

Strong large deviations for arbitrary sequences of random variables

Cyrille Joutard

Received: 26 April 2011 / Revised: 23 January 2012 / Published online: 20 April 2012
© The Institute of Statistical Mathematics, Tokyo 2012

Abstract We establish strong large deviation results for an arbitrary sequence of random variables under some assumptions on the normalized cumulant generating function. In other words, we give asymptotic expansions for the tail probabilities of the same kind as those obtained by Bahadur and Rao (Ann. Math. Stat. 31:1015–1027, 1960) for the sample mean. We consider both the case where the random variables are absolutely continuous and the case where they are lattice-valued. Our proofs make use of arguments of Chaganty and Sethuraman (Ann. Probab. 21:1671–1690, 1993) who also obtained strong large deviation results and local limit theorems. We illustrate our results with the kernel density estimator, the sample variance, the Wilcoxon signed-rank statistic and the Kendall tau statistic.

Keywords Large deviations · Bahadur–Rao theorem · Sample variance · Wilcoxon signed-rank statistic · Kendall tau statistic