Simulation_2_res_visualization_notebook

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Clarification for the alternative patterns

Linear

$y = 2x + 5$

Convex

$y = 2x^2 + 2x + 5$

Concave

$y = (-2)x^2 + 2x + 5$

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

```
## Warning: package 'data.table' was built under R version 4.4.2
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.2
```

```
library(ggpubr)
```

```
## Warning: package 'ggpubr' was built under R version 4.4.2
```

```
sim2 <- fread("C:/Users/Qba Liu/Documents/STUDIA/BIOINF_MASTER_BERLIN/MASTER_THESIS/SIMULATION_POLIGON/S
head(sim2)
```

```
##       V1 alternative_patterns sample_sizes power_global power_max
##    <int>               <char>        <int>        <num>     <num>
## 1:     1               linear            5        0.000     0.058
## 2:     2               linear            6        0.003     0.058
## 3:     3               linear            7        0.057     0.041
## 4:     4               linear            8        0.372     0.047
## 5:     5               linear            9        0.786     0.056
## 6:     6               linear           10        0.961     0.047
```

Plot the power across the sample sizes for each alternative pattern

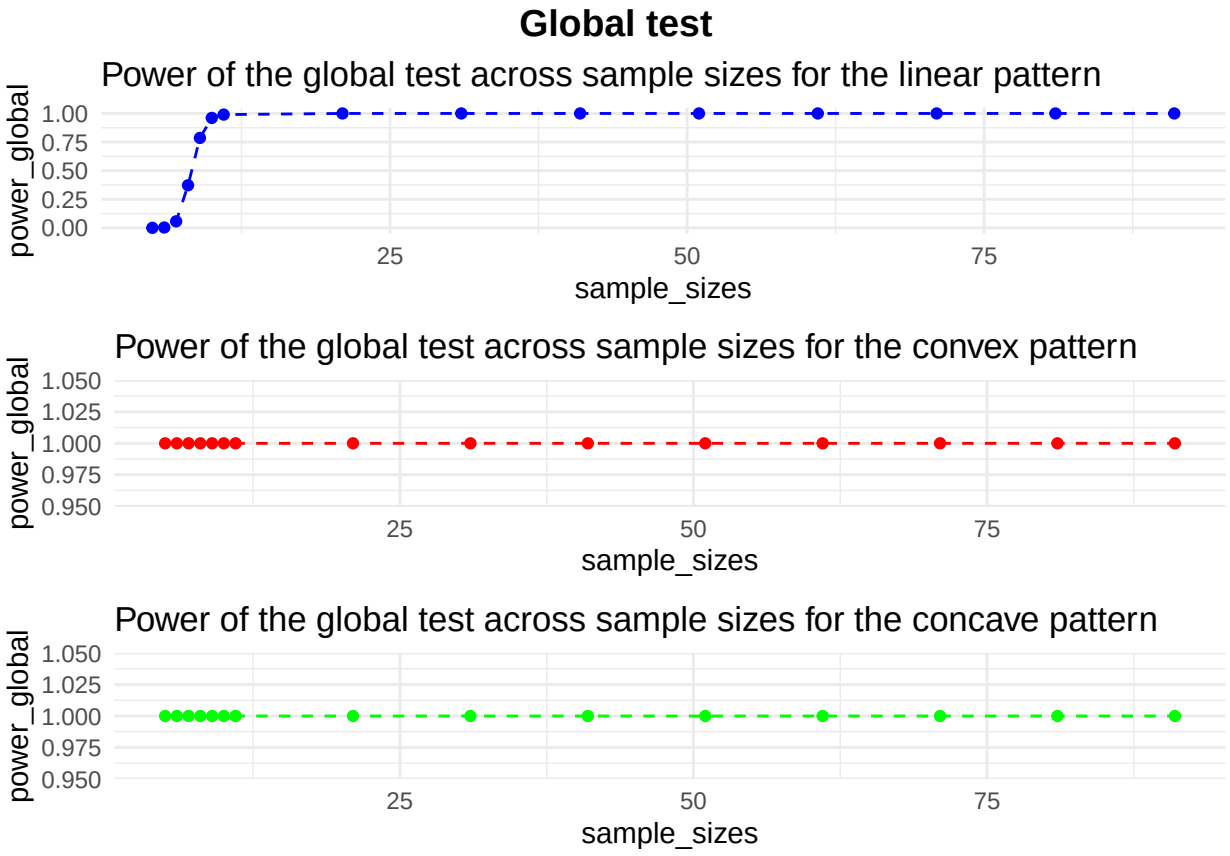
Global test

```
plot1 <- ggplot(sim2[sim2$alternative_patterns == 'linear',], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the linear pattern") +
  theme_minimal()

plot2 <- ggplot(sim2[sim2$alternative_patterns == 'convex',], aes(x = sample_sizes, y = power_global)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the convex pattern") +
  theme_minimal()

plot3 <- ggplot(sim2[sim2$alternative_patterns == 'concave',], aes(x = sample_sizes, y = power_global))
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the concave pattern") +
  theme_minimal()

combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Global test",
                                color = "black", face = "bold", size = 14))
```



