

Simulation 4 results visualization

Jakub Liu

2025-02-24

```
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
```

```
sim4 <- fread("C:/Users/Qba Liu/Documents/STUDIA/BIOINF_MASTER_BERLIN/MASTER_THESIS/SIMULATION_POLIGON/
```

Stratify by covariance structure

```
unst <- sim4[sim4$covariance_structures == 'Unstructured',]  
AR1 <- sim4[sim4$covariance_structures == 'AR(1)',]  
AR2 <- sim4[sim4$covariance_structures == 'AR(2)',]  
toe <- sim4[sim4$covariance_structures == 'Toeplitz',]
```

Plot the power for both tests and all covariance structures across the dimensionalities

```
# Unstructured covariance matrix  
  
plot1 <- ggplot(unst, aes(x = dimensions, y = power_global)) +  
  geom_point(color = "blue") +  
  geom_line(color = "blue", linetype = "dashed") +  
  ggtitle("Power of the global test across sample sizes for the unstructured covariance matrix.") +  
  theme_minimal()  
  
plot2 <- ggplot(unst, aes(x = dimensions, y = power_max)) +
```

```

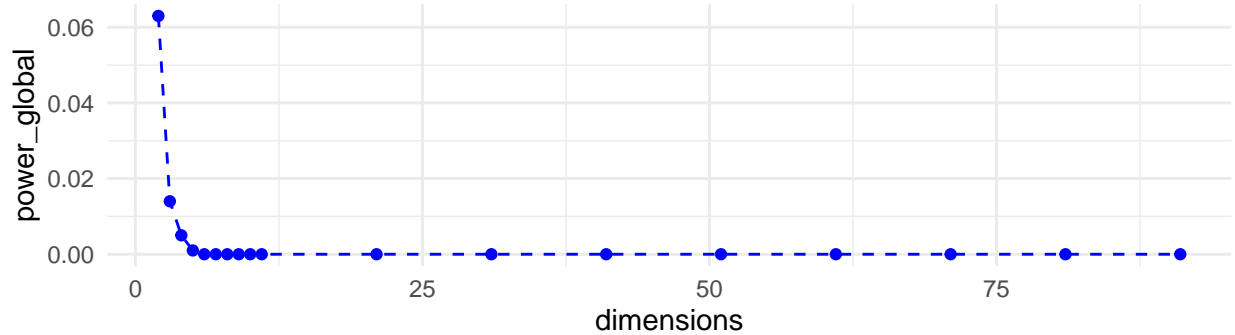
geom_point(color = "red") +
geom_line(color = "red", linetype = "dashed") +
ggtitle("Power of the maximum test across sample sizes for the unstructured covariance matrix.") +
theme_minimal()

combined_plot <- ggarrange(plot1, plot2, ncol = 1, nrow = 2)
annotate_figure(combined_plot,
                top = text_grob("Unstructured covariance matrix",
                                color = "black", face = "bold", size = 14))

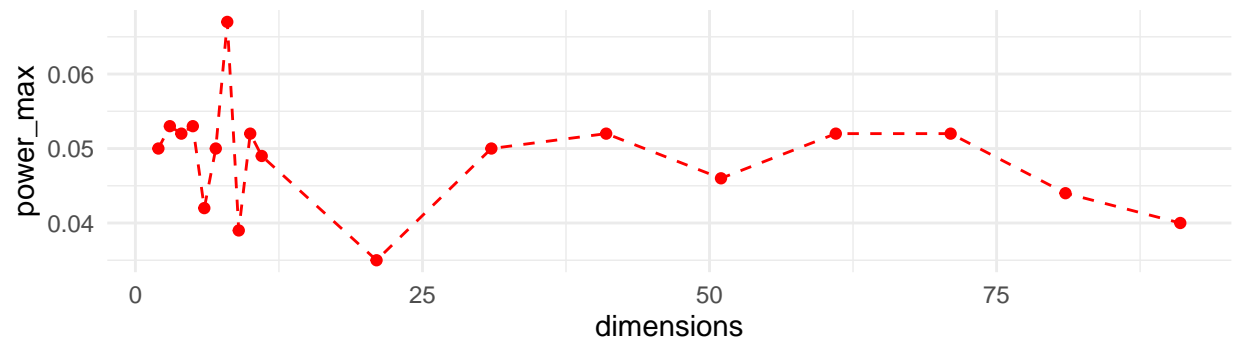
```

Unstructured covariance matrix

Power of the global test across sample sizes for the unstructured covariance matrix



Power of the maximum test across sample sizes for the unstructured covariance matrix



```

# AR(1) covariance matrix

plot1 <- ggplot(AR1, aes(x = dimensions, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the AR(1) covariance matrix.") +
  theme_minimal()

plot2 <- ggplot(AR1, aes(x = dimensions, y = power_max)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the AR(1) covariance matrix.") +
  theme_minimal()

combined_plot <- ggarrange(plot1, plot2, ncol = 1, nrow = 2)

