Mathematics > Statistics Theory

Statistical inference across time scales

Céline Duval, Marc Hoffmann

(Submitted on 6 Jun 2011)

We investigate statistical inference across time scales. We take as toy model the estimation of the intensity of a discretely observed compound Poisson process with symmetric Bernoulli jumps. We have data at different time scales: microscopic, intermediate and macroscopic. We quantify the smooth statistical transition from a microscopic Poissonian regime to a macroscopic Gaussian regime. The classical quadratic variation estimator is efficient in both microscopic and macroscopic scales but surprisingly shows a substantial loss of information in the intermediate scale that can be explicitly related to the sampling rate. We discuss the implications of these findings beyond this idealised framework.

Comments:	29 pages, 2 figures
Subjects:	**Statistics Theory (math.ST)**
MSC classes:	62B15, 62B10, 62M99
Cite as:	**arXiv:1106.1031 [math.ST]**
	(or **arXiv:1106.1031v1 [math.ST]** for this version)

Submission history

From: Céline Duval [view email]

[v1] Mon, 6 Jun 2011 11:44:32 GMT (46kb,D)

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