

Gradient flow formulations of discrete and continuous evolutionary models

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We will present an unified “energetic” view of three classical models of biological evolution: (i) the Moran process, an example of a reducible Markov Chain; (ii) the Kimura Equation, a particular case of a degenerated Fokker-Planck Diffusion; (iii) the Replicator Equation, a paradigm in Evolutionary Game Theory. It is well known that the Replicator Dynamics for two strategies is a gradient flow with respect to the celebrated Shahshahani distance. We will discuss how to reformulate the Moran process and the Kimura Equation as gradient flows, and show that the associated gradient flows are compatible in an appropriate sense.