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FISC Organizers and Special Guest Editors

Special issue

Selected Papers from the FISC Conference at Kettering University
June 24–28, 2014, Michigan, USA

This special issue of the Serdica Journal of Computing (FISC, June 24–28, 2014 Proceedings) contains part of the presented and refereed articles discussed at the Flint International Conference on Statistics (FISC), held at Kettering University in Flint, Michigan, in June 24–28, 2014. This International event was really unique for Kettering and for the institutions in this city. More than 40 participants gathered at FISC. There were participants from Sweden, France, Germany, Moldavia, Bulgaria, Italy, United Kingdom, Spain, South Africa, Canada, Cyprus, Barbados, Georgia, Moldova, USA. The title of the conference “Flint, One City, One Year Under Variability” was challenging. It serves as a hint that this conference is on statistical methods and studies of historical data. We saw many challenging problems in studies on data sets containing multiple parallel series of historical data on various things in the areas of public life, industrial and service development. And historical data are presented by huge worldwide arrays of big data that require not just specific statistical methods for excerption of useful information and learning, but also development of specific tools for data mining and reducing the dimension of the data sets. Hence, many of the existing questions naturally led to further questions on the edge between Computer Science and Statistical approaches in data manipulations. And as a result, the FISC enjoyed discussions important for the whole spectrum of interest, from algorithmic and numeric to modeling and traditional analytic and practically valued studies of specific problems.
At the end of the day, we collected 22 well written articles from those participants, who decided to publish in our journal’s *Special Proceedings of FISC* issue. As organizers and editors of the FISC Proceedings, we split the articles in two parts. The articles closed to Computer Science topics are directed to the *Serdica Journal of Computing* (published by the Bulgarian Academy of Sciences), while those with more theoretical and specific statistical orientation go to the journal *Economics, Quality, Control* (EQC), published simultaneously by De Gruyters in Germany.

This special issue of *Serdica Journal of Computing* contains 12 articles presented at FISC, then several months later prepared by the authors as publishable artwork which passed the scrutiny of a peer review process, and offered now to the judgment of readers.

**Abstracts -Part II**

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**FIVE TURNING POINTS IN THE HISTORICAL PROGRESS OF STATISTICS—MY PERSONAL VISION**

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*Key words:* Jakob Bernoulli, Abraham de Moivre, John Sinclair, Adolphe Quetelet, Andrej Kolmogorov, ASA, uncertainty, randomness, probability.

*Abstract.* Statistics has penetrated almost all branches of science and all areas of human endeavor. At the same time, statistics is not only misunderstood, misused and abused to a frightening extent, but it is also often much disliked by students in colleges and universities. This lecture discusses/covers/addresses the historical development of statistics, aiming at identifying the most important turning points that led to the present state of statistics and at answering the questions “What went wrong with statistics?” and “What to do next?”.

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**TEACHING STATISTICS TO ENGINEERS: LEARNING FROM EXPERIENTIAL DATA**

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*Key words:* Statistics for Engineers, Experiential data, quality control, statistical concepts, engineering decisions.

*Abstract.* The purpose of the work is to claim that engineers can be motivated to study statistical concepts by using the applications in their experience connected with Statistical ideas. The main idea is to choose a data from the manufacturing facility (for example, output from CMM machine) and explain that even if the parts used do not meet exact specifications they are used in production. By graphing the data one can show that the error is random but follows a distribution, that is, there is regularly in the data in statistical sense. As the error distribution is continuous, we advocate that the concept of randomness be introduced starting with continuous random variables with probabilities connected with areas under the density. The discrete random variables are then introduced in terms of decision connected with size of the errors before generalizing to abstract concept of probability. Using software, they can then be motivated to study statistical analysis of the data they encounter and the use of this analysis to make engineering and management decisions.
DEPENDENCE STRUCTURE OF SOME BIVARIATE DISTRIBUTIONS
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Key words: Bivariate Poisson, Clayton Copula, Local dependence, Measures of dependence, Regression coefficient.

