

README – Evolutionary bet-hedging in structured populations

In this document, we describe the supplementary code for the paper “Evolutionary bet-hedging in structured populations”.

We provide two MATLAB file: “simulate_bethedging_paperresults”, which generates the results presented in the paper; and “simulate_bethedging_base”, which contains the key elements to simulate the bet-hedging model with any population structures and parameters of choice.

simulate_bethedging_paperresults.m

This code should generate results similar to those in the paper. The numerical results rely on large numbers of stochastic simulations to obtain the expected dynamics. We do not provide the random seeds used, since the code was run in parallel across multiple clusters. However, sufficiently large numbers of simulations were used such that any random seeds should generate indistinguishable results from those presented in the manuscript.

This code requires an input file that contains a random seed and 16 matrices. To generate such an input file, run the “input_generation_full.m” file.

We ran this code in parallel, since many simulations are required to obtain accurate results. After running the code, the output is compiled using “compile.m”.

input_generation_full.m

This code generates input for “simulate_bethedging_paperresults.m”. The user specifies the number of input files required “Njobs” and the required population size “Nsize”. The code then generates 1000000 random graphs of size “Nsize” with average degree equal to 4. From this, a cohort of graphs is selected each with unique degree distribution variance. We then construct “Njobs” output files, each of which consist of the graph cohort and a seed number, corresponding the index of the loop. These are saved, and will generate “Njobs” input files that can be loaded into “simulate_bethedging_paperresults.m” on a different core.

compile.m

This code compiles the output of the parallel simulations. The final variable is a matrix X. Going along the columns, this records the fixation probability for the parameters corresponding to that column. Going down the rows, this records the fixation probability from the graph corresponding to that row.

simulate_bethedging_base.m

This code contains the same simulation algorithm as “simulate_bethedging_paperresults.m”. However, all of the sections of code required to generate the results in the paper have been removed. Instead, this code allows the user to specific parameters and graph structure, and will then simulate the bet-hedging model until fixation.