ABSTRACTS[1]

1. INVITED PAPERS

Poisson Approximation by the Stein–Chen Method

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Stein (1970) introduced a new technique for obtaining rates of convergence to the normal distribution, and applied it to the central limit theorem for stationary mixing sequences. His method is, however, not restricted to normal convergence, but can be adapted for use in a variety of other contexts. In particular, Chen (1975) showed how to use it for Poisson approximation.

It transpires that the method is more naturally suited to Poisson than to normal approximation. This is partly because the quantities which have to be estimated, in order to obtain a rate of convergence, are simpler in the Poisson case. The main reason, however, is that the metric which arises from Stein's method for the Poisson distribution, the total variation metric, is widely used, whereas that for the normal distribution, based on expectations of smooth functions of random variable, is not popular, and more work is required to translate the results obtained into convergence rates in the more common metrics.

In this paper, the Stein-Chen method for Poisson approximation is outlined, and is illustrated with reference to a variety of examples. In the easiest case, that of independent 0-1 summands, very good results are obtained rather simply. However, the chief attraction of the method lies in its applicability to a variety of problems concerning sums of dependent random variables. Broadly speaking, the method proves effective where the dependence is in some sense local, as for stationary mixing sequences and dissociated arrays, or diffuse, as in combinatorial and exchangeable applications, and seems less suitable where a natural flow of time is present. In this sense, the approach is complementary to that through martingales.

The success of the method in applications depends on how the argument is carried through, and in particular on careful choice of an appropriate coupling. However, the fact that, in many cases, optimal convergence rates can be obtained, makes Stein's method a powerful adjunct to the other techniques available.

[1] An asterisk is attached to the name of the speaker in the case of a joint paper.