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On the Conway-Maxwell-Poisson point process

The Poisson point process plays a pivotal role in modeling spatial point patterns. One of its key features is that the variance and the mean of the total number of points in a given region are equal, making it unsuitable for modeling point patterns that exhibit significantly different mean and variance. To tackle such point patterns, we introduce the class of Conway-Maxwell-Poisson point processes. Our model can easily be fitted with a logistic regression, its point counts in different regions are correlated and its log-likelihood in any subregion can be easily extracted. Both simulations and real data analyses have been carried out to demonstrate the performance of the proposed model.