# Projet Long

*Shogofa MORTAZA*

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## Importation des données

## Visualisation des données

## Tests statistiques

- Importation des données

```
load('../results/data.RData')
dim(data)
```

```
## [1] 53617    27
```

```
#rearrangement des col utiles de data
w_data=data[,c(1,6,11,16,21,2,7,12,17,22,3,8,13,18,23,4,9,14,19,24,5,10,15,20,25)]
#Enregistrement du nouveau tableau
save(w_data, file = "../results/w_data.RData")
#ouverture de ces données
load('../results/w_data.RData')
```

- Design

```
design <- matrix(c(rep(c(1,0,0,0,0),5),rep(c(0,1,0,0,0),5),
                   rep(c(0,0,1,0,0),5),rep(c(0,0,0,1,0),5),
                   rep(c(0,0,0,0,1),5)), ncol=5,byrow=TRUE)
colnames(design) <- c("Baseline","Ctrl","HNO3","M1","M2")
rownames(design) <- colnames(w_data)
design <- data.frame(design)
```

- Design permuté

```
#avoir le nb de lignes et de colonnes de la matrice design
dim(design)
```

```
## [1] 25  5
```

```
#creation de la matrice permutated de la meme dimension que la matrice design
#permutated_design = matrix(nrow = 25, ncol = 5)
#for (i in seq(dim(design)[2])){
#  print(i)
#  print(design[,i])
#  random_lables <- sample(design[,i])
#  print(random_lables)
#  permutated_design[,i] <- random_lables
#}
#colnames(permutated_design) <- c("Baseline","Ctrl","HNO3","M1","M2")
#rownames(permutated_design) <- colnames(w_data)
#permutated_design <- data.frame(permutated_design)
#enregistrement des données car comme sample, alors change tt le tps
#save(permutated_design, file = "./results/permutated_design.RData")
```

```
#chargement des données
load('../results/permutated_design.RData')
```

- Anova des données réelles

```
#importation de la librairie limma
library(limma)
#conditions à comparer
contrast.matrix <- makeContrasts(Ctrl-HNO3, HNO3-M1, HNO3-M2, M1-M2,
                                 Baseline-Ctrl, levels=design)
#paramètres du modèle ajustés en fct de nos données
fit <- lmFit(log2(w_data), design)
#recherche de differences significatives
eBayesResultat <- eBayes(contrasts.fit(fit, contrast.matrix))
```

- Anova des données simulées

```
#conditions à comparer
contrast.matrix1 <- makeContrasts(Ctrl-HNO3, HNO3-M1, HNO3-M2, M1-M2,
                                  Baseline-Ctrl, levels=permutated_design)
#paramètres du modèle ajustés en fct de nos données
perm_fit <- lmFit(log2(w_data), permutated_design)
#recherche de differences significatives
perm_eBayesResultat <- eBayes(contrasts.fit(perm_fit, contrast.matrix1))
```

- Calcul des pvalues

```
#données réelles
CtrlvsHNO3 <- eBayesResultat$p.value[,1]
HNO3vsM1 <- eBayesResultat$p.value[,2]
HNO3vsM2 <- eBayesResultat$p.value[,3]
M1vsM2 <- eBayesResultat$p.value[,4]
BaselinevsCtrl <- eBayesResultat$p.value[,5]
#données permutées
perm_CtrlvsHNO3 <- perm_eBayesResultat$p.value[,1]
perm_HNO3vsM1 <- perm_eBayesResultat$p.value[,2]
perm_HNO3vsM2 <- perm_eBayesResultat$p.value[,3]
perm_M1vsM2 <- perm_eBayesResultat$p.value[,4]
perm_BaselinevsCtrl <- perm_eBayesResultat$p.value[,5]
```

- Calcul des fold change

```
#données réelles
fc.CtrlvsHNO3 <- rowMeans(w_data[,design$Ctrl==1])-
  rowMeans(w_data[,design$HNO3==1])
fc.HNO3vsM1 <- rowMeans(w_data[,design$HNO3==1])-
  rowMeans(w_data[,design$M1==1])
fc.HNO3vsM2 <- rowMeans(w_data[,design$HNO3==1])-
  rowMeans(w_data[,design$M2==1])
fc.M1vsM2 <- rowMeans(w_data[,design$M1==1])-rowMeans(w_data[,design$M2==1])
fc.BaselinevsCtrl <- rowMeans(w_data[,design$Baseline==1])-
  rowMeans(w_data[,design$Ctrl==1])
#données simulées
perm_fc.CtrlvsHNO3 <- rowMeans(w_data[,permutated_design$Ctrl==1])-
  rowMeans(w_data[,permutated_design$HNO3==1])
perm_fc.HNO3vsM1 <- rowMeans(w_data[,permutated_design$HNO3==1])-
  rowMeans(w_data[,permutated_design$M1==1])
```

```
perm_fc.HNO3vsM2 <- rowMeans(w_data[,permutated_design$HNO3==1])-
  rowMeans(w_data[,permutated_design$M2==1])
perm_fc.M1vsM2 <- rowMeans(w_data[,permutated_design$M1==1])-
  rowMeans(w_data[,permutated_design$M2==1])
perm_fc.BaselinevsCtrl <- rowMeans(w_data[,permutated_design$Baseline==1])-
  rowMeans(w_data[,permutated_design$Ctrl==1])
```