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Book of Abstracts

Edited by Biljana Mileva Boshkoska

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ABSTRACTS

(in order of the conference programme schedule)

Keynote, ROBERT KOPAL *University College Algebra, Zagreb, Croatia*
Title: Social network analysis in national security

Social network analysis (SNA) provides an analytical/methodological framework for studying the patterns and processes that underpin financial transactions, phone calls, social/peer influences, information flow, local and international trade or any other exchange between individuals, groups, organizations or other entities. SNA can assist in detecting hidden connections between entities (modelled as network nodes) and reveal their degree of mutual influence at various levels, including the most complex global network level, which is can hardly be achieved with any other approach. In the context of growing concern of national security, SNA represents an evolution – if not a revolution – in unravelling the connectivity patterns among the security/intelligence agencies around the world. Looking at a sample of interesting cases, in this talk we will examine the range of SNA applications in national security.

Keynote, MARKO BOHANEK *Department of Knowledge Technologies, Jožef Stefan Institute, Slovenia*
Title: Data Mining for Decision Support and the “4C Requirements”: Correctness, Completeness, Consistency and Comprehensibility

With the abundance of data generated and stored in computer networks, the idea of developing decision support systems (DSSs) from data is becoming more and more appealing. Data can be viewed as a historical record of past decisions. The idea of the “Data Mining for Decision Support” approach is to process this data by machine learning and/or data mining algorithms in order to obtain models that can guide or predict future decisions. It is commonly believed that such models, once developed from data and checked for accuracy, are immediately suitable for supporting human decision makers and could be easily embedded in DSSs. Unfortunately, these expectations often turn out to be too naïve for practice and rarely work as expected. In this talk, we will investigate the “Data Mining for Decision Support” approach from the viewpoint of a decision analyst and DSS developer. We will use real cases from the areas of health-care management and food production to identify and illustrate the main obstacles for using data-mined models in DSSs. On this basis, we will formulate and explain the “4C Requirements” for models to be used in the DSSs: Correctness, Completeness, Consistency and Comprehensibility. For future data mining research, we will suggest to put more emphasis on considering ordered features and classes, fulfilling the dominance principle and monotonicity of models, measuring and improving the comprehensibility of models, and ensuring the completeness of models. Also, data mining and decision support should work together to achieve a better verification and validation of models with respect to the end-user’s problem, and provide a better support for integrating data with expert knowledge.

Keynote, LUKA KRONEGGER *Faculty of Social Sciences, University of Ljubljana, Slovenia*
Title: Bibliometric analysis of Slovenian scientific community

In recent years bibliographic analysis of research performance became a global hype. Physicists, Computer scientists, Organisational scientists, Social scientists, Librarians, etc. try to utilize given resources of bibliographic databases and computer power that enabled researchers to grasp these huge datasets. There are different ways how to analyse these data. Some see the bibliographic data as solid technical playground, others as fascinating quantification of researchers daily reality. The perspective of our interdisciplinary team tries to join these different views, by joining quantitative analysis with social theories and sensitivity to social reality. Several approaches to analyse publication activity of researchers in Slovenia, as small scientific community, will be presented. The presentation is mainly based on the results obtained by three methods: i) clustering of symbolic data applied on distributions of collaboration on the level of scientific disciplines, ii) modelling of network dynamics with SIENA, where models of preferential attachment and small world were tested, and iii) multilevel analysis with scientific productivity and excellence as dependent variables. The analyses are performed on co-authorship network of all Slovenian researchers (around 20000) affiliated into 72 scientific disciplines which are nested into 7 research fields. In the period 1986-2010 these researchers published around one million publications.

