The 15th International Symposium on Operations Research in Slovenia - SOR'19

Bled, Slovenia, September 25 – 27, 2019
http://sor19.fov.uni-mb.si/

SOR'19 programme

Slovenian Society INFORMATIKA
Section for Operational Research
- organizer -

University of Maribor
Faculty of Organizational Sciences
- co-organizer -

University of Ljubljana
Faculty of Mechanical Engineering
- co-organizer -

Partnership for
Advance Computing in Europe
- sponsor –

Association of European Operational Research
Societies
- co-sponsor -

Wednesday September 25, 2019	**Thursday** September 26, 2019	**Friday** September 27, 2019
8.15 – Registration	8.15 – Registration	8.15 – Registration
9.00 – 9.45 Opening ceremony (Hall I)	9.00 – 9.50 **Plenary lecture (Hall I): (PL3) Tibor Illés** Budapest University of Technology and Economics, Hungary	9.00 – 9.50 **Plenary lecture (Hall I): (PL5) Matej Praprotnik** National Institute of Chemistry, Slovenia
9.50 – 10.40 **Plenary lecture (Hall I): (PL1) Ivan Bratko** Slovenian Academy of Sciences and Arts, and University of Ljubljana, Slovenia	10.00 – 11.15 Parallel sessions (Hall I, II and III): **(SS1) AORiA&AM + (SS6) SM&SOR + (SS7) TI4.0**	10.00 – 11.15 Parallel sessions (Hall I, II and III): **(SS3) GT&A + (S1) EM&S + (S3) F&I**
10.45 – 11.15 Coffee break	11.15 – 11.45 Coffee break	11.15 – 11.45 Coffee break
11.15 – 12.45 Parallel sessions (Hall I, II and III): **(S6) MCDM + (S8) P&M + (S2) E&SI**	11.45 – 12.45 Parallel sessions (Hall I, II and III): **(SS4) HPC&BD + (S4) LTGA + (SS2) F&BIiMCDM**	11.45 – 13.30 Parallel sessions (Hall I, II and III): **(SS3) GT&A + (S1) EM&S + (S3) F&I**
12.45 – 13.55 Lunch break	12.45 – 13.55 Lunch break	
14.00 – 14.50 **Plenary lecture (Hall I): (PL2) Mirjana Čižmešija** University of Zagreb, Croatia	14.00 – 14.50 **Plenary lecture (Hall I): (PL4) Joanna Józefowska (The EURO plenary)** Poznań University of Technology, Poland	13.40 – 14.20 Closing ceremony (Hall I)
15.20 – 22.00 Excursion with dinner	15.00 – 16.00 Parallel sessions (Hall I, II and III): **(S5) MP&O + (SS2) F&BIiMCDM + (SS5) OiHE**	
	16.00 – 16.30 Coffee break	
	16.30 – 17.45 Parallel sessions (Hall I, II and III): **(S5) MP&O + (S7) HR + (SS5) OiHE**	
	18.00 – 19.30 Social event	

Plenary lectures: 40 minutes for presentation plus 10 minutes for discussion.
Contributed papers: 14 minutes all together for presentation and for discussion.

Wednesday

September 25, 2019

8.15 – Registration

9.00 – 9.45 Opening ceremony (Hall I)

9.50 – 10.40 **Plenary lecture** (Hall I, Chair: Niko Schlamberger)
PL1 – **Ivan Bratko:** Robot Learning and Planning with Qualitative Representations

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10.45 – 11.15 Coffee break

11.15 – 12.45 Parallel sessions:

