A BERRY-ESSÉEN THEOREM FOR SERIAL RANK STATISTICS

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Abstract. Berry-Esséen bounds of the optimal $O(n^{-1/2})$ order are obtained, under the null hypothesis of randomness, for serial linear rank statistics, of the form $\sum a_1(R_t)a_2(R_{t-k})$. Such statistics play an essential role in distribution-free methods for time-series analysis, where they provide nonparametric analogues to classical (Gaussian) correlogram-based methods. Berry-Esséen inequalities are established under mild conditions on the score-generating functions, allowing for normal (van der Waerden) scores. They extend to the serial case the earlier result of Does (1982, *Ann. Probab.*, **10**, 982–991) on (*nonserial*) linear rank statistics, and to the context of nonparametric rank-based statistics the *parametric* results of Taniguchi (1991, *Higher Order Asymptotics for Time Series Analysis*, Springer, New York) on quadratic forms of Gaussian stationary processes.

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