From subcopulas to copulas

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According to Sklar's Theorem it is known that the probability law of any random vector can be expressed as a composition of the distribution functions of all one-dimensional margins and a suitable copula. However, while the copula associated with a random vector is unique when all margins are continuous, in the non-continuous case, various copulas can be associated with the same random vector, all being coincident in a subset of the copulas domain. This fact poses the natural question of how it is possible to construct a copula given some partial information about the values that it assumes. One of the most common extension procedures is given by the multilinear interpolation (or checkerboard construction), which also plays a central role in characterizing dependence concepts for discrete random vectors. Here, the structure of the class of subcopulas is investigated ad extension procedures (generalizing the multilinear interpolation) are presented in a high-dimensional framework to transform a specific subcopula to a copula. Moreover, convergence results are given in order to check how these extensions approximate (in different metrics) a target copula.