Nonparametric Inference for Controlled Branching Processes with deterministic function

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Controlled branching processes are stochastic growth population models in which the number of individuals with reproductive capacity in each generation is controlled by a deterministic function. The behaviour of these populations is strongly related to the main parameters of the offspring distribution. In practice these values are unknown and their estimation is necessary. Usually it must be observed the whole family tree up to a given generation in order to estimate the offspring distribution. In this work, we deal with the problem of estimating the main parameters of the model assuming that the only observable data are the total number of individuals in each generation. We set out the problem in a nonparametric framework and obtain the maximum likelihood estimator of the offspring distribution using the expectation-maximization algorithm. Finally, we show the accuracy of the algorithm by way of simulated examples.