Keynote, LOVRO ŠUBELJ *Faculty of Computer and Information Science, University of Ljubljana, Slovenia*
Title: Reliability of bibliographic databases for scientometric network analysis

Bibliographic databases range from expensive hand-curated solutions (WoS) to preprint repositories (arXiv), public servers (DBLP) and automated services that collect manuscripts from the Web (Scholar). These provide the basis for scientific research, where new knowledge is derived from the existing, while also the main source of its evaluation. The databases are used by scientists on a daily basis and often studied in bibliometrics and scientometrics literature. However, while the content and structure of modern databases differ substantially, there exist only informal notions on their reliability. In this talk I will present a study of reliability of different citation and collaboration networks extracted from most popular bibliographic databases. Despite considerable differences between the databases, the results will indicate that there is no “best” database. The most appropriate choice largely depends on the type of the information one is interested in and on the type of the analysis one wishes to conduct.

Leo Mršić, IN2data, Zagreb: Presentation of the company IN2data

IN2data Data Science Company is part of IN2 Group, largest ISV in Croatia. Its interdisciplinary team of scientists and professionals with relevant academic and industry business knowledge, able to deliver advanced analytical solutions, is unique in the region. Services portfolio include predictive modelling and big data analytics, social networks (SNA), segmentation models, cross sell & up sell models, fraud detection, churn predictions, scoring, text mining, early warning systems and social CRM. IN2data capability to deliver different analytics solutions on demand also include models adoption for tailor-made requirements in various environments. For best performance solution components could also be used as stand-alone models or could be integrated inside client's current solution. As an analytical company we take great care to explain and communicate business value for our customers as clearly as possible. Our approach is based on the right mixture of business domain knowledge, advanced methodological competences and state of the art technology. All offerings are clearly linked to business goals and business value is determined with measurable performance indicators. Inside our team all kinds of data are respected and carefully managed as one of the company's most valuable asset. Our emotion for data can be compared with great music or, as we like to say, with great dish. On first notice, all cooks can look the same but when you taste their works you can easily tell which one is great. Our knowledge base is powered by more than 20 data experts at your disposal, ranging from senior data scientists with 20+ years of experience to data researchers. Five of our base team members are data scientists with PhD+ level while our extended team include two more and three PhDc's. Our principal consultants published 20+ books with distinguished international publishers and copyrighted 150+ scientific papers in data science domain for different industries. IN2data, as a member of IN2 Group, also benefits from extensive group experience in retail industry. IN2 group is engaged in telecom industry for years, implementing its own as well as standard solutions, CRM & BI system development and system integration. A list of references and case studies is available on demand. We focus our special attention to convergence in industries today therefore we combine best practices from different industries to provide tailor made solutions with maximum efficiency for our clients.

Leo Mršić and Igor Kaluder, IN2data, Zagreb: Customer Satisfaction Improvement using Advanced Analytics Models in Telco Industry

Session will provide valuable insight into customer satisfaction improvement project which include advanced analytics and models usage on massive data sample. Participants will learn how such model can be planed and delivered, how to plan KPI's in such complex environment and how potential customer can prepare itself for such project. Authors will show several benefits which directly address business value improvement taken from real life experience in developing churn, churn & SNA and CLV models.

Andreas Hinz, LMU Munich: Where mathematics meets psychology

The Tower of Hanoi, invented by the French number theorist Edouard Lucas in 1883, is a classical example for recursion in mathematics and computer science. Early on, psychologists used the game for tests of cognitive abilities. The mathematical modelling as a Hanoi graph, allows for a computerized test tool which also includes a variant, called the Tower of London.

Ciril Petr, IMFM Ljubljana: Computational experiments on Hanoi graphs

Generalizing the classical Tower of Hanoi, invented by E. Lucas in 1883, to more than three pegs gives us a highly nontrivial mathematical object worth to explore not only analytically but also experimentally. The first significant computing experiment was published in 1999 by J.-P. Bode and A. M. Hinz who confirmed the Frame-Stewart conjecture in the case of four pegs for up to and including 17 discs. In 2004 R. Korf extended these results and also found a surprising phenomenon for $n=15$ discs in the corresponding Hanoi graph H_4^{15} . Even more surprising was that this Korf phenomenon did not occur for $n=16$ to 19, but reappeared for $n=20$ to 24. In 2014 we got access to supercomputing facilities where we managed to extend numerical results of several phenomena.

