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Zero-adjusted and random sum models: mean and dispersion modelling

We consider mean and dispersion models for an outcome variable which is a sum of a random number of non-negative random variables. An example is total insurance claim size in a period, where there can be C claims on a policy within the period, $C=0,1,2,\dots$. In a fixed period, a policy will either experience no claim, in which case the claim amount is identically zero; or one or more claims, which are non-negative amounts typically having extremely right-skewed distributions. The distribution of the total is mixed discrete-continuous: a continuous, right-skewed distribution with a single probability mass at zero. The model explicitly specifies log-linear models for the parameters in the distribution of the total amount. The method is illustrated on Australian insurance and hydrological data sets.