

Confidence Interval on Shiny App

Wen-Jie Tseng

Overview

- ▶ What is R?
- ▶ What is Shiny?
- ▶ Comparing the difference of two independent means
 - ▶ <https://goo.gl/ua2Lbb>
- ▶ Conclusion

What is R?

- ▶ R is a language and environment for statistical computing.
- ▶ Some nice properties of R:
 - ▶ R is open source.
 - ▶ R is flexible.
 - ▶ The community of R is still growing.

What is Shiny?

- ▶ Shiny is a web application framework for R.
- ▶ One could turn the analyses into interactive web application.
- ▶ No prerequisite knowledge of HTML, CSS, or JavaScript.

Comparing difference of two independent means

- ▶ Assume there are IQ scores from two *independent* groups of students.
- ▶ The IQ scores follow a normal distribution.

```
library(multicon)
library(gplots)
x <- rnorm(27, 100, 15)
y <- rnorm(27, 108, 15)
grp <- as.factor(rep(c(1, 2), each = 27))
dta <- data.frame(iq=c(x, y), grp=grp)
```

Have a Look in Dataset

```
head(dta)
```

```
##           iq grp
## 1  98.67565   1
## 2  89.86220   1
## 3 106.20190   1
## 4  90.65253   1
## 5  98.16595   1
## 6 100.61708   1
```

```
str(dta)
```

```
## 'data.frame':   54 obs. of  2 variables:
## $ iq : num  98.7 89.9 106.2 90.7 98.2 ...
## $ grp: Factor w/ 2 levels "1","2": 1 1 1 1 1 1 1 1 1 1
```

Descriptive Statistics

```
with(dta, tapply(iq, grp, mean))
```

```
##           1           2  
## 101.1467 108.5700
```

```
with(dta, tapply(iq, grp, sd))
```

```
##           1           2  
## 12.48315 15.43391
```

Independent T-Test

- Now we could conduct an independent t-test to examine if there exists a significant difference between two group means.

```
t.test(x, y)
```

Welch Two Sample t-test

data: x and y

t = -1.9432, df = 49.822, p-value = 0.05766

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-15.0970057 0.2505173

sample estimates:

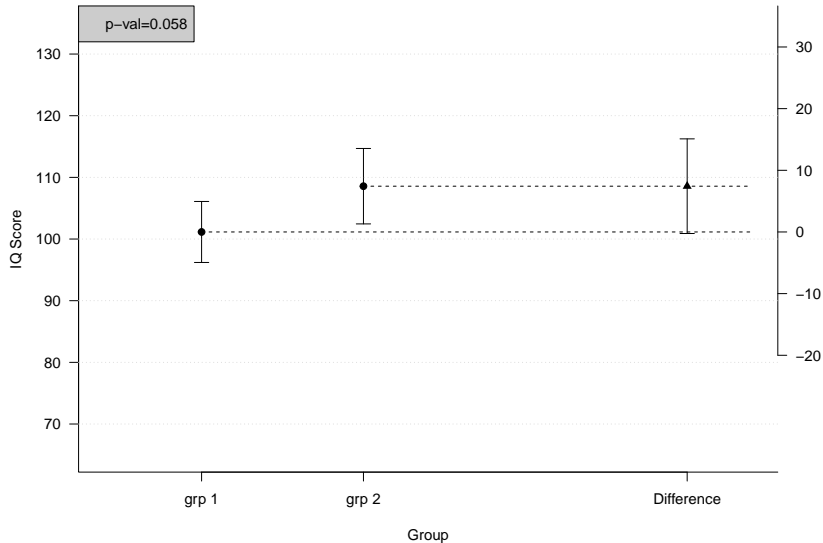
mean of x mean of y

101.1467 108.5700

Draw the Plot

```
diffPlot(iq ~ grp, data = dta, xlab = "Group",  
  ylab = "IQ Score", ylim = c(65, 135),  
  grp.names = c("grp 1", "grp 2"))  
grid(nx=NA, ny=NULL)  
legend('topleft', horiz = TRUE, bg = "gray80",  
  legend = paste('p-val=', round(t.test(x, y)$p.val, 3),  
  sep = ""))
```

Draw the Plot: The Output



Shiny Application

- ▶ Comparing means of two independent groups

Concluion

- ▶ Interactive graphic on Shiny application could help users to have a better understanding.
- ▶ It is efficient to have a web application with R and Shiny.

Code Script of Shiny App

```
1 # ui.R
2
3 shinyUI(fluidPage(
4   h3("Comparing the difference of two independent means"),
5   sidebarLayout(
6     sidebarPanel(
7       sliderInput("diff", label="Difference of means", value=8, max=15,
8         min=-15, step=1),
9       sliderInput("n", label="Sample size", value=27, max=50, min=10, step=1)
10     ),
11     mainPanel(
12       plotOutput("Plot")
13     )
14   )
15 ))
```

Figure 1: ui.R

Code Script of Shiny App

```
1 # server.R
2 library(multicon)
3 library(gplots)
4 set.seed(2000)
5 shinyServer(function(input, output){
6   output$Plot <- renderPlot({
7     y <- rnorm(input$N, 100 + input$diff, 15)
8     set.seed(1)
9     x <- rnorm(input$N, 100, 15)
10    grp <- as.factor(rep(c(1, 2), c(input$N, input$N)))
11    dta <- data.frame(iq=c(x, y), grp=grp)
12    result <- t.test(x, y)
13
14    #
15    diffPlot(iq ~ grp, data=dta, xlab="Group", ylab="IQ Score",
16             ylim=c(65, 135), grp.names = c("grp 1", "grp 2"))
17    grid(nx=NA, ny=NULL)
18    legend('topleft', legend=paste('p-val=', round(result$p.val, 3), sep=""),
19           horiz=T, bg="gray80")
20  })
21 })
```

Figure 2: server.R

Start using R!

- ▶ R could make statistical and data analysis easier!

Thank you for your attention!