

Estimation of subcritical Galton Watson processes with correlated immigration

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We consider an observed subcritical Galton Watson process $\{Y_n, n \in \mathbb{Z}\}$ with correlated stationary immigration process $\{\epsilon_n, n \in \mathbb{Z}\}$. Two situations are presented. The first one is when $\text{cov}(\epsilon_0, \epsilon_k) = 0$ for k larger than some k_0 : a consistent estimator for the reproduction and mean immigration rates is given, and a central limit theorem is proved. The second one is when $\{\epsilon_n, n \in \mathbb{Z}\}$ has general correlation structure: under mixing assumptions, we exhibit an estimator for the the logarithm of the reproduction rate and we prove that it converges in quadratic mean with explicit speed. In addition, when the mixing coefficients decrease fast enough, we provide and prove a two terms expansion for the estimator. Numerical illustrations are provided.

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