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Litors

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weighted kernel matrix. We extend the core KSC model by adding extra terms in the objective function related to the labeled information together with regularization constants. The resulting dual is no longer an eigenvalue problem but a linear system. Simulation results show the applicability of the proposed method.

3 - Restating clinical impression of severity index for Parkinson's disease using just non-motor criteria
Rubén Armañanzas, Artificial Intelligence Department, Technical University of Madrid, Facultad de Informática, Campus de Montegancedo, 28660, Madrid, Spain, r.armananzas@upm.es, *Pablo Martinez-Martin, Concha Bielza, Pedro Larrañaga*

Clinical impression of severity index (CISI) for Parkinson's disease (PD) is an index to assess PD severity based on four clinical domains. Since this is a continuous value, a categorization policy is proposed by solving an optimization problem. Using this encoding, different comparisons between CISI and other non-motor indexes or items are addressed using wrapper item subset selection and estimation of distribution algorithms. Results show how some of the non-motor items are very relevant, achieving good classification performances when used to predict the CISI severity index.

■ WC-30

Wednesday, 12:30-14:00
CC-A31

DEA and Performance Measurement: Applications 9

Stream: DEA and Performance Measurement (contributed)
Contributed session

Chair: *Ahti Salo*, Systems Analysis Laboratory, Aalto University School of Science and Technology, P.O. Box 11100, Otakaari 1 M, 00076, Aalto, Finland, ahti.salo@aalto.fi

1 - Measuring the Operation Efficiency for Bus Transit in Taiwan with Undesirable Outputs
Chao-Chung Kang, Department of Business Administration and Graduate Institute of Management, Providence University, 200, Chung-Chi, Rd., 433, Shalu, Taichung, Taiwan, cckang@pu.edu.tw

This paper studies the operating efficiency for bus transit with undesirable outputs by slack-based data envelopment analysis (SBM-DEA) in Taiwan. Data of Taipei over 2007-2010 is drawn for the study. Vehicle-kilometer and operation revenue are taken as desirable outputs; vehicle emission as undesirable output; labor, vehicle, and fuel are the inputs. We compare the differences in efficiency evaluation produced by DEA and SBM-DEA. The effects in relative efficiency of desirable and undesirable output can suggest practical strategies for improving the operating efficiency of bus transit.

2 - Factors defining Effectiveness of automatic vehicle location systems
Daniil Opolchenov, Department of Electronics, Transport and Telecommunication Institute, Lomonosova street 1, LV-1019, Riga, Latvia, Opolchenov.D@tsi.lv

This work is devoted to solving the problem of AVL systems effectiveness estimation. In this work we consider the tasks of defining the factors which determine the effectiveness of AVL systems, and of obtaining their numerical values and distribution laws. To reduce the analysis complexity, we divide AVL systems into subsystems and redefine accordingly the factors defining their effectiveness. The results of this work can be used to obtain an effectiveness index.

3 - Chinese Companies Distress Prediction: An Application of Data Envelopment Analysis
Zhiyong Li, Business School, University of Edinburgh, Flat 13, 35 Peffer Bank, EH16 4FE, Edinburgh, Scotland, United Kingdom, zhiyong.li@ed.ac.uk, *Jonathan Crook, Galina Andreeva*

Traditional distress prediction models employ financial ratios to predict distress. We investigate the predictive accuracy of efficiency measures along with ratios in predicting distress in Chinese companies. Unlike previous studies where DEA was used to generate a single efficiency-TE, we decompose TE into PTE and SE. These variables are introduced into LR to make prediction. Efficiency of firms for several industrial sectors is integrated in one industry-specific LR. The results show the predictive power is improved by this efficiency. Both Cross-sectional and panel models are tested.

4 - Analyzing Portfolios of DMUs with Ratio-Based Efficiency Analysis (REA)
Ahti Salo, Systems Analysis Laboratory, Aalto University School of Science and Technology, P.O. Box 11100, Otakaari 1 M, 00076, Aalto, Finland, ahti.salo@aalto.fi, *Juuso Liesiö, Yongjun Li*

In this paper, we extend Ratio-Based Efficiency Analysis [Salo and Punkka, 2011, Mgmt Sci 57/1] for the comparison of portfolios, defined as combinations of DMUs where the share of each DMU is required to satisfy linear constraints. In particular, we establish a dominance relationship among such feasible portfolios in order to determine which portfolios are more efficient than others. We also examine the composition of efficient portfolios, which allows us to determine minimum and maximum bounds on the share of any DMU across all efficient portfolios.

■ WC-31

Wednesday, 12:30-14:00
CC-A33

OR and Ethics I

Stream: OR and Ethics
Invited session

Chair: *Cristobal Miralles*, Depto. Organización de Empresas, Universidad Politecnica de Valencia, Cami de Vera s/n, 46022, Valencia, Spain, cmiralles@omp.upv.es
Chair: *Fred Wenstøp*, Strategy and Logistics, BI Norwegian School of Management, Nydalsveien 37, 0483, Oslo, Norway, fred.wenstop@bi.no

1 - On Multidimensional Performance Measures — A Critical Reflection and Future Developments
João Clímaco, INESC-Coimbra, 3004-512, Coimbra, Portugal, jclimaco@inescc.pt

In this communication we start by summarizing and exemplifying the difficulties to build quality of life indicators and sustainability indicators, aggregating several dimensions. Ethical, methodological and practical issues are emphasised. Secondly, we discuss how and in which cases the notion of capability, proposed by A.Sen, could be useful, and we propose a multidimensional visual procedure to explore the information provided by adequate dashboards, helpful in those situations. A software demonstration will be done. Finally, future trends of research are outlined.

2 - Responsibility in Decision-Support
Sven Diekmann, Philosophy & Ethics of Technology, Eindhoven University of Technology, P.O. Box 513, IPO 1.14, 5600 MB, Eindhoven, Netherlands, s.diekmann@tue.nl

Operations Researchers (ORs) often influence decisions on ethical issues, e.g. HIV policies. Although they do not decide themselves, their work makes them accountable for consequences of supported decisions. However, are ORs also morally blameworthy? Are they accountable for unforeseeable consequences? I distinguish responsibility, accountability and blameworthiness. In the following, I investigate criteria for holding ORs accountable or blameworthy. I conclude that ORs can always be hold accountable for consequences related to their work, while blameworthiness depends on specific conditions.