Abstract

The Bisexual Galton–Watson branching process (BGWP), introduced by Daley (1968), is a discrete time branching model that is well-suited to describing the probabilistic evolution of populations where females and males coexist and form couples (mating units) which reproduce independently with the same offspring probability distribution. To describe the probabilistic evolution of more complicated populations with sexual reproduction, there have been introduced modified bisexual branching models. An important special case of these processes are the BGWPs with immigration which have been introduced in González, Molina and Mota (1999). In particular, in this work we will be concerned with BGWPs which allow in each generation the immigration of females and males. The probabilistic theory about this model has been studied in González, Molina and Mota (2000, 2002).

There exists a plentiful literature on the topic of estimation of parameters associated with asexual Galton-Watson processes with immigration (GWPI) (see Wei and Winnicki (1990) and references within it). It is worth pointing out the approach achieved in Wei and Winnicki (1990) in the attempt to solve the problem of providing estimators of the parameters of a GWPI which do not required any prior knowledge about the growth behaviour of the process. These authors proposed a unified estimation theory based on conditional weighted least squares theory. However, there are no studies about the estimation problems arising from the BGWPs with immigration. Motivated by the work of Wei and Winnicki (1990), in this communication we will propose conditional weighted least squares estimators of the offspring and immigration mean vectors of a BGWP with immigration and we will derive their asymptotic properties when the process is subcritical, focusing our attention on their strong consistency and limit distributions.

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