Discrete processes, drift-diffusion equations and replicator dynamics

Fabio Chalub

Department of Mathematics, Universidade Nova de Lisboa, Portugal.

chalub@fct.unl.pt

Max Souza

Department of Mathematics, Universidade Federal Fluminense, Brazil.

msouza@mat.uff.br

Abstract

Simple evolutionary models, like the Moran process or the Wright-Fisher process, have been used to model cancer initiation and progression [1, 2]. In this talk we show that for large populations these models can be naturally divided in two time scales, the first related to natural selection, the second to genetic drift. We obtain the large population limit of these process in different scalings. In one precise scaling it is possible to keep both effects. In this case, we have as limit model a partial differential drift-diffusion equation of degenerated type. We analyze this equation from the mathematical point of view, show some numerics related to fixation probabilities to finite populations and discuss the role of mutations in mathematical terms.

Keywords: discrete processes, replicator dynamics, drift-diffusion equations.

References

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