SCV 2008: December 1-3, Taipei, Taiwan (Abstract)

Probabilistic Rounding

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Abstract

Using rounded data in estimating moments and regression parameters gives rise to biased estimates. With simple rounding, the bias can be approximately eliminated by using Sheppard's correction. In some applications, notably in historical surveys, data are often rounded asymmetrically such that some rounded values are preferred over other ones, e.g., even values over odd values or integers over half integers.

Probabilistic rounding is a model that can handle this case. It is based on a rounding pro_le function and comprises deterministic asymmetric rounding and mixture rounding as special cases. A variant of Sheppard's correction can be derived, which depends on the pro_le function and generalizes the common Sheppard's correction.