

Variance Estimators in Branching Processes with Non-Homogeneous Immigration

Ibrahim Rahimov¹, George P. Yanev²

¹ Zayed University, Dubai, United Arab Emirates

Ibrahim.Rahimov@zu.ac.ae

² University of Texas - Pan American, Texas, USA

yanevgp@utpa.edu

Keywords: branching processes, non-homogeneous immigration, conditional least-squares estimators.

Branching processes with immigration were proposed to study the temporal development of populations of differentiated cells in [3] and more recently in [1]. More specifically, terminally differentiated oligodendrocytes of the central nervous system and leukemia cells were analyzed. In both cases the cell population expanded through both division of existing (progenitor) cells and differentiation of stem cells. The population's viability was preserved by allowing the immigration distribution to vary in time. We construct conditional least-squares estimators for the offspring variance assuming that the immigration mean increases to infinity over time. The asymptotic normality of the proposed estimators is established. Part of the results was published in [2].

References

- [1] O. Hyrien and N.M. Yanev (2012) *Asymptotic behavior of cell populations described by two-type reducible age-dependent branching processes with non-homogeneous immigration*, Mathematical Population Studies, **19** 164–176.
- [2] I. Rahimov and G.P. Yanev (2012) *Variance estimators in critical branching processes with non-homogeneous immigration*, Mathematical Population Studies, **19** 188–199.
- [3] A.Y. Yakovlev and N.M. Yanev (2006) *Branching stochastic processes with immigration in analysis of renewing cell populations*, Mathematical Biosciences, **203** 37–63.