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Abstract

For a set of iid $U(0,1)$-distributed random variables we introduce a normal beta-transformed uniform empirical process. The new process possesses the property that it is normally distributed in all order statistics. We show that this process converges to a standardized Brownian bridge in the central range and large parts of the intermediate range. Moreover, it coincides asymptotically on a suitable interval with the well-known normalized versions of the uniform empirical and uniform quantile process. It remains an open question whether the convergence of the new process to a standardized Brownian bridge may be even better than for empirical and quantile processes. The supremum of the normal beta-transformed process coincides with a special statistic of a goodness-of-fit (GOF) test with so-called equal local levels. Recent results show that such GOF tests have favorable properties compared to GOF tests based on empirical and quantile processes.

Keywords: Empirical process, Goodness-of-fit, Hungarian construction, Supremum of stochastic process, Standardized Brownian bridge

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