Strijov V.V. Sequential model selection in forecasting // 25th European Conference on Operational Research, 2012 : 176.

EURO 25 - Vilnius 2012   **TD-44**

4 - Records Properties of Nonstationary Time Series

Ana Elizabeth García Sipols, Estadística e investigación operativa, Universidad Rey Juan Carlos, c/ Tulipan s/n, 28933, Madrid, Spain, anaelizabeth.garcia@urjc.es, *Clara Simon de Blas*, *M. Teresa Santos Martin*

This paper compares the statistical properties of the records from independent and identically distributed time series with those of time series containing a single unit root. It is shown that there are important differences in both the limiting distributions and the convergence rates of the associated record counting processes. We prove some properties for the test statistic in the context of the renewal theory and we suggest two new candidates to test the hypothesis of random walk with positive and negative drift.

■ TD-43

Tuesday, 14:30-16:00
BW-Granite

Stochastic and robust optimization

Stream: Stochastic Programming
Invited session

Chair: *Abdel Lisser*, LRI, Universite de Paris Sud, Bat. 650, 91405, Orsay, France, lisser@lri.fr

1 - Solving SCOPF problems by a new structure-exploiting method

Naiyuan Chiang, School of Mathematics School of Mathematics School of Mathematics School of Mathematics, University of Edinburgh, Room 5620, JCMB, The King's Buildings, EH9 3JZ, Edinburgh, State, United Kingdom, sorakid507@gmail.com

The aim of this paper is to demonstrate some new approaches to solve the linearized security constrained optimal power flow (SCOPF) problem by OOPS, which is a modern structure-exploiting primal-dual interior-point implementation. Firstly, we present a reformulation of the SCOPF model, in which most matrices only need to be factorized once throughout the IPM iterations. Moreover, we use a preconditioned iterative method to solve the corresponding linear system and suggest several schemes to pick a good and robust preconditioner based on combining different "active' contingency scenarios.

2 - A Second-Order Cone Programming approach for Linear programs with joint probabilistic constraints

Abdel Lisser, LRI, Universite de Paris Sud, Bat. 650, 91405, Orsay, France, lisser@lri.fr

In this this talk, we consider a special case of Linear programming problems with joint probabilistic constraints (LPPC). We assume that the constraint matrix is random with normally distributed coefficients and independent rows. To solve this hard problem, we use the piecewise linear approximation and the piecewise tangent approximation to come up with upper and lower bounds respectively. For this purpose, we solve two different second-order cone programming (SOCP) problems. Numerical results on randomly generated data are given.

3 - Robust portfolio optimization - impact of copula and estimation choice

Justyna Majewska, Department of Demography and Business Statistics, University of Economics in Katowice, 1 Maja 50, 40-287, Katowice, Katowice, Poland, justyna.majewska@ue.katowice.pl, *Grażyna Trzpiot*

The paper deals with estimating risk-minimizing portfolios when departures from standard assumption of Gaussianity are present. Its aim is to investigate the impact of different copula on optimal portfolios, when different robust alternatives to the classical variance portfolio optimization problem are used. Specifically, we examine some aspects of the relationship of dependence structure and robust estimation. We present applications using a data set based on a global portfolio of an emerging market investors located in Central and Eastern Europe.

4 - On reduction of quantile optimization problems with discrete distributions to mixed integer programming problems

Vladimir Norkin, Operations Research, Institute of Cybernetics, Glushkov avenue, 40, 03187, Kiev, Ukraine, norkin@i.com.ua, *Andrey Kibzun*, *Andrey Naumov*

In the report we suggest a method of equivalent reduction of a general quantile optimization problem with discrete distribution of random data to large scale mixed integer programming problems. The latter are supposed to be solved by standard discrete optimization software. As a particular case a two-stage quantile stochastic optimization problem is considered. Our main contribution consists in establishing new conditions of equivalence between two formulations. Some generalizations can be found in http://www.optimization-online.org/DB_HTML/2010/05/2619.html

■ TD-44

Tuesday, 14:30-16:00
BW-Marble

Model Generation and Model Selection

Stream: Machine Learning and its Applications
Invited session

Chair: *Michael Khachay*, Ural Branch of RAS, Institute of Mathematics and Mechanics, S.Kovalevskoy, 16, 620990, Ekaterinburg, Russian Federation, mkhachay@imm.uran.ru
Chair: *Vadim Strijov*, Russian Academy of Sciences, Computing Center, Vavilova 42-268, 119333, Moscow, Russia, Russian Federation, strijov@ccas.ru

1 - Search for Optimal Composite Indicators

Miroslav Klucik, Faculty of Economics, VSB-Technical University of Ostrava, Havlickovo nabrezi 38, 701 21, Ostrava, Czech Republic, miroslav.klucik.st@vsb.cz

Contemporary approaches to construct composite leading indicators using economic theory and statistical analysis rely mostly on subjective decisions of researchers and analysts. An artificial intelligence tool — genetic programming — can mine all the information available in large data sets and help to construct models best fitted to the reference data. The composition of indicators and the lead of time series are being searched for by symbolic regression. The structure of associated information between reference series and large data sets is shown.