(S6) Chair: Tunjo Perić **Multi-Criteria Decision-Making** (Hall I)	**(S8)** Chair: Liljana Ferbar Tratar **Production and Management** (Hall II)	**(S2)** Chair: Lidija Zadnik Stirn **Environment and Social Issues** (Hall III)
S6.1 - Andrej Bregar: Experimental Evaluation of Multiple Criteria Utility Models with Veto Related Preference Structures	S8.1 - Helena Brožová, Tomáš Šubrt, Jan Rydval and Petra Pavlíčková: Fuzzy Threatness Matrices in Project Management	S2.1 - Wellington Alves, Ângela Silva and Helena Sofia Rodrigues: Sustainable Practices: An Analysis of Portuguese Companies
S6.2 - Rok Drnovšek, Marija Milavec Kapun, Vladislav Rajkovič and Uroš Rajkovič: Multi-Attribute Risk Assessment Model for Developing Ventilator-Associated Pneumonia	S8.2 - Vedran Kojić and Zrinka Lukač: On the Cost Minimization Problem with CES Technology: Reverse Hölder's Inequality Approach	S2.2 - János Baumgartner and Zoltán Süle: Cost Optimal Process Design with Reliability Constraints
S6.3 - Josip Matejaš, Tunjo Perić and Danijel Mlinarić: On Sustainable Principles in Multi Objective Programming Problems	S8.3 - Ilko Vrankić, Mirjana Pejić Bach and Tomislav Herceg: Cooperativeness in Duopoly from an Evolutionary Game Theory Perspective	S2.3 - Petra Grošelj, Lidija Zadnik Stirn and Gregor Dolinar: Aggregation of Individual Judgments into Group Interval Judgments in AHP
S6.4 - Liu Shiang-Tai: A Heuristic Algorithm Approach to Imprecise Malmquist Productivity Index	S8.4 - Vedran Kojić, Zrinka Lukač and Krunoslav Puljić: On the Properties of the Sato Production Function	S2.4 - Marek Kvet and Jaroslav Janáček: Population Diversity Maintenance Using Uniformly Deployed Set of p-Location Problem Solutions
S6.5 - Srečko Zakrajšek, Eva Jereb, Uroš Rajkovič, Vladislav Rajkovič and Mojca Bernik: A Multi-Criteria, Hierarchical Model for the Evaluation of Scenarios that Facilitate the Development of Digital Competences of Gymnasium Students in the Republic of Slovenia	S8.5 - Liljana Ferbar Tratar and Ansari Saleh Ahmar: The Comparison of Holt-Winters Methods and A-Sutte Indicator in Forecasting the Foreign Visitor Arrivals in Indonesia, Malaysia, and Japan	S2.5 - Samo Drobne and Marija Bogataj: The Role of Local Action Groups for the Optimal Allocation of Investments in the Long-Term Care
S6.6 - Tunjo Perić, Zoran Babić and Slavko Matanović: Decision Making in Complex Decentralized Business Systems by Multi-Level Multi-Objective Linear Programming Methods		S2.6 - Ângela Silva, Wellington Alves and Helena Sofia Rodrigues: Level of Implementation of Lean Manufacturing Tools: A Case Study in the North of Portugal

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12.45 – 13.55 Lunch break

Wednesday
September 25, 2019

14.00 – 14.50 **Plenary lecture** (Hall I, Chair: Janez Povh)

PL2 - **Mirjana Čižmešija:** Economic Sentiment in Quantitative Analysis

15.20 – 22.00 **Excursion with dinner**

We will meet at the hotel Astoria lobby, take a bus and go to guided tour to Vintgar gorge in Gorje village near Bled (http://www.vintgar.si/vintgar-gorge/?lang=en).

After the guided tour we will go to early dinner in restaurant at Šobec where we will take a culinary tour of Slovenian dishes (https://www.sobec.si/en/facilities/restaurant.html).

Thursday
September 26, 2019

8.15 – Registration

9.00 – 9.50 **Plenary lecture** (Hall I, Chair: Janez Žerovnik)
PL3 - **Tibor Illés**: Sufficient Linear Complementarity Problems – Pivot Versus Interior Point Algorithms

10.00 – 11.15 Parallel sessions:

