IC-Finder – user guide

Authors: Noelle Haddad, Cédric Vaillant and Daniel Jost

Before using the program, please read the LICENSE file.
Any suggestions and remarks might be addressed to Daniel Jost: *daniel.jost@imag.fr*

IC-Finder is a freely open-source MATLAB/GNU OCTAVE routine that allows to infer the partitioning of HiC maps into interacting compartments.

Downloading the program

Download the IC-Finder package at:
http://membres-timc.imag.fr/Daniel.Jost/DJ-TIMC/Software.html
and unzip it in your favorite folder.

Requirements

To run IC-Finder, you would need MATLAB (version 2012 or higher) with the 'Statistics and Machine Learning' Toolbox or GNU OCTAVE (version 3.8.0 or higher) with the 'statistics' package.

Running IC-Finder

Open MATLAB or GNU OCTAVE and go to the directory where the routine IC_Finder.m is saved. For GNU OCTAVE users, before using IC-Finder, please load the statistics package by typing "pkg load statistics" in the octave command line.

IC-Finder takes a contact matrix as an input and delivers up to 4 outputs depending on the chosen options.

Input
- the HiC map or contact matrix (already loaded in MATLAB/OCTAVE or in a text file) : IC-Finder accepts the input contact matrix in a dense (a NxN data table containing the contact frequencies with N the total number of bins) or sparse (a Kx3 data table with K the number of non-zero entries of the corresponding dense matrix, each line contains the identities of the bins and the corresponding contact frequencies) format.

Output(s)
- the list of predicted interaction compartments (DOM): left-end and right-end positions of the domain.
- a matrix (Z) encoding the dendrogram (hierarchical) tree.
- a matrix (PD) encoding the probability for two bins to belong to the same compartment.
- a vector (PB) encoding the probability for a bin to be a boundary between two consecutive compartments.

Run

To run IC-Finder, type "[output lists]=IC_Finder(input,options & paramter values)" in the command line with the appropriate output list, input matrix and options and parameter values. A detailed description of how to use IC-Finder, of all the options and of how to modify parameter values can be found by opening the IC_Finder.m routine or by typing "help IC_finder" in the command line. See also some examples below.

For saving computing time when treating very large matrix, put options 'PlotFigures' and 'SaveFigures' to 0 to avoid graphical issues when MATLAB or OCTAVE try to plot large matrix. Also think of splitting large contact matrices into many smaller matrices.

Examples

To obtain only the partition of a HiC map present in the file './hicmap.txt' and save the output files and figures starting with the word 'results':
>> dom=IC_finder('./hicmap.txt','Name','results') ;

To obtain the probability that two bins belong to the same compartment for two different hierarchies:
>> [dom,Z,PD,PB]=IC_finder(hicmap,'Option','rh','SigmaZero',[5 10]) ;