Decompounding random sums: a nonparametric approach

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Abstract A compound distribution is the distribution of a random sum, which consists of a random number N of independent identically distributed summands, independent of N. Buchmann and Grübel (Ann Stat 31:1054–1074, 2003) considered decompounding a compound Poisson distribution, i.e. given observations on a random sum when N has a Poisson distribution, they constructed a nonparametric plug-in estimator of the underlying summand distribution. This approach is extended here to that of general (but known) distributions for N. Asymptotic normality of the proposed estimator is established, and bootstrap methods are used to provide confidence bounds. Finally, practical implementation is discussed, and tested on simulated data. In particular we show how recursion formulae can be inverted for the Panjer class in general, as well as for an example drawn from the Willmot class.