Ring	Dec 25, 2022	['Bandai Namco Entertainment', 'FrontSoftware']	4.5	3.9K	3.9K
2	1	Grand Theft Auto V	Sept 17, 2019	[SuperGiant Games]	4.3	2.9K	2.9K
3	2	The Legend of Zelda: Breath of the Wild	Mar 02, 2017	['Nintendo', 'Nintendo EPD Production Group No. 1']	4.4	4.3K	4.3K
4	3	Undertale	Sep 15, 2015	['tobyfox', '8-bit']	4.2	3.5K	3.5K
5	4	Hollow Knight	Feb 24, 2017	['Team Cherry']	4.4	3K	3K
6	5	Minecraft	Nov 18, 2011	['Mojang Studios']	4.3	2.3K	2.3K

```
df %>%
```

```
  mutate(Genres = c('Adventure', 'RPG'),
```

```
        Rating = as.numeric(Rating))
```

```
  select(-Team)
```

```
  head(df)
```

Summary

1 Elden Ring is a fantasy, action and open world game with RPG elements such as stats, weapons and spells. Rise, Tarnished, and be guided by grace to brandish the power of the Elden Ring and become an Elden Lord in the Lands Between.

2 A rogue-lite hack and slash dungeon crawler in which Zagreus, son of Hades the Greek god of the dead, attempts to escape his home and his oppressive father by fighting the souls of the dead through the various layers of the ever-shifting underworld, while getting to know and forging relationships with its inhabitants.

3 The Legend of Zelda: Breath of the Wild is the first 3D open-world game in the Zelda series. Link can travel anywhere and be equipped with weapons and armor found throughout the world to grant him various bonuses. Unlike many games in the series, Breath of the Wild does not impose a specific order in which quests or dungeons must be completed, while the game still has environmental obstacles such as weather effects, inhospitable lands, or powerful enemies, many of them can be overcome using the right method. A lot of critics ranked Breath of the Wild as one of the best video games of all time.

4 A small child falls into the underground, where monsters have long been banished by humans and are hunting every human that they find. The player controls the child as they try to make it back to the surface through hostile environments, all the while engaging with a turn-based combat system with puzzle-solving and bullet hell elements, as well as other unconventional game mechanics.

5 A 2D metroidvania with an emphasis on close combat and exploration in which the player enters the once-prosperous now-blaek insect kingdom of Hallownest, travels through its various districts.

