

Malliavin calculus for marked binomial processes and Chen-Stein method

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We can observe a clumping phenomenon when counting the number of series of t heads in a sequence of independent coin tosses or the occurrences of a rare word in a DNA sequence. The Chen-Stein method is an efficient tool to limit the approximation error when the law of the number of clusters can be approximated by a Poisson law (possibly compound).

We revisit this method by reducing these two problems to that of a Poisson approximation for functionals of marked binomial processes (MBPs), which are discrete analogues of marked Poisson processes. We then develop stochastic analysis tools and a Malliavin calculus for MBPs. Under this new formalism, we obtain a general criterion - for the distance in total variation - of the Poisson approximation for MBP functionals, in terms of Malliavin operators. In this talk, I will give elements of the Malliavin formalism for MBPs, state the general result of the approximation and illustrate it by applying it to the two situations of interest.

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