

# fMRI\_Analysis

2022-11-27

## Import data

```
# Change file extension
# path <- "./data/data/"
# old_names <- list.files(path)
# new_names <- gsub(".1D", ".csv", old_names)
# file.rename(paste0(path, file_names), paste0(path, new_names))

# Import data
diag <- read_csv("./data/phenotypic_CMU.csv") %>% janitor::clean_names()
```

## Single-subject analysis

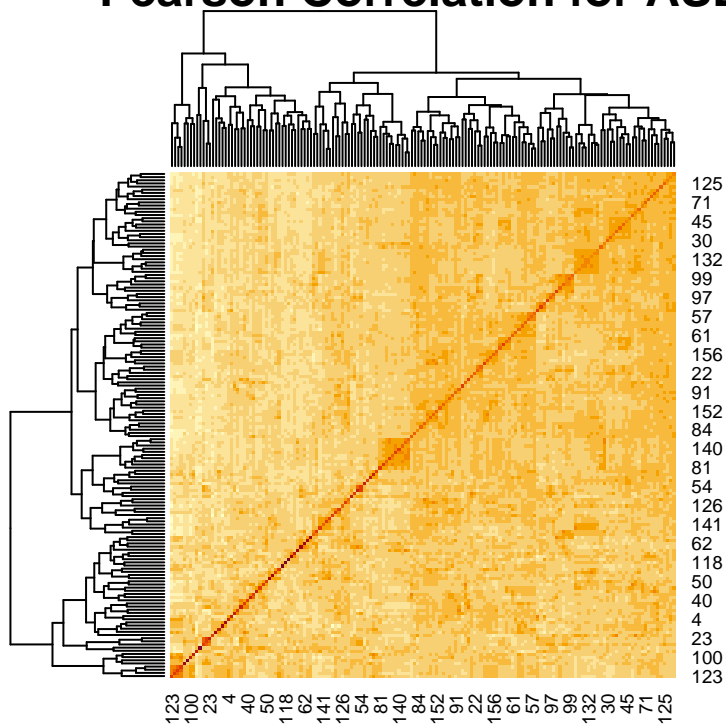
```
path <- "./data/data/"
indepTest <- gaussCItest

# Find asd vs. control
df_file_names <- inner_join(data.frame(name = list.files("./data/data/"),
                                       sub_id = as.numeric(substring(list.files("./data/data/"), 7, 13)),
                                       diag, by = "sub_id")
asd_files <- df_file_names %>% filter(dx_group == 1) %>%
  select(1) %>% mutate(name = paste(path, name, sep = ""))
tc_files <- df_file_names %>% filter(dx_group == 2) %>%
  select(1) %>% mutate(name = paste(path, name, sep = ""))

par = c(mfrow = c(3, 2))
# --- ASD ---
asd_dat <- fread(sample(as.matrix(asd_files), 1), select = c(1:160))
suffStat_asd <- list(C = cor(asd_dat), n = nrow(asd_dat))

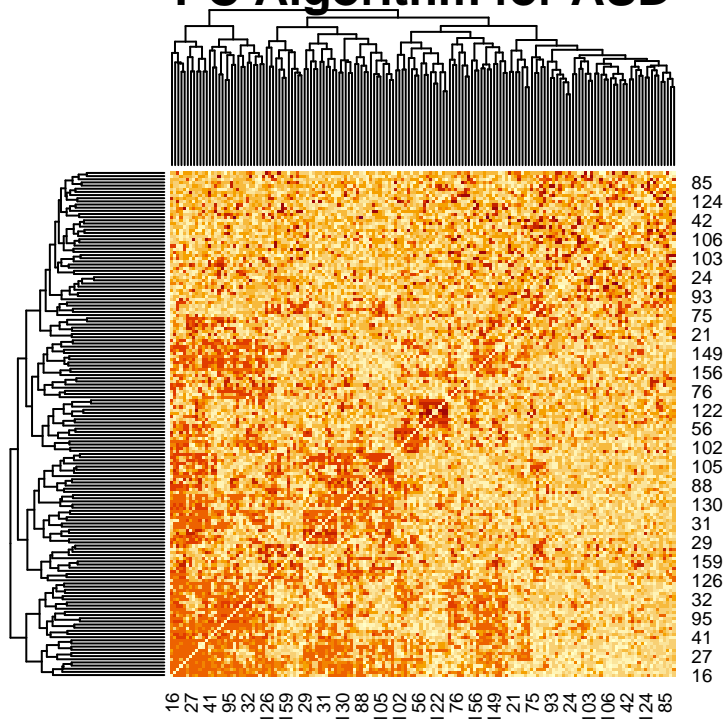
# corr
asd_corr <- cor(asd_dat)
t_asd_corr <- (asd_corr - min(asd_corr))/(max(asd_corr) - min(asd_corr))
colnames(t_asd_corr) <- seq(160)
rownames(t_asd_corr) <- seq(160)
heatmap(t_asd_corr, main = "Pearson Correlation for ASD")
```

