
RONG ZHU, McMaster University, Hamilton, Ontario, Canada

The geometric down-weighting method and its applications

The geometric down-weighting method can be applied to enlarge an existing discrete distribution family. The enlarged family has one more parameter which regulates the decreasing rate of probability mass function, thus, yielding new moment features. Applying the geometric down-weighting method to a family with infinite mean, we can obtain an enlarged family which can have both finite and infinite means. Such an enlarged family can accommodate for the heavy-tailed count data, because it allows various tail heaviness. Particularly, when applying this method to the two-parameter discrete stable family which has infinite mean, we obtain a three-parameter discrete distribution family called the generalized Poisson-inverse Gaussian (GPIG). Apart from the extremely heavy-tailed discrete stable, the GPIG family extends the over-dispersed Poisson-inverse Gaussian (PIG) and also includes the equally-dispersed Poisson. Therefore, the GPIG family is flexible in handling less or more over-dispersed count data. We illustrate the GPIG family by the application of the citation counts of published articles in 1990 in JASA and JSPI respectively.