SEMINARIO

Conjunto Modelamiento Estocástico
Ncleo Milenio Modelos Estocásticos de Sistemas Complejos y Desordenados

EXPOSITOR

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TITULO

A non exchangeable coalescent arising in phylogenetics

Abstract:

A popular line of research in evolutionary biology is to use time-calibrated phylogenies in order to infer the underlying diversification process. Most models of diversification assume that species are exchangeable and lead to phylogenetic trees whose shape is the same in distribution as that of a Yule pure-birth tree. Here, we propose a non-exchangeable, individual-based, point mutation model of diversification where interspecific pairwise competition (rate d) is always weaker than intraspecific pairwise competition (rate c), and is only felt from the part of individuals belonging to younger species. The only important parameter in this model is $d/c =: 1a$, which can be seen as a selection coefficient.

We show that as the initial metapopulation size grow to infinity, the properly rescaled dynamics of species lineages converge to a 'shift-down/look-up coalescent' where lineages are given levels: the species at level i is the $i-th$ most recent extant species. At constant rate, all lineages simutaneously "shift down" their level by -1, while the lineage at level 1 "looks up" to a geometrically distributed (with parameter a) level and coalesces with the lineage present there. By interlacement techniques, we propose a dimensionally-reduced version of this model allowing for fast simulation and likelihood computation of given trees. We use this algorithm and MCMC data augmentation methods to estimate the parameter a from real trees, and compare this estimate to classical measures of tree imbalance.

Jueves 18 de diciembre a las 16 : 15hrs, en la sala de Seminarios Jacques L. Lions, séptimo piso.