

ABSTRACT

Multiple hypothesis testing is an important topic in statistics. Therefore, the problem addressed in this thesis is an important one. The Bayesian methods of hypotheses testing are widely used for solving different problems, and this technique is rather well developed. A lot of scientific works are dedicated to the development of this method. Many interesting and important results have been obtained in this field by different authors. Despite of this fact there still remain a lot of unsolved problems. For filling these gaps, in this thesis we consider different problems of testing many hypotheses by the Bayesian approach. In particular, in the Bayesian problem of many hypotheses testing concerning all the parameters of multidimensional normal distribution at correlation of observation results we have obtained the following new results: the problem of computation of the risk function were considered; the formulae for calculation of multidimensional probability integrals by series using the reduction of dimensionality to one without information loss were derived; the formulae for calculation of product moments for normalized normally distributed random values were derived; the problems of existence and continuity of the probability distribution law of linear combination of exponents of quadratic forms of the normally distributed random vector, and, also, the problem of finding the closed form of this law were considered; the existence of this law and the opportunity of its unambiguous determination by calculated moments of the appropriate random variable were proved; the approximation of optimal regions of acceptance of hypotheses, which significantly simplify the algorithms of realization of general solutions of the task, is offered; the properties and interrelations of the developed methods and algorithms were investigated; the problem of choosing the loss function in the Bayesian problem of many hypotheses testing was considered; the results of sensitivity analysis of the considered Bayesian problem are given; the calculation results for concrete examples, which show the validity of the obtained results are given. Especially must be emphasized that new sequential method of testing many hypotheses based on special properties of regions of acceptance of hypotheses in the conditional Bayesian task of testing many hypotheses is offered. The results of research of the properties of this method are given. They show the consistency, simplicity and optimality of the obtained results in time sense of the chosen criterion, which consists in the upper restriction of the probability of the error of one kind and the minimization of the probability of the error of the second kind. The examples of testing of hypotheses for the case of the sequential independent sample from the multidimensional normal law of probability distribution with correlated components are cited. They show the high quality of the offered methods.