The mean time to extinction in stochastic models of population dynamics

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Many questions in population dynamics are related to the potential for the persistence of the population, or conversely, it's risk for extinction. In the case of continuous time Markov chain models, this can be quantified by the probability of extinction or the mean time to extinction. As models become more realistic, they tend to increase in complexity. Analytical analysis becomes intractable and it becomes necessary to techniques for approximation. This has been an area of considerable recent attention among researchers. In this talk, a general theorem for the calculation of conditional mean duration of a finite absorbing discrete time Markov chain is presented. Applications are presented in which this result is paired with the technique of local approximation of continuous time Markov chains in time and space to calculate the mean time to extinction in epidemiological and ecological models.

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