```

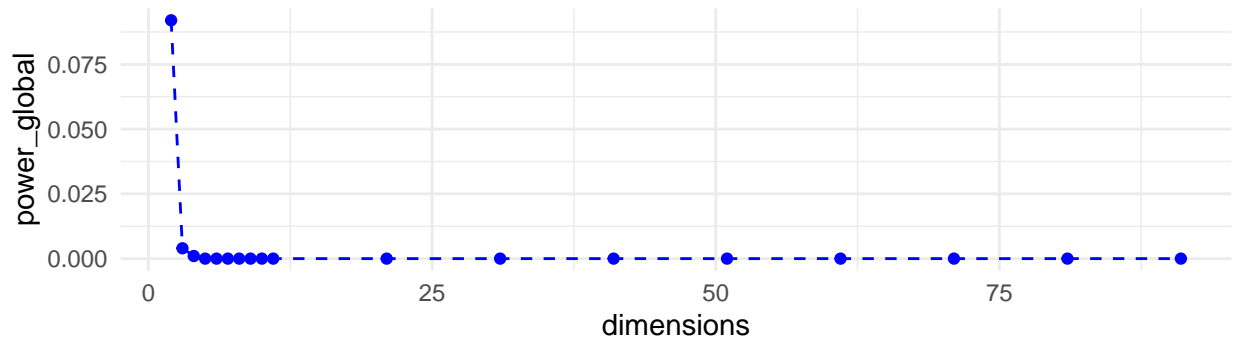
```

annotate_figure(combined_plot,
  top = text_grob("AR(1) covariance matrix",
    color = "black", face = "bold", size = 14))

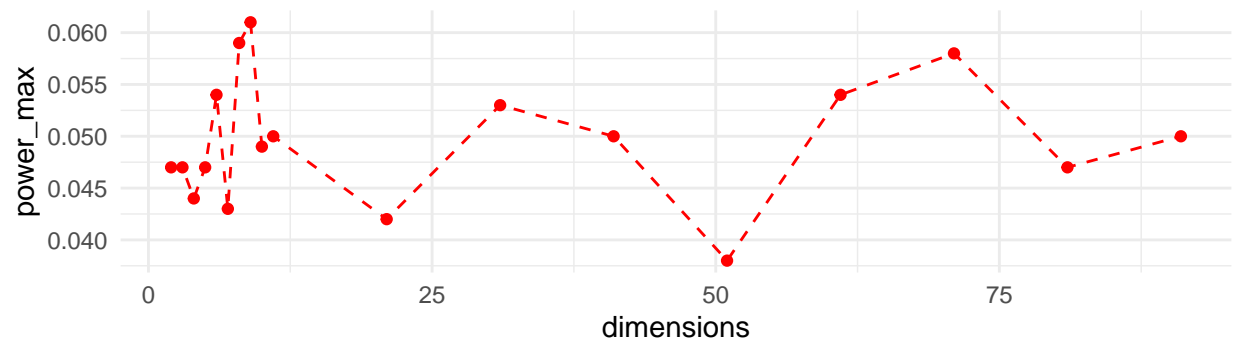
```

AR(1) covariance matrix

Power of the global test across sample sizes for the AR(1) covariance matrix



Power of the maximum test across sample sizes for the AR(1) covariance matrix



```

# AR(2) covariance matrix

