Kinship and pedigree analysis: Methods and applications

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Exercise set VIII. DVI analysis with Diviana

Introduction

The online version of Diviana is available here: https://magnusdv.shinyapps.io/diviana/.

However, for optimal performance I recommended to run Diviana locally from RStudio. To set this up, restart R and execute the following:

```r
# Install 'remotes' if needed
if (!requireNamespace("remotes", quietly = TRUE))
  install.packages("remotes")

# Install dev versions of pedsuite packages
pkgs = c("pedtools", "ribd", "forrel", "dvir", "diviana")
for(pkg in pkgs)
  remotes::install_github(paste0("magnusdv/", pkg))
```

After installing the packages, you may launch Diviana:

```r
diviana::launchApp()
```

Note: Diviana is work in progress, and should be considered a beta version. Also, the online version is not secure, and should not be used with sensitive data.

Exercise VIII-1   (Example: `planecrash`)

  a) Load the `planecrash` example data and click *Overview* to view a plot of the dataset. How many victims, missing individuals, and reference families are there?
  b) Open the *Analysis* tab and click *Solve*. Study the output tables and plot, and explain the solution.
  c) Study the output log. Was joint analysis used in this case? Why not?
  d) Reduce the LR threshold to 1000, and re-analyse the data. Explain the changes.
  e) Go to *Relatedness* and check the estimated PM-PM relationships. One pair stands out. Who are they, and what is their most likely relationship?

Exercise VIII-2   (Example: `planecrash` - cont.)

Reset all and load the `planecrash` dataset again. In each point below, do the described changes, save the pedigree and re-analyse the dataset. Explain the conclusions for the family in question.

  a) Modify family F1 so that the mother (individual 1) is missing instead of the daughter.
  b) In family F2, add a sister to the missing person M2, named "M2-2", who is also missing.
  c) Add a new family (F6) to the dataset. This should be a family with two missing sisters, named A and B. The family has no typed reference individuals.

Exercise VIII-3   (Example: `fire`)

a) Load the `fire` example data. How many victims, missing individuals, and reference families are there?
b) Open the *Analysis* tab and click *Solve*. Explain the solution. What is the GLR score?
c) Change the sex of individual M3 to male and then re-analyse the dataset. What is the new solution? Explain the changes.
d) Select *Ignore sex* and re-analyse the dataset. Verify that the solution is the same as in b).

Exercise VIII-4   (Example: `exclusionExample`)

a) Load the `exclusionExample` example data. How many victims, missing individuals, and reference families are there?
b) Open the *Relatedness* tab and click *Calculate* in the AM-AM panel. Are there any potential errors in the reference data?
c) Calculate the PM-PM relatedness and comment on the results.
d) Go to *Analysis* and run the analysis. How many of the missing individuals are identified?