Abstract. Dependence in the world of uncertainty is a complex concept. However, it exists, is asymmetric, has magnitude and direction, and can be measured. We use some measures of dependence between random events to illustrate how to apply it in the study of dependence between non-numeric bivariate variables and numeric random variables. Graphics show what is the inner dependence structure in the Clayton Archimedean copula and the Bivariate Poisson distribution. We know this approach is valid for studying the local dependence structure for any pair of random variables determined by its empirical or theoretical distribution. And it can be used also to simulate dependent events and dependent r/v’s, but some restrictions apply.

ON THE $L^P$-NORM REGRESSION MODELS FOR ESTIMATING VALUE-AT-RISK*
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Key words: Value-at-Risk (VaR), Quantile distributions, Least-squares estimation, $L^p$-norms.

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Abstract. Analysis of risk measures associated with price series data movements and its predictions are of strategic importance in the financial markets as well as to policy makers in particular for short- and long-term planning for setting up economic growth targets. For example, oil-price risk-management focuses primarily on when and how an organization can best prevent the costly exposure to price risk. Value-at-Risk (VaR) is the commonly practised instrument to measure risk and is evaluated by analysing the negative/positive tail of the probability distributions of the returns (profit or loss). In modelling applications, least-squares estimation (LSE)-based linear regression models are often employed for modeling and analyzing correlated data. These linear models are optimal and perform relatively well under conditions such as errors following normal or approximately normal distributions, being free of large size outliers and satisfying the Gauss-Markov assumptions. However, often in practical situations, the LSE-based linear regression models fail to provide optimal results, for instance, in non-Gaussian situations especially when the errors follow distributions with fat tails and error terms possess a finite variance. This is the situation in case of risk analysis which involves analyzing tail distributions. Thus, applications of the LSE-based regression models may be questioned for appropriateness and may have limited applicability. We have carried out the risk analysis of Iranian crude oil price data based on the $L^p$-norm regression models and have noted that the LSE-based models do not always perform the best. We discuss results from the $L_1$, $L_2$ and $L_\infty$-norm based linear regression models.

THE METHODOLOGY OF THE SUBSISTENCE MINIMUM CALCULATION FOR DEVELOPING COUNTRIES AND ITS COMPUTATION ON THE GEORGIAN EXAMPLE
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Key words: Subsistence Minimum; Consumer’s Basket; Minimum Food Basket; Minimum Non-Food Basket; poverty line.

Abstract. This article shows the social importance of subsistence minimum in Georgia. The methodology of its calculation is also shown. We propose ways of improving the calculation of subsistence minimum in Georgia and how to extend it for other developing countries. The weights of food and non-food expenditures in the subsistence minimum baskets are essential in these calculations. Daily consumption value of the minimum food basket has been calculated too. The average consumer expenditures on food supply and the other expenditures to the share are considered in dynamics. Our methodology of the subsistence minimum calculation is applied for the case of Georgia. However, it can be used for similar purposes based on data from other developing countries, where social stability is achieved, and social inequalities are to be actualized.
GENERALIZED PRIORITY SYSTEMS. ANALYTICAL RESULTS AND NUMERICAL ALGORITHMS*
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Key words: Priority, switchover time, busy period, queue length, traffic coefficient.
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Abstract. A class of priority systems with non-zero switching times, referred as generalized priority systems, is considered. Analytical results regarding the distribution of busy periods, queue lengths and various auxiliary characteristics are presented. These results can be viewed as generalizations of the Kendall functional equation and the Pollaczek-Khintchin transform equation, respectively. Numerical algorithms for systems’ busy periods and traffic coefficients are developed.

ON THE BUSY PERIOD IN ONE FINITE QUEUE OF M/G/1 TYPE WITH INACTIVE ORBIT
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Key words: finite queuing systems, inactive customers, busy period, number of successful calls.

Abstract. The paper deals with a single server finite queuing system where the customers, who failed to get service, are temporarily blocked in the orbit of inactive customers. This model and its variants have many applications, especially for optimization of the corresponding models with retrials. We analyze the system in non-stationary regime and, using the discrete transformations method study, the busy period length and the number of successful calls made during it.