## Pearson Correlation for ASD

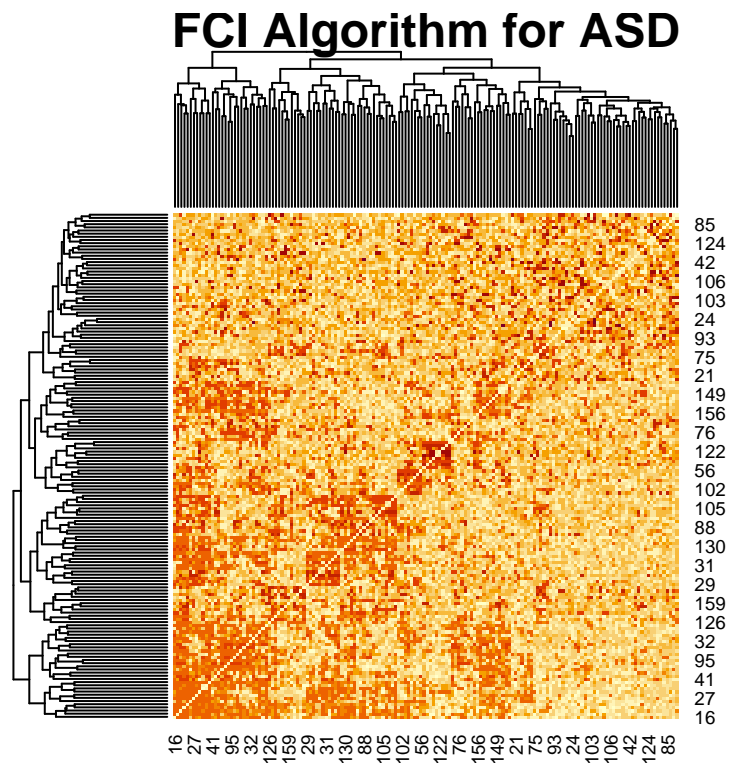


```
# pc
asd_pc <- pc(suffStat_asd, indepTest, alpha = 0.5, m.max = 1,
            p = ncol(asd_dat), verbose = FALSE, numCores = 8)
t_asd_pc <- (asd_pc@pMax - min(asd_pc@pMax))/(max(asd_pc@pMax) - min(asd_pc@pMax))
heatmap(1 - t_asd_pc, main = "PC Algorithm for ASD")
```

## PC Algorithm for ASD



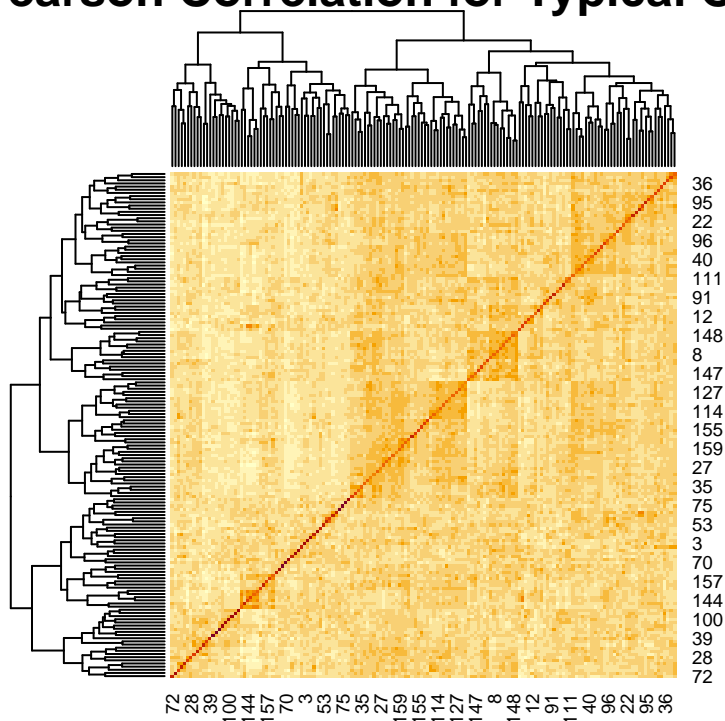
```
# fci
asd_fci <- fci(suffStat_asd, indepTest, alpha = 0.5, m.max = 1,
              p = ncol(asd_dat), verbose = FALSE, numCores = 8)
t_asd_fci <- (asd_fci@pMax - min(asd_fci@pMax))/(max(asd_fci@pMax) - min(asd_fci@pMax))
heatmap(1 - t_asd_fci, main = "FCI Algorithm for ASD")
```



```
# --- TC ---
tc_dat <- fread(sample(as.matrix(tc_files), 1), select = c(1:160))
suffStat_tc <- list(C = cor(tc_dat), n = nrow(tc_dat))

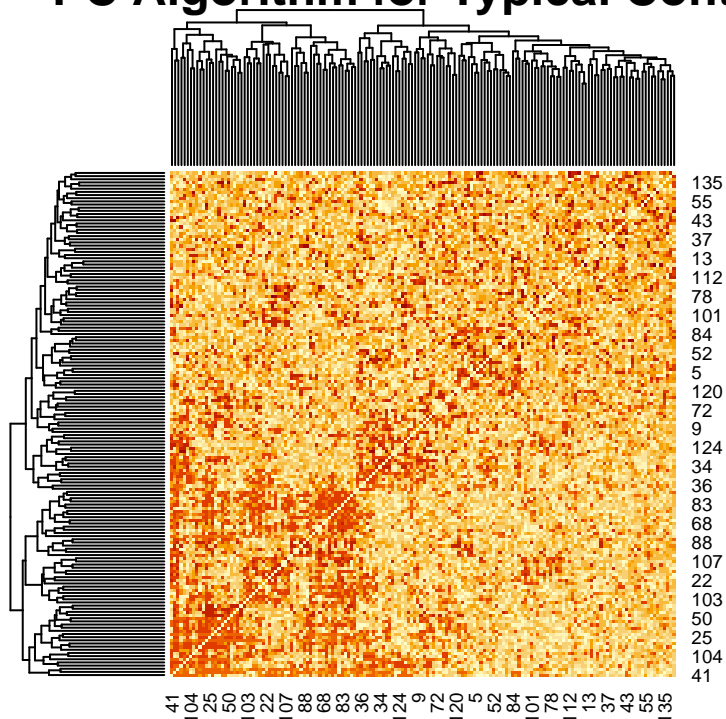
# corr
tc_corr <- cor(tc_dat)
t_tc_corr <- (tc_corr - min(tc_corr))/(max(tc_corr) - min(tc_corr))
colnames(t_tc_corr) <- seq(160)
rownames(t_tc_corr) <- seq(160)
heatmap(t_tc_corr, main = "Pearson Correlation for Typical Control")
```

