Tutorial on how to use EPICS

This tutorial illustrates how to use EPICS using an interactive MATLAB code. The code considers communities that follow the generalized Lotka Volterra model.

The code uses the following inputs

1) The number of species in the community.
2) Steady-state abundances of species in their respective monocultures (the carrying capacities).
3) Steady-state abundances of species in each leave-one-out cultures.

It then yields effective interactions between the species and their abundances in the all-species community.

We demonstrate the use of the code for a five species gut microbial community (see the accompanying paper for details). The five species are *Lactobacillus plantarum* (Lp), *Lactobacillus brevis* (Lb), *Acetobacter pasteurianus* (Ap), *Acetobacter tropicalis* (At), and *Acetobacter orientalis* (Ao).

The table below contains the input data, which must be provided along with specifying the number of species (here 5). Note that the code does not use species names. The data must be entered maintaining the order of the species as indicated below.

Carrying capacity (Log_{10})	Lp	Lb	Ap	At	Ao
	5.25	5.626	5.15625	5.375	5.15625

Leave-one-out data (Log_{10})	Leave Lp	Leave Lb	Leave Ap	Leave At	Leave Ao
Lp	0	2.96875	1.8125	2.03125	1.75
Lb	2.90625	0	1.84375	2.28125	1.65625
Ap	0.90625	0.25	0	0.5	1.34375
At	1.25	0.8125	0.9375	0	1.1875
Ao	0.84375	1.65625	1.21875	1.03125	0

The code then yields the following outputs.

Effective pairwise interactions					
	Lp	Lb	Ap	At	Ao
Lp	-1	-0.14061	0.691259	-0.13905	0.501714
Lb	-0.76928	-1	0.595415	-0.58396	0.00311
Ap	-0.03943	0.125568	-1	0.187146	-0.8796
At	-0.24257	0.078488	-0.10827	-1	-0.72932
Ao	-0.00275	-0.0466	-0.11655	0.027199	-1
Predicted abundances (Log_{10}) in the community					
	Lp	Lb	Ap	At	Ao
EPICS	5.387189	5.342563	4.82782	4.978445	5.104158