Blaž Rodič, Faculty of information studies: Modelling of international migrant flows

We will present a project idea aiming to develop a model that will provide a better understanding of processes in migrant flows and enable identification of potential new phenomena in the dynamics of migration for researchers and stakeholders in the management of migration processes. Previous research in the field of migration has identified a number of rules and factors affecting individual decisions on migration and the choice of target countries. The model is to include the influence of conditions in countries of origin, transit and destination countries, the influence of geographic and political boundaries, the influence of migration and asylum policies in shaping migration routes and migration. The planned model will also serve as a good example of multi-method integration, which will encourage the development of multi-method simulation models in other problem areas.

Benedikt Perak and Tajana Ban Kirigin, University of Rijeka: Formalizing an Ontological Model of Lexical Concepts and Constructions for Emotion Domain

This paper describes the process of: modelling the ontological hierarchy of lexical units within emotion domain(s) as represented by Component Process Model (CPM) of Emotion and formalized by MFOEM ontology, and b) formalizing the semantic-syntactic properties of linguistic constructions used to construe the meanings of emotion domain(s) within large corpora hrWaC (1,3 GW). For the description of construal of the meaning we propose an Ontology Model of Lexical Concepts and Constructions (OMLCC). The OMLCC expresses the epistemological and ontological status of the concepts referenced by the lexical units. Nodes denote concepts. For a node x , $A(x)$ denotes the (unique) superclass (4) – class (15) –subclass the concept denoted by x belongs to, and implicitly its entity from the ontology structure. Edges denote semantical connections of concepts, linking constructing concepts to the emerging concept from the next superclass in the hierarchical ontology structure.

Kristina Ban, Faculty of information studies: Wikipedia growth across most prominent languages

Wikipedia is probably the largest existing global knowledge repository. As of October 2016 there are 284 languages with active Wikipedias, ranging from English with more than five billion articles to Wikipedias with only a single article. Wikipedias change and grow on daily basis, with growth reflecting the trends in cultures related to specific languages. We consider the dates of birth of all articles that simultaneously exist in 26 most prominent languages on Wikipedia. Our analysis reveals interesting growth patterns across languages: following the most prominent English, dynamics of other languages seems to be organized in clusters of languages that exhibit similar behavior.

Marko Potokar, Institute for IT forensics, Ljubljana: The admissibility of the use of ICT for control and security at the workplace

Viewing e-mails, programs for monitoring the use of work stations, use of GPS devices in company vehicles, activation of the GPS system on business mobile phones, viewing images and data of video surveillance cameras and access control system, use of DLP technology and biometric measures are only some of the possible solutions of modern information technology for the control and protection of resources of the organization. The fact is that we have to be careful in using IT solutions, which were designed in an environment where the attitude to privacy in the workplace is quite different than in Europe. In the US, namely information privacy in the workplace is less protected than in Europe. Legislative framework gives greater weight to the employer's right to control their property, rather than the right of employees to privacy in the workplace. This raises a basic question: Is this kind of control admissible at all and what effect does it have on security and privacy of employees?

Tomaž Aljaž, Faculty of informations studies: Using Agile methodologies to increase throughput of projects

In IT, according to The Standish Group survey 2015 CHAOS report, only few projects perform well to meet cost, time, and scope. Only 16.2% software projects were completed on-time and on-budget, but provided approximately 42% of the originally-proposed features and functions. Clearly, the failure rate of IT projects is high and as response to that organisations tend to implement modern project management methodologies in terms of better project or business performance. The presentation shows example of using Agile methodologies to improve throughput of projects in multiproject environment with shared resources. In particular, it will be shown traditional approach of managing projects and continue with step-by-step approach using Agile project management methodologies, demonstrating how can be achieved the increased throughput at least doubling the number of projects that organisation can complete in the same period – all within existing employees and without changes in technology.