7 29°C Sunny

Search

ENG IN 15-12-2025

SHETH L.U.J AND SIR M.V. COLLEGE

SUBJECT :- DATA ANALYSIS WITH SAS/SPSS/R

```
raji - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ Go to file/function + Addins +
Source

Console Terminal Background Jobs ×
R: R 4.1.2 - raji@raji
of time I gave this game.", "NAfO sou muito de jogo indie, admito que joguei poucos, mas devo dizer que Hades foi um dos melhores jogos que joguei na vida, facilmente no top 15. Toda sua arte, dublagem, gameplay, carisma dos personagens, A todo incr ... <truncated>
3 ["This game is the game (that is not CS:GO) that I have played the most ever. I have played this game for 400 hours.', "A really good switch game, however didn't really grip me like mario odyssey eye", "I was very disappointed by the final boss fight, but the rest of the game is so good it makes me not want to even do the final boss fight anyway just so i can play more of the game. I do wish that there were more unique mechanics in combat besides just parrying and link's flurry rush, but the world is really pretty and actually incentivizes exploring it. characters are great, s great and makes you work for it, and there's tons of hidden secrets and details.", "em 105 horas de jogo NAfO houve um segundo que eu nAfO tava me divertindo e eu acho que isso diz muit o", "Sencillamente el mejor juego que he tenido el placer de disfrutar, espero 5 Años para poder Jugarlo y puedo decir que valta cada segundo la espera. No estoy ni cerca de conseguir el 10 0, tengo mas de 100 horas y no estoy descubriendo cosas nuevas. Va MAis alla; de un simple juego, es una experiencia que lamentablemente solo se puede vivir ... <truncated>
4 ["soundtrack is tied for #1 with nier automata, a super charming story and characters which have become iconic, and all that made by 1 man. thats it, thats it, ... <truncated>
5 ["this game's worldbuilding is incredible, with its amazing soundtrack and gorgeous art direction it really makes you feel like you're spiderman, one of the best value in gaming tbh, this game is packed full of content and none of it feels like filler, even the boss rush manages to feel fresh by introducing some surprise bosses/boss variants as rewards for beating tough pantheons. cant wait to play silksong when it turn 80!", "This isn't just a game, this is an entire experience.\n\nI was not too much into Metroidvania games before this game came along, and bought into the genre, now I'm seeking for similar experiences and can't wait to play silksong.\n\nWith the game done all 112% in my first run through I'm creating the game again, the I'll aim to master the game on steam, and this is the first game that instigated me to get into Metroidvania.\n\nFaz uns 2/3 anos que eu zeroi esse jogo, mesmo assim nunca saiu da minha memória.\n\nVou reregar para fazer uma análise mais aprofundada.", "Faz uns 2/3 anos que eu zeroi esse jogo, mesmo assim nunca saiu da minha memória.\n\nVou reregar para fazer uma análise mais aprofundada.", "i like how you can bounce on spikes with your nail, a good casual game that offers additional challenges for people that are socially challenged", "A riveting action/adventure game with a stunning design. Extremely rewarding but also gruesomely difficult at times.", "\'ll give this game a 4 for each individual aspect (platforming, exploration, combat) but the integration and packaging of the content are so good, it\'s slightly better than the sum of its parts. Most of the combat and traversal abilities feel useful, and many evoke that sweet Metroid-y, gieef u1 feeling that you\'ll finally be able to access that new area, grab that item, or beat that boss. The end-game challenges, reminiscent of wiley\'s fortress and boss rushes after Megaman has fully self-actualized, were the highlight. Boss ... <truncated>
6 ["Minecraft is what you make of it. unfortunately theres no reason to do anything.", "muito bom, vc pode construir, usar sua imaginação, mods, sobreviver, jogar multiplayer e ate zerar o jogo de minecraft A um jogo incrivel e etc ... <truncated>
7 Plays Playing Backlogs Wishlist
1 17K 3.8K 4.6K 4.8K
2 21K 3.2K 6.3K 3.6K
3 30K 2.8K 5K 2.8K
4 28K 679 4.9K 1.8K
5 21K 2.4K 8.3K 2.3K
6 33K 1.8K 1.1K 230
> str(df)
'data.frame': 1512 obs. of 14 variables:
 $name: chr "Elden Ring" "Hades" "The Legend of Zelda: Breath of the wild" "Undertale" ...
 $rating: num 4.5 4.3 4.4 4.2 4.4 4.3 4.2 4.3 4.3 4.3 ...
 $releasedate: chr "Feb 25, 2022" "Dec 10, 2019" "Mar 03, 2017" "Sep 15, 2015" ...
 $team: chr "[BANDAI Namco Entertainment, 'Fromsoftware']" "[supergiant Games]" "[Nintendo, 'Nintendo EPE Production Group No. 3']" "[tobyfox, '8-4']" ...
 $rating: num 4.5 4.3 4.4 4.2 4.4 4.3 4.2 4.3 4.3 4.3 ...
 $times_listed: chr "3.9K" "2.9K" "4.3K" "3.5K" ...
 $number_of_reviews: chr "3.9K" "2.9K" "4.3K" "3.5K" ...
 $genres: chr "[Adventure, 'RPG']" "[Adventure, 'RPG']" "[Adventure, 'RPG']" "[Adventure, 'Indie', 'RPG', 'Turn Based Strategy']" ...
 $summary: chr "Elden Ring is a fantasy action and open world game with RPG elements such as stats, weapons and spells. Rise." ... <truncated> "A rogue-lite hack and slash dungeon
```

```
raji - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Source
Console Terminal Background Jobs
[R: R-4.1.2 - /nfilj] >
6 33K 1.8K 1.1K 230
> str(df)
'data.frame': 1512 obs. of 14 variables:
 $ X : int 0 1 2 3 4 5 6 7 8 9 ...
 $ Title : chr "Elden Ring" "Hades" "The Legend of Zelda: Breath of the wild" "Undertale" ...
 $ Release.Date: chr "Feb 25, 2022" "Dec 10, 2019" "Mar 03, 2017" "Sep 15, 2015" ...
 $ Team : chr "[Banda] Namco Entertainment" "[FromSoftware]" "[Supergiant Games]" "[Nintendo", "Nintendo EPD Production Group No. 3]" "[tobyfox", "8-4]" ...
 $ Rating : num 4.5 4.3 4.4 4.2 4.4 4.3 4.2 4.3 3 4.3 ...
 $ Skating : num 1.7 1.8 1.9 1.8 1.9 1.8 1.9 1.8 1.9 1.8 ...
 $ Number.of.Reviews: chr "2.9K" "2.9K" "4.3K" "3.5K" ...
$ Genres : chr "[Adventure", "RPG"] "[Adventure", "Brawler", "Indie", "RPG]" "[Adventure", "Indie", "RPG", "Turn Based Strategy"] ...
$ Summary : chr "Elden Ring is a fantasy, action and open world game with RPG elements such as stats, weapons and spells. Rise, " __truncated__ "The Legend of zelda: breath of the wild is the first 3d open-world game in the zelda series. Link ca crawler in which zugreus, son of hades the greek god of the dead, attempts " __truncated__ "the legend of zelda: breath of the wild is the first 3d open-world game in the zelda series. Link ca travel an" __truncated__ "the first playthrough of elden ring is one of the best experiences gaming can offer you but after youve explo" __truncated__ "[convinced this is a roguelike for people who do not like the genre. The art is technically good but the aesth" __truncated__ "[this game is the game (that is not CS:GO) that I have played the most ever. I have played this game for 400 h" __truncated__ "[soundtrack is tied for 21 with nier automata. a super charming story and characters which have become iconic]" __truncated__ ...
$ Plays : chr "17K" "21K" "30K" "28K" ...
$ Playing : chr "3.8K" "3.2K" "2.5K" "679" ...
$ BackLogs : chr "4.6K" "6.3K" "5K" "4.9K" ...
$ Wishlist : chr "4.8K" "3.6K" "2.6K" "1.8K" ...
> dim(df)
[1] 1512 14
>
> # 3. Create Paired variables
> set.seed(123) # for reproducibility
>
> df$rating_Before <- df$Skating
> df$rating_After <- df$Skating + runif(nrow(df), -0.2, 0.2)
>
> print("Summary of Rating Before:")
[1] "Summary of Rating Before:"
> summary(df$rating_Before)
   Min. 1st Qu. Median Mean 3rd Qu. Max. NA's 
0.700  3.400  3.800  3.719  4.100  4.800  13 
>
> print("Summary of Rating After:")
[1] "Summary of Rating After:"
> summary(df$rating_After)
   Min. 1st Qu. Median Mean 3rd Qu. Max. NA's 
0.8352  3.4193  3.7806  3.7179  4.1178  4.8271  13 
> # 4. Prepare Paired Data
```

