

New results on variance prediction and systematic sampling on the sphere

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Stereology constitutes an interesting branch of probability, statistics, and integral geometry that focus on estimating geometrical measures by using systematic random sampling. A very deep problem is to evaluate the goodness of the estimation, given that the number of samples is restricted in applications to few samples. One popular method is to model the covariogram by the properties of the object, but it is still an open problem to fully characterize the variance. In this talk, we review several proposed estimators based on sampling on the sphere, then we analyze the error of these estimators and propose some predictors constructed using reproducing kernel spaces. We consider the case of irregular sampling due to its importance in applications. Recent research has focused on the effect of random variability in sampling in Cavalieri designs and it is still open in a more general setting. We consider the case of sampling in the sphere under random perturbations and its effects on variance prediction. Finally, we validate our approach by numerical simulations.