**A. P. Koldanov**, **V. A. Kalyagin**, **P. A. Koldanov** (Nizhny Novgorod, Russia, National Research University Higher School of Economics, Laboratory of Algorithms and Technologies for Network Analysis). **Distribution free statistical procedures in random variables networks.**

Consider a network generated by a random vector $X = (X_1, X_2, \dots, X_N)$. Nodes of network are random variables $X_i$, $i = 1, 2, \dots, N$ and weight of edge $(i, j)$ is given by some measure of association $\gamma$ between random variables $X_i$ and $X_j$. In this paper we investigate random variables networks $(X, \gamma)$ where random vector $X$ has elliptically contoured distribution with density functions [1]:

$$f(x; \mu, \Lambda) = |\Lambda|^{-\frac{1}{2}} g\{(x-\mu)'\Lambda^{-1}(x-\mu)\} \tag{1}$$

where $\Lambda$ is positive definite matrix, $g(x) \geqslant 0$, and $\gamma$ is Pearson correlation $\gamma^P$ or sign similarity $\gamma^S_{i,j} = \mathbf{P}\{(X_i - \mu_i)(X_j - \mu_j) > 0\}$. It can be shown that in this case threshold graphs are defined only by the matrix $\Lambda$ and don't depend on the function $g$. However properties of threshold graph identification statistical procedures can be dependent on the function $g$. In particular, risk function for traditional statistical identification procedures in Pearson correlation network is essentially different for multivariate Gaussian and Student distributions with the same matrix $\Lambda$ [2]. In some applications it is important to construct identification statistical procedures with the risk function invariant with respect to $g$ (distribution free statistical procedures). Our main result is: single step, step down Holm, and step up Hochberg multiple decision procedures for threshold graph identification are distribution free in sign similarity network. Moreover, we show that these procedures can be adapted for distribution free threshold graph identification in Pearson correlation network.

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