2021101113_Beferroni_Activity

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Contents

```r
raw_p_values <- c(0.005,0.001,0.01,0.0005,0.0009,0.04,0.056,0.05,0.048,0.013,0.037,0.043,0.002,0.025,0.
sorted_p_values <- sort(raw_p_values)
bonferroni_adjusted <- p.adjust(sorted_p_values, method = "bonferroni", n = length(sorted_p_values))
hochberg_adjusted <- p.adjust(sorted_p_values, method = "hochberg", n = length(sorted_p_values))
print("Sorted p-values:")
```

```
## [1] "Sorted p-values:"
```

```r
print(sorted_p_values)
```

```
##  [1] 0.0005 0.0009 0.0010 0.0020 0.0050 0.0100 0.0130 0.0250 0.0370 0.0400
## [11] 0.0430 0.0480 0.0500 0.0560 0.0700 0.0800 0.1100
```

```r
print("Bonferroni-adjusted p-values:")
```

```
## [1] "Bonferroni-adjusted p-values:"
```

```r
print(bonferroni_adjusted)
```

```
##  [1] 0.0085 0.0153 0.0170 0.0340 0.0850 0.1700 0.2210 0.4250 0.6290 0.6800
## [11] 0.7310 0.8160 0.8500 0.9520 1.0000 1.0000 1.0000
```

```r
print("Hochberg-adjusted p-values:")
```

```
## [1] "Hochberg-adjusted p-values:"
```

```r
print(hochberg_adjusted)
```

```
##  [1] 0.0085 0.0144 0.0150 0.0280 0.0650 0.1100 0.1100 0.1100 0.1100 0.1100
## [11] 0.1100 0.1100 0.1100 0.1100 0.1100 0.1100 0.1100
```

```r
library(reshape2)
library(ggplot2)

plot_data <- data.frame(x = c(1:17),
                        raw = sorted_p_values,
                        bonferroni = bonferroni_adjusted,
                        hochberg = hochberg_adjusted,
                        reference = rep(0.05, 17)) # Replicating 0.05 for comparison line

adjusted_p_values_plot <- ggplot(plot_data, aes(x)) +
  geom_line(aes(y = raw), color = "blue") +
  geom_line(aes(y = bonferroni), color = "red") +
  geom_line(aes(y = hochberg), color = "green") +
  geom_line(aes(y = reference), color = "black", linetype = "twodash") +
  labs(title = "Comparison of p-value adjustments",
       x = "Sorted outcomes",
       y = "p-values")

print(adjusted_p_values_plot)
```
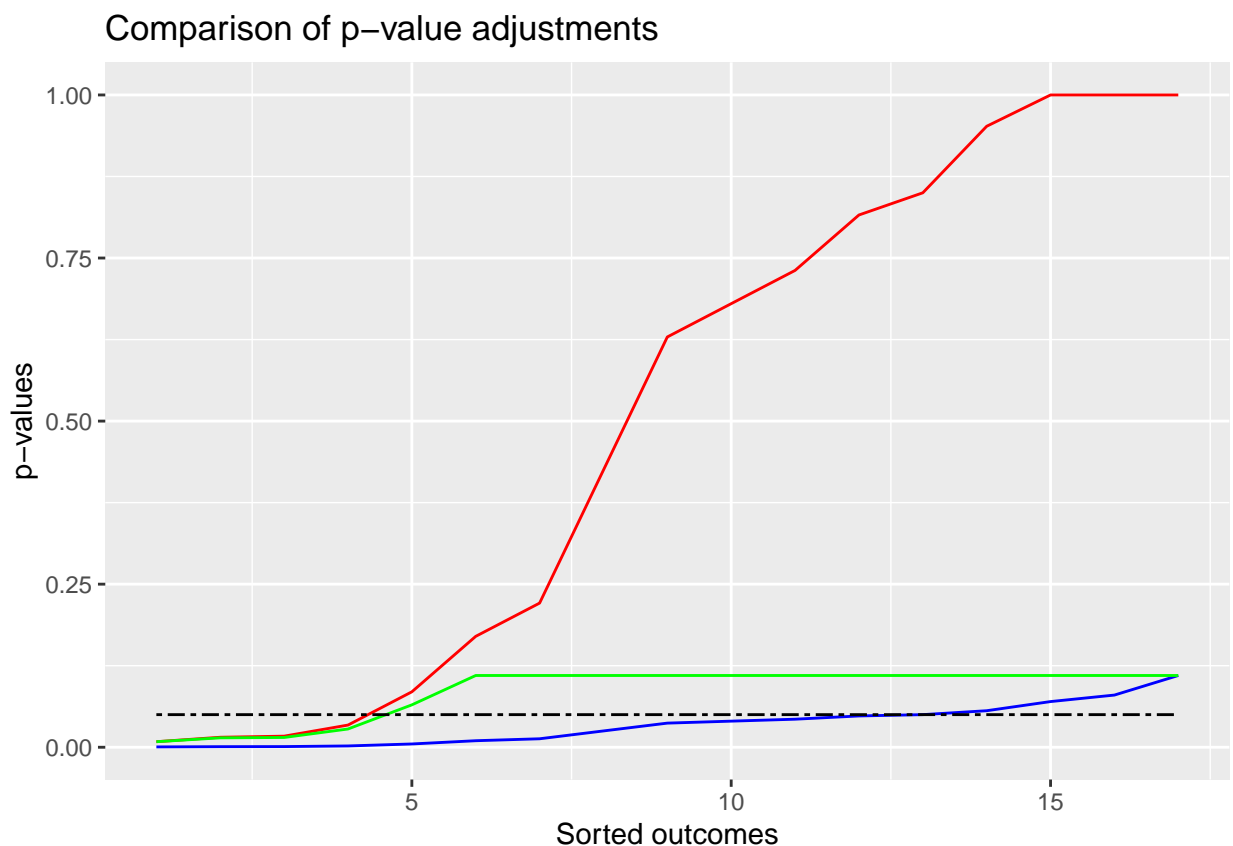

- The yellow line represents unadjusted p-values, while the red line depicts Benjamini-Hochberg corrected p-values, and the green line shows Bonferroni corrected p-values. Additionally, the black dotted line represents the alpha level set at 0.05.

- Interpretation based on the line plot:

– The Bonferroni method, known for its conservatism, is reflected in the results of the correction. The multiplication of the number of observations to correct the p-values leads to notably higher values compared to the unadjusted p-values.
– On the other hand, the Benjamini-Hochberg method adjusts while considering constraints, resulting in intuitively higher values than unadjusted p-values but lower than Bonferroni corrections. This observation aligns with the trends depicted in the plotted graph.

The analysis drawn from the graph suggests that elevated adjusted p-values for the mentioned tests suggest a limited level of evidence supporting an impact. The Bonferroni adjustment appears stricter as it results in higher adjusted p-values. Conversely, the Benjamini-Hochberg adjustment, correlating with lower adjusted p-values compared to our alpha level, is comparatively less stringent.