GHEP-ISFG 2026 Workshop: **Disaster Victim Identification**

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Exercise set III. Complex DVI cases with DIVIANA

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

To run DIVIANA locally, first install the package in a fresh R session:

```
# install.packages("remotes")
remotes::install_github("magnusdv/diviana", dep = T)
```

After installation you may launch the app with a single command:

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

Exercise III-1 (Plane crash)

a) Load the `planecrash` example data and click *Overview*. How many victims, missing individuals, and reference families are there?

b) Go to `MARKERS` and inspect the information. Click on a marker and display its allele frequencies.

c) Go to `RELATEDNESS` and check the estimated `PM-PM` relationships. One pair stands out. Who are they, and what is their most likely relationship?

d) Open the `ANALYSIS` tab and click *Solve*. Study the output tables and plot, and explain the solution.

e) What is an 'Undisputed' match in DIVIANA? (Hint: Study the LR matrix.)

f) Study the output log. Was joint analysis used in this case? Why not?

g) Reduce the LR threshold to 1000, and re-analyse the data. Explain the changes.

Exercise III-2 (Helicopter case)

In this exercise we revisit the Helicopter case from the first exercise session, where you were asked to save the final Familias project as a `.fam` file for later use.

a) Load the Familias file: In the `DATA` tab, click the *Import* button in the AM window, and follow the instructions. Click *Overview* to see a plot of the dataset. Explain the two versions of Family F2.

b) In the PM window, click *Alias* and generate new aliases: Keep the original names until the first underscore. (This makes merged PM sample names more manageable.)

c) Go to `MARKERS` and inspect the information. Click on the marker `D21S11` and display its allele frequencies. What is the frequency of allele `30`?

d) Go to `RELATEDNESS` and check for relatedness between the victims (`PM-PM`). Comment on the results.

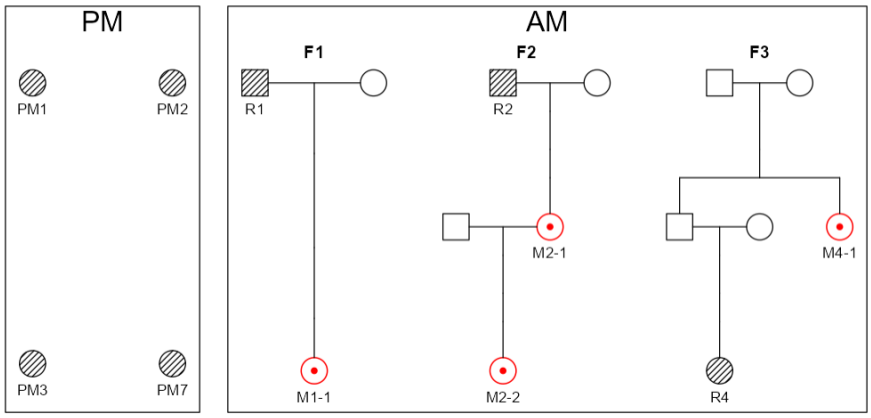
e) Check the relatedness between references (`AM-AM`), including *Across families*. Comment on the results.

f) Go to `ANALYSIS` and press *Solve*. Study the different output tables and discuss the solution. Why is the identification of `PM1` *undisputed*, while `PM2` is *disputed*? (Hint: Look at the LR matrix.)

Exercise III-3 (Helicopter case - cont.)

We will now do the Helicopter case 'properly' in DIVIANA, using joint analysis in Family F2.

a) Go back to `DATA` and edit the pedigree so that F2 contains both missing persons. Delete the redundant copy of F2. After suitable edits, the overview plot should look like this:



b) Now solve the case and study the results. What is the conclusion for Family F2?

c) Explain how the GLR scores for PM2 and PM3 are obtained. (Hint: Look at the `Joint` table.)

d) Download the results and inspect the tables in the Excel document.

Exercise III-4 (Helicopter case from plain input files)

This exercise shows how to import plain text files in DIVIANA, recreating the Helicopter case with the same input files as in the original Familias exercise.

a) Reset DIVIANA, and import the file *Exercise-Helicopter-AM-Data.txt* in the AM window. Remember to choose *Text file* before you browse for the file.

b) Create the three pedigrees. Assign reference individuals and missing persons in each family.

c) Import the file *Exercise-Helicopter-PM-Data.txt* in the PM window. In the preview table (before clicking *Save*) select samples PM1, PM2, PM3 and PM7 so that only these are imported.

d) Go to `MARKERS`, select *Custom* database, and import the file *Exercise-Helicopter-Freq.fam*. Also set a *Standard* ('equal') mutation model with rate 0.001 for both males and females. Check that the marker summary table looks correct.

e) Go to `ANALYSIS` and click *Solve*. Compare the results with the answers obtained in the previous exercise.