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Evolving genealogies for branching populations under selection and competition

Abstract: We consider here a continuous state branching process with two types of individuals subject to selection and density dependent competition (but this can be extended to a multitype setting with mutations). We give a pathwise construction of the joint evolution of population size, type frequencies and genealogies, where the latter are described by processes of marked distance matrix distributions. Our construction is achieved by means of a lookdown approach and provides a synthesis as well as a generalization of cases (fluctuating population sizes under neutrality, selection with constant population size) considered separately in two seminal papers by Donnelly and Kurtz (1999). The selective genealogies are then obtained in a transparent way from the neutral genealogies combined with the “active” selection/competition events. Joint work with A. Blancas Benitez, S. Gufler, S. Kliem, A. Wakolbinger.