Mathematics > Statistics Theory

Delta method in large deviations and moderate deviations for estimators

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The delta method is a popular and elementary tool for deriving limiting distributions of transformed statistics, while applications of asymptotic distributions do not allow one to obtain desirable accuracy of approximation for tail probabilities. The large and moderate deviation theory can achieve this goal. Motivated by the delta method in weak convergence, a general delta method in large deviations is proposed. The new method can be widely applied to driving the moderate deviations of estimators and is illustrated by examples including the Wilcoxon statistic, the Kaplan--Meier estimator, the empirical quantile processes and the empirical copula function. We also improve the existing moderate deviations results for M-estimators and L-statistics by the new method. Some applications of moderate deviations to statistical hypothesis testing are provided.

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