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Shuffles of copulas and a new measure of dependence

Pongpol Ruankong, Tippawan Santiwipanont, Songkiat Sumetkijakan

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Using a characterization of Mutual Complete Dependence copulas, we show that, with respect to the Sobolev norm, the MCD copulas can be approximated arbitrarily closed by shuffles of Min. This result is then used to obtain a characterization of generalized shuffles of copulas introduced by Durante, Sarkoci and Sempi in terms of MCD copulas and the $\star$-product discovered by Darsow, Nguyen and Olsen. Since shuffles of a copula is the copula of the corresponding shuffles of the two continuous random variables, we define a new norm which is invariant under shuffling. This norm gives rise to a new measure of dependence which shares many properties with the maximal correlation coefficient, the only measure of dependence that satisfies all of R\'enyi's postulates.

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