COMPOUND NEGATIVE BINOMIAL APPROXIMATIONS FOR SUMS OF RANDOM VARIABLES

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Abstract: The negative binomial approximations arise in telecommunications, network analysis and population genetics, while compound negative binomial approximations arise, for example, in insurance mathematics. In this paper, we first discuss the approximation of the sum of independent, but not identically distributed, geometric (negative binomial) random variables by a negative binomial distribution, using Kerstan's method and the method of exponents. The appropriate choices of the parameters of the approximating distributions are also suggested. The rates of convergence obtained here improve upon, under certain conditions, some of the known results in the literature. The related Poisson convergence result is also studied. We then extend Kerstan's method to the case of compound negative binomial approximations and error bounds for the total variation metric are obtained. The approximation by a suitable finite signed measure is also studied. Some interesting special cases are investigated in detail and a few examples are discussed as well.

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