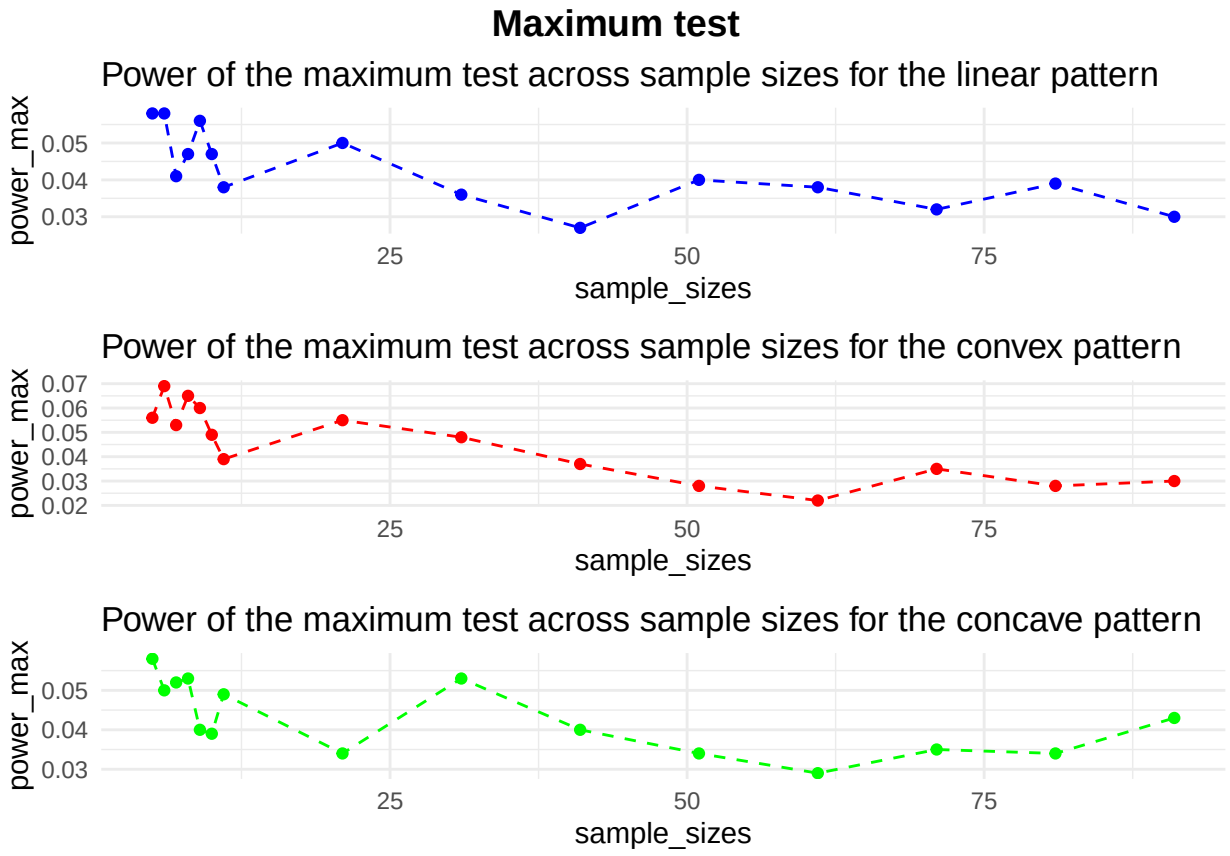
Maximum test

```
plot1 <- ggplot(sim2[sim2$alternative_patterns == 'linear',], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the linear pattern") +
  theme_minimal()

plot2 <- ggplot(sim2[sim2$alternative_patterns == 'convex',], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the convex pattern") +
  theme_minimal()

plot3 <- ggplot(sim2[sim2$alternative_patterns == 'concave',], aes(x = sample_sizes, y = power_max)) +
  geom_point(color = "green") +
  geom_line(color = "green", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the concave pattern") +
  theme_minimal()

combined_plot <- ggarrange(plot1, plot2, plot3, ncol = 1, nrow = 3)
annotate_figure(combined_plot,
                top = text_grob("Maximum test",
                                color = "black", face = "bold", size = 14))
```


Maximum test
Power of the maximum test across sample sizes for the linear pattern
power_max
0.05
0.04
0.03
25
50
75
sample_sizes
Power of the maximum test across sample sizes for the convex pattern
power_max
0.07
0.06
0.05
0.04
0.03
0.02
25
50
75
sample_sizes
Power of the maximum test across sample sizes for the concave pattern
power_max
0.05
0.04
0.03
25
50
75
sample_sizes