Vortrag

am Dienstag, 23. Juni 2015
15:30 Uhr
Institut für Medizinische Informatik, Statistik und Dokumentation,
Raum S-05-170
LKH-Eingangszentrum, Auenbruggerplatz 2 /5.OG, 8036 Graz

The Ratio-Plot, the Negative-Binomial, and Beyond (with Applications to Capture-Recapture)

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Abstract

If two neighbouring probabilities of a Poisson density p_x are considered in its ratio and multiplied by (x+1) for count x, in other words if we consider $r_x = (x+1)p_{x+1} / p_x$ where $p_x = \exp(-\lambda)\lambda^x / x!$, then this quantity is constant and independent of x, in fact it corresponds to the Poisson parameter λ. This observation is taken as a starting point to consider the quantity r_x in more generality. In particular, it can be shown that for a negative binomial r_x is a straight line with positive slope. As a natural estimate of r_x exists with $\hat{r}_x = (x+1)f_{x+1} / f_x$, where f_x is the frequency of count x, this device a can be used as a diagnostic tool for the presence of a Poisson or Negative Binomial. This diagnostic device is particularly useful for zero-truncated counts as they arise in the capture-recapture setting since it is invariant to zero-truncation.

The negative binomial is used frequently to cope with overdispersion and consequently advertised as state-of-the art method for dealing with count data. However, in particular in the zero-truncated case, the negative-binomial experience fitting problems, more commonly as expected even if sampled from the true model. Using the ratio-plot we can locate the source of these problems. Hence we argue that the negative-binomial is less useful, in particular for zero-truncated data, than common belief indicates. We illustrate this problem with national data on domestic violence in the Netherlands. Finally, the talk will illuminate alternative distributions including the mixed Poisson-log-normal model and the Conway-Maxwell-Poisson distribution as well point out the ratio regression approach as flexible tool for population size estimation of elusive target populations.
