JEDy: A Julia package for Evolutionary Dynamics

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Objectives

The objectives of this advanced project are to:

- Become familiar with standard methods for studying evolutionary dynamics computationally and analytically

- Become familiar with the Julia [1] language and its use in scientific computing

- Kickstart the development of an open-source package for studying evolutionary dynamics using Julia

Progress

So far I have been familiarising myself with the Julia language by replicating part of the results of a paper [2] which studies the iterated prisoners dilemma. I have succeeded in reproducing the behavior of the stochastic model (the Moran process) employed in the paper using identical values of the parameters. The code that I have developed should be able to handle matrix games of arbitrary rank (ie. not just the Prisoner's Dilemma). In addition I have written code to determine the transition matrix of the game between various states, and hence the fixation probabilites and stationary distributions for arbitrary simple matrix games.

Plans

The plan for the rest of the semester is to begin writing the package as soon as possible. This will begin with setting up and familiarising ourselves with a Github repository next week, and then beginning development of the package. Our first task will be to decide on the scope of the package for the remainder of the semester; what functionality we want to provide, what our method signatures are, and which external packages we will rely on.

References

[1] Jeff Bezanson, Stefan Karpinski, Viral B. Shah, Alan Edelman, *Julia: A Fast Dynamic Language for Technical Computing*. eprint arXiv:1209.5145, September 2012.

[2] Lorens A. Imhof, Drew Fudenberg, Martin A. Nowak and Robert M. May, *Evolutionary Cycles of Cooperation and Defection*. PNAS, Vol. 102, No. 31, 2005.