MARGINAL PERMUTATION INVARIANT COVARIANCE MATRICES IN LINEAR MODELS WITH APPLICATIONS IN THE STUDY OF KNEE OSTEOARTHRITIS

T. Nahtman

University of Tartu, Estonia

† E-mail: *Tatjana.Nahtman@ut.ee*

In many practical applications, for example in psychometric and medical research, the assumption about interchangeability of levels of factors may be both reasonable and convenient (Viana, 1994; Olkin and Viana, 2000; etc.). Votaw (1948) considered medical problems where a symmetric normal distribution, which is a normal distribution with a certain covariance structure, was applied. He discussed so called complete and compound symmetry.
The goal of the present study is to perform a comprehensive study of covariance structures which are invariant with respect to marginal permutations. We prove that the presence of symmetry in data implies a specific structure for the covariance matrices. When a structure exists, the incorporation of this covariance structure in the analysis will lead to more efficient inference. The obtained results are used in the study of knee osteoarthritis (KOA).