

Simulating and Forecasting Human Population with General Branching Process

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The branching process theory is widely used to describe a population dynamics in which particles live and produce other particles through their life, according to given stochastic birth and death laws. The theory of General Branching Processes (GBP) presents a continuous time model in which every woman has random life length and gives birth to children in random intervals of time. The flexibility of the GBP makes it very useful for modelling and forecasting human population. This paper is a continuation of previous developments in the theory, necessary to model the specifics of human population, and presents their application in forecasting the population age structure of Bulgaria. It also introduces confidence intervals of the forecasts, calculated by GBP simulations, which reflect both the stochastic nature of the birth and death laws and the branching process itself. The simulations are also used to determine the main sources of risk to the forecast.

Primary author: Dr TRAYANOV, Plamen (Sofia Univeristy "St. Kliment Ohridski")

Presenter: Dr TRAYANOV, Plamen (Sofia Univeristy "St. Kliment Ohridski")