## Pearson Correlation for Typical Control



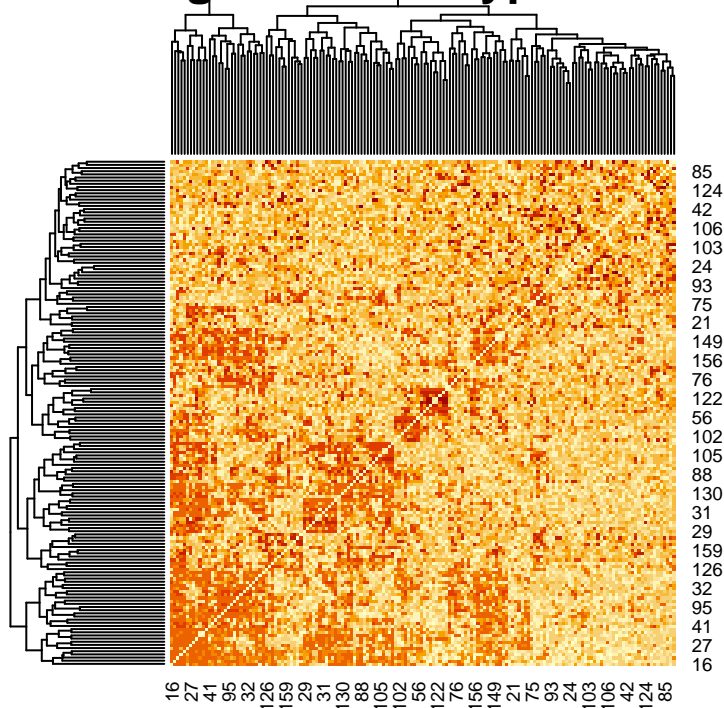
```
# pc
tc_pc <- pc(suffStat_tc, indepTest, alpha = 0.5, m.max = 1,
           p = ncol(tc_dat), verbose = FALSE, numCores = 8)
t_tc_pc <- (tc_pc@pMax - min(tc_pc@pMax))/(max(tc_pc@pMax) - min(tc_pc@pMax))
heatmap(1 - t_tc_pc, main = "PC Algorithm for Typical Control")
```

## PC Algorithm for Typical Control



```
# fci
tc_fci <- fci(suffStat_asd, indepTest, alpha = 0.5, m.max = 1,
             p = ncol(asd_dat), verbose = FALSE, numCores = 8)
t_tc_fci <- (tc_fci@pMax - min(tc_fci@pMax))/(max(tc_fci@pMax) - min(tc_fci@pMax))
heatmap(1 - t_tc_fci, main = "FCI Algorithm for Typical Control")
```

## FCI Algorithm for Typical Control



## Group analysis

```
# # ASD
# all_asd <- lapply(seq(nrow(asd_files)), function(x) {
#   file_path <- paste(path, asd_files[x,], sep = "")
#   dat <- fread(file_path, select = c(1:160))
#   #
#   cor_dat <- cor(dat, method = "pearson")
# })
#
# # average correlations
# mean_asd <- apply(simplify2array(all_asd), 1:2, mean)
#
# # PC algorithm
# indepTest <- gaussCIttest
#
# suffStat_2 <- list(C = cor(dat2), n = nrow(dat2))
# pc_est_21 <- pc(suffStat_2, indepTest, alpha = 0.5, p = 160,
#               m.max = 1, verbose = FALSE)
# a <- pc_est_21@pMax
```

```
# b <- 1 - (a - min(a))/(max(a) - min(a))  
# heatmap(b)
```