```

```

plot1 <- ggplot(AR2, aes(x = dimensions, y = power_global)) +
  geom_point(color = "blue") +
  geom_line(color = "blue", linetype = "dashed") +
  ggtitle("Power of the global test across sample sizes for the AR(2) covariance matrix.") +
  theme_minimal()

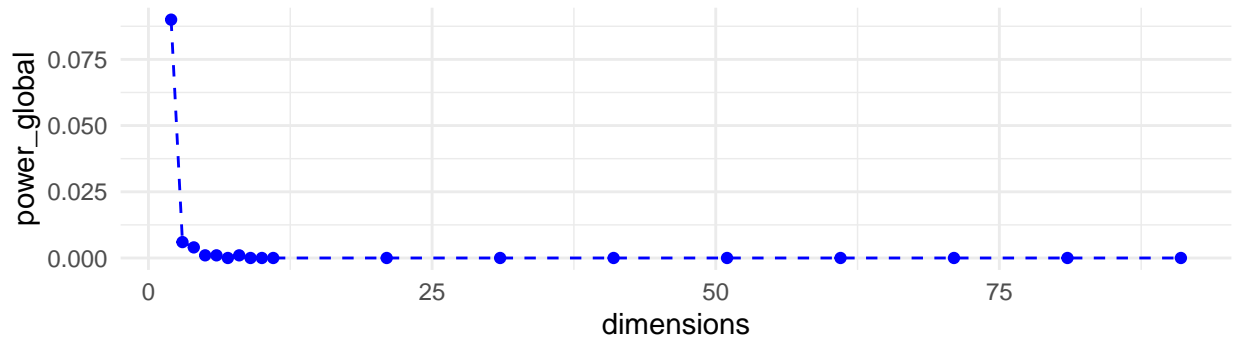
plot2 <- ggplot(AR2, aes(x = dimensions, y = power_max)) +
  geom_point(color = "red") +
  geom_line(color = "red", linetype = "dashed") +
  ggtitle("Power of the maximum test across sample sizes for the AR(2) covariance matrix.") +
  theme_minimal()

combined_plot <- ggarrange(plot1, plot2, ncol = 1, nrow = 2)
annotate_figure(combined_plot,
  top = text_grob("AR(2) covariance matrix",
    color = "black", face = "bold", size = 14))

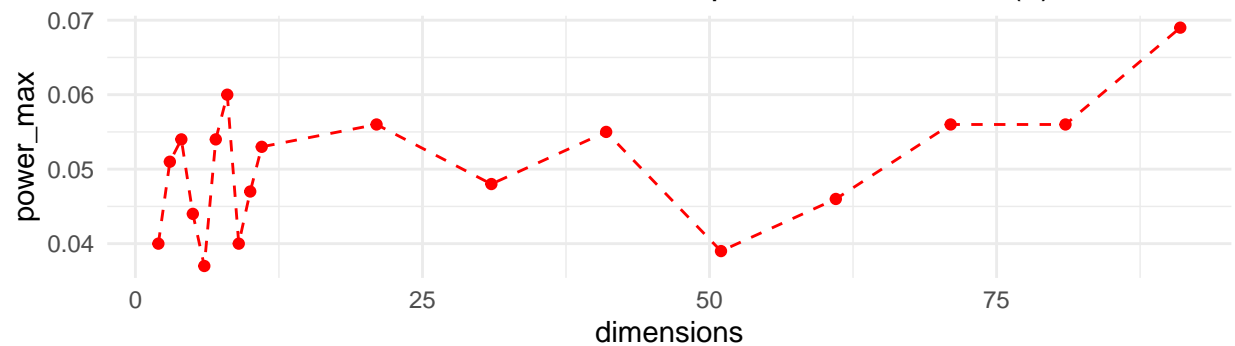
```

AR(2) covariance matrix

Power of the global test across sample sizes for the AR(2) covariance matrix



Power of the maximum test across sample sizes for the AR(2) covariance matrix

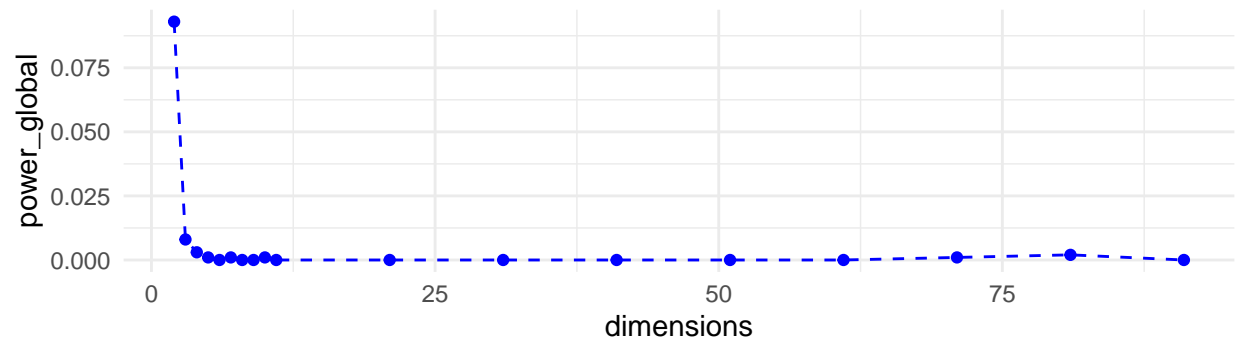


```
# Toeplitz covariance matrix
```

```
plot1 <- ggplot(toe, aes(x = dimensions, y = power_global)) +  
  geom_point(color = "blue") +  
  geom_line(color = "blue", linetype = "dashed") +  
  ggtitle("Power of the global test across sample sizes for the Toeplitz covariance matrix.") +  
  theme_minimal()  
  
plot2 <- ggplot(toe, aes(x = dimensions, y = power_max)) +  
  geom_point(color = "red") +  
  geom_line(color = "red", linetype = "dashed") +  
  ggtitle("Power of the maximum test across sample sizes for the Toeplitz covariance matrix.") +  
  theme_minimal()  
  
combined_plot <- ggarrange(plot1, plot2, ncol = 1, nrow = 2)  
annotate_figure(combined_plot,  
  top = text_grob("Toeplitz covariance matrix",  
    color = "black", face = "bold", size = 14))
```

Toeplitz covariance matrix

Power of the global test across sample sizes for the Toeplitz covariance matrix



Power of the maximum test across sample sizes for the Toeplitz covariance matrix

