Tunable Approximations for the Mean and Variance of the Maximum of Heterogeneous Geometrically Distributed Random Variables

Daniel R. Jeske
University of California at Riverside

Todd Blessinger
Food and Drug Administration

Analysis of the maximum of n independent geometrically distributed random variables arises in a variety of applications in computer science and engineering. Evaluating the mean and variance of the maximum when n is large present considerable computational challenges. While approximate formulae have been proposed in the case where each geometric distribution has the same probability of success, p, the heterogeneous case has not received any attention. We derive an $\varepsilon -$ accurate approximation for both the mean and the variance in the heterogeneous case. The approximations also apply to the homogeneous case, and offer something new with their ability to tune the approximation to any desired level of accuracy. We illustrate the formulae with a reliability application where the heterogeneous context arose quite naturally.