

On a Model of Evolution of Subspecies

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Abstract

Ben-Ari and Schinazi (2016) introduced a stochastic model to study “virus-like evolving population with high mutation rate”. This model is a birth and death model with an individual at birth being either a mutant with a random fitness parameter in $[0,1]$ or having one of the existing fitness parameters with uniform probability; whereas a death event removes the entire population of the least fit site. We change this to incorporate the notion of “survival of the fittest”, by requiring that a non-mutant individual, at birth, has a fitness according to a preferential attachment mechanism, i.e., it has a fitness f with a probability proportional to the size of the population of fitness f . Also death just removes one individual at the least fit site. This preferential attachment rule leads to a power law behaviour in the asymptotics, unlike the exponential behaviour obtained by Ben-Ari and Schinazi (2016). This is a joint work with Hideki Tanemura, Keio University, Yokohama.

Keywords:

Markov Chain; Random Walk; Preferential Attachment Model.