Social networks

For these scripts, I used the following organization : I did 3 .py scripts (**plot.py**, **load.py** and **compute.py**) which contain functions that I use in the main script (**network\_analysis.ipynb**) to compute and display the figures about the networks. You need to import mc.load, mc.plot or mc.compute in the main script to use their functions.

Network\_analysis.ipynb

This is the main script for the computation of the networks. It is a work document, so it constently changes as I work on these scripts. I tried to organize it in sections, but it may still be a bit messy. To call functions from the .py scripts, for instance heatmap in the plot.py, you need to write mc.plot.heatmap().

Plot.py

This script contains functions useful to plot the figures we need (**heatmap** and **network**).

**Heatmap**

This function displays the heatmap of a matrix with specific parameters (see the description of the function for the list of them).

***L37*** : figsize = the size of the figure window created

***L42*** : sns.heatmap = some parameters of the heatmap can be changed (annot, linewidths, linecolor, square, cbar\_kws)

***L45*** : plt.savefig = some parameters of the saving can be changed (bbox\_inches, pad\_inches)

**Network**

This function displays the network of a colony depending on a matrix of interaction.

***L76*** : figsize = the size of the figure window created

***L81, L84, L90*** : color = the colors of the nodes, depending on the type of network created

***L92*** : 0.5 = the degree of rescaling of the links’ widths

***L93*** : nx.kamada\_kawai\_layout = the layout choosen for the individuals’ positions on the graph

***L106*** : imsize = the size of the pictures plotted

***L112*** : z = the size of the rectangle around the picture. Now it is 50 pixels more but you can change it

***L125*** : label\_options = the parameters of the labels if you only plot the names, not the pictures

***L128*** : ax.margins = the size of the margins around the figure created

Load.py

This script allows us to load all the important informations to compute the metrics we need for network analysis.

**List\_files**

This function creates a list of all the files’ names in a folder and its subfolders

***L16*** : “.xls” = only .xls files but you can change it if you work with other kinds of files

**Infos**

This function loads the informations contained in excel sheets

***L28*** : index\_col and sheet\_name = you can change this if your file is not organised this way

**Kinship**

This function loads the matrix of kinship among the colony of interest

***L39*** : sheet\_name and index\_col = you can change this if your file is not organised this way

**Reorder\_files**

This function allows us to reorder the files in their chronological order. This can be useful if the data have been loaded weirdly from the boris app (it has happened already several times)

***L54, L58, L68*** : encoding = the way the data was encoded in the excel file, it can change

Compute.py

This script contains all the functions needed to compute the metrics we use to create the network graphs. Some functions are no longer used (**dsi\_aggressive** and **matrix\_grooming**) but I didn’t remove them as they can be a starting point to write new functions.

**Matrices\_infos**

See description

**Binary\_matrix**

See description

**Thresholed\_matrix**

See description

***L93*** : m > 3 = if you want a mean connexion number of 3. You can change this number depending on what you want

**Dis\_matrix\_global**

See description

**Dis\_matrix\_individual**

See description

**Dsi\_affiliative**

This function computes the affiliative DSI by taking into account all the behaviors stated in the parameters of the function (list\_of\_b). It is with this function that a metric can be computed to represent the social network of a colony of monkeys.

***L239*** : encoding and sep = how the observation data is encoded in the excel file

Be careful : in this function, we use the headers of the excel files provided by the Boris app. If they are changed, you need to change it in this function aswell!

*Things to do : globally, these scripts are an ongoing proccess and are far from being finished. You should discuss with Julia about what De Vico Fallani told us regarding social networks, and working with these ideas might be a good improvement (for instance, look at the mean number of connexions in Parkinson to see if we have something similar).*