2 - Nonlinear regression model generation and graph transformations

Roman Sologub, Innovations and High Technology, Moscow Institute of Physics and Technology, 508, 86, Altufievskoe sh., Moscow, 127349, Moscow, alucardische@gmail.com

We investigate a problem of non-linear regression model generation. The practical application is to define regression of strike and maturity of a European option towards its volatility. To derive the volatility surface we use symbolic regression. The competitive models are generated as superpositions of expert-given functions. The main problem of the model generation process is to filter the isomorphic models with different structure. The methods of graph transformation are used as solution. The result is a set of models of unique structures. The optimal model is selected from this set.

3 - Multiclass classification of cardio-vascular disease patients with sample size estimation

Anastasia Motrenko, Applied mathematics and management, MIPT, Moscow, Russian Federation, pastt.petrovna@gmail.com

We discuss an algorithm that classifies four groups of patients, divided by their health condition. Concentrations of proteins in blood cells are used as features. Our first objective is to select a set of features that will classify the patients making minimum amount of errors. This selection is implemented by means of exhaustive search. Two classification strategies are investigated, "one versus all" and "all versus all". The second objective is the sample size. Amount of data is small, so we evaluate minimum sample size, necessary for statistical significance of classification.

4 - Mixture models in the financial time series forecasting

Vadim Strijov, Russian Academy of Sciences, Computing Center, Vavilova 42-268, 119333, Moscow, Russia, Russian Federation, strijov@ccas.ru

To forecast financial time series one needs a set of models of optimal structure and complexity. The mixture model selection procedures are based on the coherent Bayesian inference. To estimate the model parameters and covariance matrix, Laplace approximations methods are introduced. Using the covariance matrix one could split up the data set to form mixture of models and select a model with minimum description length.

■ TD-45

Tuesday, 14:30-16:00
BW-Water

Quantitative Approaches in Managerial and Financial Accounting

Stream: Quantitative Approaches in Managerial and Financial Accounting
Invited session

Chair: *Matthias Amen*, Chair for Quantitative Accounting & Financial Reporting, University of Bielefeld, Universitaetsstrasse 25, 33615, Bielefeld, Germany, Matthias.Amen@web.de

1 - Optimizing continuous inventory

Matthias Amen, Chair for Quantitative Accounting & Financial Reporting, University of Bielefeld, Universitaetsstrasse 25, 33615, Bielefeld, Germany, Matthias.Amen@web.de

Physical inventory exists explicitly or implicitly (IFRS, ISA 501) in all accounting systems. The German Commercial Code (Handelsgesetzbuch, HGB) requires an annual physical inventory for each item of the balance sheet. Traditional physical inventory requires a stop of operations of the production plant for a certain period around the balance sheet date. To ensure continuous production continuous inventory is also allowed. We present an optimization approach to determine the schedule of stocktaking in a continuous inventory system during the accounting period.

2 - Meta Managerial Accounting — quantitative approaches for designing managerial accounting systems

Markus Puetz, Chair, Department of Managerial Accounting and Control, WHL Graduate School of Business and Economics, Hohbergweg 15 - 17, D-77933, Lahr, Baden-Wuerttemberg, Germany, markus.puetz@whl-lahr.de

Meta Managerial Accounting (MMA) is used to design effective managerial accounting systems for practical applications. In this presentation 3 MMA approaches will be discussed: 1. Analytical and graph theoretical approach for representation of business and control processes with open decision networks. 2. First order predicate logic approach for specification of business and control processes and potentials, including handling of verification and validation tasks which refer to control methods. 3. Approach for implementation of simulation based open decision networks for MMA purposes.

3 - Corporate taxes, capital structure and valuation: Combining Modigliani/ Miller and Miles/ Ezzell

Ulrich Schäfer, Professur für Finanzen und Controlling, Georg-August-Universität Göttingen, Platz der Göttinger Sieben 3, 37073, Göttingen, Germany, ulrich.schaefer@wiwi.uni-goettingen.de, *Stefan Dierkes*

Valuing a company with Discounted Cash Flow (DCF) approaches requires assumptions about the financing strategy. In general, pure strategies are considered thus far: Either, according to Modigliani and Miller, debt levels or, following Miles and Ezzell, capital structure targets are pre-determined for all periods. In this paper, it is shown how to value a company for an arbitrary combination of these strategies.

The familiar approaches are embedded into a common framework. For practical application, a combined financing allows for a more realistic modeling of a company's financing strategy.

4 - Electronic transfer of financial data to banks - reasons for refusal and possible improvements

Karina Sopp, University of Vienna, Bruenner Straße 72, 1210, Vienna, Austria, karina.sopp@univie.ac.at

Electronic transfer of financial data based on a reporting language like XML or XBRL gets more and more common in multiple areas. However in the communication between banks and their business customers the distribution of financial information in alternative formats still remains dominant and therefore shows potential for further development. To detect the reasons for the lack of acceptance a survey was carried out among approximately 2000 Austrian accountants. The results of the survey show next to the reasons for the low acceptance the conditions which have to be met for a higher acceptance.