Marshall, Albert W.; **Olkin, Ingram**

Families of multivariate distributions. (English) Zbl 0683.62029

J. Am. Stat. Assoc. 83, No. 403, 834-841 (1988).

The main observation of this paper is the following result. Let $H_1, H_2, \ldots, H_n$ be univariate distribution functions, and let G be an n-variate distribution function with support in $(0,\infty)^n$. Let $G_1, G_2, \ldots, G_n$ be the univariate marginals of G. Denote the Laplace transform of G_i by Φ_i, $i = 1, 2, \ldots, n$. Let K be an n-variate distribution function with all univariate marginals uniform on [0,1]. Denote $F_i(x) \equiv \exp\{-\Phi_i^{-1} H_i(x)\}$, $i = 1, 2, \ldots, n$. Then

$$H(x_1, x_2, \ldots, x_n) \equiv \int \ldots \int K(F_1^{\theta_1}(x_1), \quad F_2^{\theta_2}(x_1), \ldots, F_n^{\theta_n}(x_n)) dG(\theta_1, \theta_2, \ldots, \theta_n)$$

is an n-variate distribution function with marginals $H_1, H_2, \ldots, H_n$.

The authors show that many well-known parametric multivariate distributions are special cases of the above representation. They indicate the usefulness of this representation for modeling and simulation purposes. They also discuss the positive and negative dependence properties of such distributions.

Reviewer: M.Shaked

MSC:

62H05 Characterization and structure theory for multivariate probability distributions; copulas
62H10 Multivariate distribution of statistics
60E05 Probability distributions: general theory

Keywords:

associated random variables; bivariate distributions; mixtures of distributions; total positivity; uniform marginals; Laplace transform; positive and negative dependence properties

Full Text: DOI