SHETH L.U.J AND SIR M.V. COLLEGE

SUBJECT :- DATA ANALYSIS WITH SAS/SPSS/R

Rajji - RStudio

```

e Tor 400 h'1 __truncated__ soundtrack is tied TOR #1 with nier automata. a super charming story and characters which have become 'iconic' __truncated__ ...
$ plays      : chr  "17K" "21K" "30K" "28K" ...
$ rating    : chr  "2.8K" "3.2K" "3.5K" "67K" ...
$ backlog   : chr  "4.6K" "6.3K" "5K" "4.9K" ...
$ wishlist  : chr  "4.8K" "3.6K" "2.6K" "1.8K" ...
> dim(df)
[1] 1512 14
>
> # 3. Create Paired Variables
> set.seed(123) # for reproducibility
>
> df$rating_before <- df$rating
> df$rating_after <- df$rating + runif(nrow(df), -0.2, 0.2)
>
> print("Summary of Rating Before:")
[1] "Summary of Rating Before:"
> summary(df$rating_before)
   Min. 1st Qu. Median  Mean 3rd Qu.  Max. NA's 
0.700  3.400  3.800  3.719  4.100  4.800    13
>
> print("Summary of Rating After:")
[1] "Summary of Rating After:"
> summary(df$rating_after)
   Min. 1st Qu. Median  Mean 3rd Qu.  Max. NA's 
0.8352 3.4193 3.7806 3.7179 4.1178 4.8271    13
>
> # 4. Prepare Paired Data
> paired_df <- df %>%
+   select(rating.Before, rating.After) %>%
+   na.omit()
>
> print("Number of paired observations:")
[1] "Number of paired observations:"
> nrow(paired_df)
[1] 1499
>
> # 5. Descriptive Statistics
> mean_before <- mean(paired_df$rating.Before)
> mean_after <- mean(paired_df$rating.After)
>
> print(paste("Mean Rating Before:", round(mean_before, 2)))
[1] "Mean rating before: 3.72"
> print(paste("Mean Rating After:", round(mean_after, 2)))

```

Air Poor Today 12:45 ENG IN 15-12-2025

Rajji - RStudio

```

File Edit Code View Plots Session Build Debug Profile Tools Help
Source Terminal Background Jobs
R R 4.1.2 - ~/Desktop/
> mean_after <- mean(paired_df$rating.After)
>
> print(paste("Mean Rating Before:", round(mean_before, 2)))
[1] "Mean rating before: 3.72"
> print(paste("Mean Rating After:", round(mean_after, 2)))
[1] "Mean rating after: 3.72"
>
> # 6. Paired t-test
> # H0: Mean difference between ratings is zero
> # H1: Mean difference between ratings is not zero
>
> print("Paired t-test Result:")
[1] "Paired t-test Result:"
>
> t_test_result <- t.test(
+   paired_df$rating.Before,
+   paired_df$rating.After,
+   paired = TRUE
+ )
> print(t_test_result)

Paired t-test

data: paired_df$rating.Before and paired_df$rating.After
t = 0.5012, df = 1498, p-value = 0.6163
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-0.004319808 0.007284937
sample estimates:
mean of the differences
0.001482564

>
> # 7. Decision Based on p-value
> if (t_test_result$p.value < 0.05) {
+   print("Reject the null hypothesis")
+ } else {
+   print("Fail to reject the null hypothesis")
+ }
[1] "Fail to reject the null hypothesis"
> print(head(Retail_Product))

```

Air Poor Today 12:45 ENG IN 15-12-2025