

EDITORIAL: Inference in Clinical Experiments

Statistical methods all are more widely used in all spheres of human activity. Their importance in medicine and biology especially intensively is developing and increasing since the latest decade of the previous century. The reason of this circumstance consists in especial complexity of the problems of these domains caused by complexity of their character, by the great number of the parameters included in them and of the factors influencing their. Many of the factors affecting the observation results used for investigation of the problems under study are random by their nature and, hence, the observation results are random. Therefore the study and solution of these problems require the application of the modern methods of probability and mathematical statistics.



Practically all basic problems of mathematical statistics more or less are connected with determination of concrete values of the parameters of the used models or with isolation of one from the set of their possible values. Solution of these problems is realized by the methods of mathematical statistic incorporated in estimation theory and statistical hypotheses testing which shortly is named inference. Issued from here, the methods of inference have the great importance and are widely used in medicine and biology. This is reason of publication of the offered hot topic of the journal. In this volume are incorporated the manuscripts dedicated to the development of the considered methods and to the application of these methods for solving such actual problems of the medicine that are neurology, breast cancer and cardiology.

In particular, the paper “Constrained Bayesian Method of Composite Hypotheses Testing: Singularities and Capabilities” deals with the Constrained Bayesian Method (CBM) for testing composite hypotheses. CBM is new philosophy in statistical hypotheses testing. It has all positive characteristics of well-known classical approaches. It is a data-dependent measure like Fisher’s test for making a decision, it uses a posteriori probabilities like the Jeffreys test and computes error probabilities Type I and Type II like the Neyman-Pearson’s approach does. Application of CBM to the composite hypotheses testing problems is considered in the paper and its optimality in comparison with known methods is shown. Since composite hypotheses testing is actual problem of the medicine we hope this paper will assist to the solution of these problems on the desired level.

Next paper “A method to assess neurological effectiveness of a spinal adjustment for an individual patient: A descriptive study” by the methods of regression analysis and Descriptive Statistics study compares the neurological assessment of resting pulse rate (RPR) in an instance of adjustment versus no adjustment. The method may be of

interest to practicing clinicians who have a neurological focus (e.g., chiropractors in subluxation-centered chiropractic). The method also calculated various pre RPR values for future comparison of other adjustments with matching pre RPR, and where the patient is his or her own control.

The paper “Non invasive cardiac output evaluation with CO₂ rebreathing method for CRT patients” processing experimental data by statistical methods (in particular, methods of correlation analysis and statistical hypotheses testing) concludes that the gas rebreathing technique is an easy, safe and well established method for non-invasive measurement of cardiac output with good prospects for clinical application in heart disease patients. The Innocor system is also a promising non-invasive method to assess the cardiac output at baseline in HF patients with CRT; maybe in the future it could be assessed also during a submaximal exercise test.

Kartlos Kachiashvili

(Guest Editor)

Professor, Faculty of Informatics and Control Systems,
the Georgian Technical University
Main Scientific Worker,
the I. Vekua Institute of Applied Mathematics of the Tbilisi State University
Georgia
E-mail: k.kachiashvili@gtu.edu.ge