A35_Hoermann

Paul Hörmann

1/6/2020

```
library(data.table)
library(tidyr)
```

```
x = c(122, 120, 123, 126, 124)
y = c(114, 125, 121, 127, 128)
z = c(118, 129, 131, 135, 137)
data = data.table(x, y, z)
data
```

```
##      x   y   z
## 1: 122 114 118
## 2: 120 125 129
## 3: 123 121 131
## 4: 126 127 135
## 5: 124 128 137
```

Wilcoxon singed-rank

```
diff = data.table(diff = (data$x - data$y))
diff$abs = abs(diff$diff)
as.data.table(diff)
```

```
##    diff abs
## 1:    8   8
## 2:   -5   5
## 3:    2   2
## 4:   -1   1
## 5:   -4   4
```

```
o = order(diff$abs)
odiff = diff[o]
odiff$rank = seq.int(nrow(odiff))
odiff
```

```
##    diff abs rank
## 1:   -1   1    1
## 2:    2   2    2
## 3:   -4   4    3
## 4:   -5   5    4
## 5:    8   8    5
```

```
wm = 1 + 3 + 4
wp = 2 + 5
v = min(c(wm, wp))
v
```

```
## [1] 7
```

```
wilcox.test(data$x, data$y, paired = T)
```

```
##
##  Wilcoxon signed rank test
##
## data:  data$x and data$y
## V = 7, p-value = 1
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(data$x, data$z, paired = T)
```

```
## Warning in wilcox.test.default(data$x, data$z, paired = T): cannot compute
## exact p-value with ties
```

```
##
##  Wilcoxon signed rank test with continuity correction
##
## data:  data$x and data$z
## V = 1, p-value = 0.1041
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(data$y, data$z, paired = T)
```

```
## Warning in wilcox.test.default(data$y, data$z, paired = T): cannot compute
## exact p-value with ties
```

```
##
##  Wilcoxon signed rank test with continuity correction
##
## data:  data$y and data$z
## V = 0, p-value = 0.05791
## alternative hypothesis: true location shift is not equal to 0
```

Wilcoxon-Mann-Whitney U-test

```
wmwv = sort(c(data$x, data$y))
wmw = data.table(n = seq.int(2*nrow(data)), v = wmwv)
wmw
```

```
##       n   v
##  1:  1 114
##  2:  2 120
##  3:  3 121
##  4:  4 122
##  5:  5 123
##  6:  6 124
##  7:  7 125
##  8:  8 126
##  9:  9 127
## 10: 10 128
```

```
wmwranked = data.table(n = seq.int(nrow(data)), x = data$x, rx = c(4, 2, 5, 8, 6), y = data$y, ry = c(1
wmwranked
```

```
##    n   x rx   y ry
## 1: 1 122  4 114  1
## 2: 2 120  2 125  7
## 3: 3 123  5 121  3
## 4: 4 126  8 127  9
```

```
## 5: 5 124  6 128 10
```

```
ux = sum(wmwranked$rx) - 5*6/2
uy = sum(wmwranked$ry) - 5*6/2
ustat = min(c(ux, uy))
ustat
```

```
## [1] 10
```

```
ustat < 2
```

```
## [1] FALSE
```

```
wilcox.test(data$x, data$y)
```

```
##
##  Wilcoxon rank sum test
##
## data:  data$x and data$y
## W = 10, p-value = 0.6905
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(data$x, data$z)
```

```
##
##  Wilcoxon rank sum test
##
## data:  data$x and data$z
## W = 5, p-value = 0.1508
## alternative hypothesis: true location shift is not equal to 0
```

```
wilcox.test(data$y, data$z)
```

```
##
##  Wilcoxon rank sum test
##
## data:  data$y and data$z
## W = 4, p-value = 0.09524
## alternative hypothesis: true location shift is not equal to 0
```