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AN INVARIANCE PRINCIPLE FOR PROCESSES INDEXED BY TWO PARAMETERS AND SOME STATISTICAL APPLICATIONS

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Abstract: Let $D((0,1]^2)$ denote the space of all functions on $(0,1]^2$ with no discontinuities of the second kind. We prove weak invariance principles in the space $D((0,1]^2)$ for processes of the form $\int h(H_{n+m}(t))dF_n(t)$, $m,n \geq 1$, where F_n and G_m are two independent empirical distribution functions of independent, identically distributed sequences of random variables,

$$H_{n+m} = (n+m+1)^{-1}(nF_n + mG_m),$$

and where h belongs to a certain class of functions on the open unit interval. The appropriate topology in $D((0,1]^2)$ is given by uniform convergence on compact sets. This type of processes is central in nonparametric statistics having applications to two-sample linear rank statistics and signed rank statistics.

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