Prediction of precision in systematic sampling

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Systematic sampling is widely used in stereology. Practical stereology is commonly based on measurements on serial sections and grids of quadrats, cycloids or points superimposed on sections. The precision of estimators based on systematic measurements can be assessed, using the so-called transitive methods due to [9]. The use of the transitive methods in stereology has been discussed in a series of paper since the 80’s, see e.g. [4, 1]. A key point of the transitive approach is the modelling of the covariogram which describes the spatial variation of the underlying measurement function. As shown recently in [2] on a particular example, the predicted coefficient of error may vary by a multiplicative factor of 20 depending on the choice of the covariogram model. New results, see [7], show that some a priori knowledge about the measurement function’s smoothness should provide some guidelines for modelling the covariogram. This point is discussed in more details for the particular problem of assessing the precision of the Cavalieri method for volume estimation. Then the covariogram model can be chosen based on a priori information about the geometry of the investigated body.

The transitive approach provides general tools for assessing the precision of systematic sampling. Recently, a further method has been described for count measurements, see [8]. The precision prediction takes into account both the number of sampling units and the sampling unit size. The method can be applied to popular stereological methods described in [3, 11, 6].

Since the 80’s, the use of transitive methods in stereology has been the object of continuous developments. One may expect further results adapted to specific stereological designs in the next years.

References

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