The Lotka-integral equation and an example in forestry

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Abstract

In some populations, such as a forest, age structure (distribution) can have a significant effect on the growth of the population.

This talk describes the Lotka-integral equation, which is a continuous-time population model that accounts for the age structure of the given population. The application of this model to a system requires knowledge of the age-specific maternity function, age-specific survivorship, and an initial age distribution. First, I will motivate this model, and subsequently work through a solution to the integral equation, using elementary mathematical methods to determine the stable age distribution and the asymptotic growth rate.

An application of the Lotka-integral equation to a forest system is discussed, where we use recruitment and tree survival knowledge to determine a stable age distribution of a forest. Finally, the usefulness of stable age distribution knowledge will be addressed.