(SS1) Chair: K. Pažek and Č. Rozman **Application of OR in Agriculture and Agribusiness Management** (Hall I)	**(SS6)** Chair: Jerzy Michnik **System Modelling & Soft Operational Research** (Hall II)	**(SS7)** Chair: Niko Herakovič and Janez Kušar **Towards Industry 4.0** (Hall III)
SS1.1 - Karmen Pažek and Tina Kep: Project Planning for Cattle Stall Construction Using Critical Path Method	SS6.1 - Dariusz Banas: A Unified Environment for Quantitative and Qualitative Modelling of Dynamic Systems	S6.1 - Mihael Debevec and Niko Herakovič: Digital Twin of Unique Type of Production for Innovative Training of Production Specialists
SS1.2 - Boris Prevolšek, Karmen Pažek, Maja Žibert and Črtomir Rozman: Using Data Envelopment Analysis and Analytic Hierarchy Process to Measure Efficiency of Tourism Farms: Case of Slovenia	SS6.2 - Katarína Cechlárová, Diana Plačková and Tatiana Baltesová: Modelling the Kidney Transplant Waiting List	S6.2 - Matic Muc, Vili Malnarič, Jernej Klemenc and Janez Žerovnik: Physical Testing of a Trailing Arm by Discrete Optimization
SS1.3 - Aneta Trajanov, Jaap Schröder, David Wall, Antonio Delgado, Rogier Schulte and Marko Debeljak: Assessing the Nutrient Cycling Potential in Agricultural Soils Using Decision Modelling	SS6.3 - Mario Jadrić: Framework for Discrete-Event Simulation Modeling Supported by LMS Data and Process Mining	S6.3 - Miha Pipan, Jernej Protner and Niko Herakovič: Distributed Manufacturing Node Control with Digital Twin
SS1.4 - Jožef Vinčec, Karmen Pažek, Črtomir Rozman and Jernej Prišenk: Application of Weighted Goal Programming Method for Hybrids Selection of Endives	SS6.4 - Polona Pavlovčič Prešeren and Aleš Marjetič: Particle Swarm Optimization in Geodetic Datum Transformation	S6.4 - Jaka Toman, Uroš Rajkovič and Mirjana Kljajić Borštnar: Scrap Determination with Process Mining – Literature Review
SS1.5 - Maja Žibert, Črtomir Rozman, Boris Prevolšek and Andrej Škraba: The System Dynamics Model for Diversification of Agricultural Holdings into Farm Tourism	SS6.5 - Jerzy Michnik: IT Service Business Analysis with Balanced Scorecard and Weighted Influence Non-Linear Gauge System	S6.5 - Tena Žužek, Lidija Rihar, Tomaž Berlec and Janez Kušar: Use of a Standard Risk Model and a Risk Map for Product Development Project Planning and Management

11.15 – 11.45 Coffee break

11.45 – 12.45 Parallel sessions:

(SS4) Chair: Janez Povh and Mirjana Kljajić Borštnar **High-Performance Computing and Big Data** (Hall I)	**(S4)** Chair: Marija Bogataj **Location and Transport, Graphs and their Applications** (Hall II)	**(SS2)** Chair: Tadeusz Trzaskalik and Tomasz Wachowicz **Formal and behavioral issues in MCDM** (Hall III)
SS4.1 - Agnès Ansari, Alberto Garcia Fernandez, Bertrand Rigaud, Marco Rorro and Andreas Vroutsis: Running Deep Learning Experiments over the PRACE 5IP Infrastructure	S4.1 - Samo Drobne, Alberto Garre, Eloy Hontoria and Miha Konjar: Functional Regions Detection by Walktrap and Chains' Methods	SS2.1 - Helena Gaspars-Wieloch: A Scenario-Based AHP Method for One-Shot Decisions and Independent Criteria
SS4.2 - Blaž Gašperlin, Tomi Ilijaš and Mirjana Kljajić Borštnar: Opportunities of Cloud High Performance Computing for Smes – A Meta-Analysis	S4.2 - Dobroslav Grygar and Michal Kohani: Data Conversion and Exact Approach to Overhead Wires Network Minimisation for the Battery Assisted Trolleybus Fleet	SS2.2 - Nikola Kadoić, Nina Begičević Ređep and Blaženka Divjak: Application of PageRank Centrality in Multi-Criteria Decision Making
SS4.3 - Timotej Hrga and Janez Povh: Accelerated Alternating Direction Augmented Lagrangian Method for Semidefinite Programs	S4.3 - Slobodan Jelić: RealForAll Pollen Semaphore: A Short-Term Prediction System for Airborne Pollen Concentrations Based on Neural Nets	SS2.3 - Tadeusz Trzaskalik: Bipolar Sorting and Ranking of Multistage Alternatives
SS4.4 - Alen Vegi Kalamar, Drago Bokal and Janez Povh: Parallelization of BiqMac Solver	S4.4 - Francisco Campuzano-Bolarín, Fulgencio Marín-García, José Andrés Moreno-Nicolás, Marija Bogataj and David Bogataj: Evaluation of Net Present Value in Supply Chains Using Network Simulation Method	

Thursday
September 26, 2019

12.45 – 13.55 Lunch break

14.00 – 14.50 Plenary lecture (Hall I, Chair: Immanuel Bomze)
PL4 - **Joanna Józefowska:** Just-in-Time Scheduling (The EURO plenary)

15.00 – 16.00 Parallel sessions:

(S5) Chair: Zrinka Lukač **Mathematical Programming and Optimization** (Hall I)	(SS2) Chair: Tadeusz Trzaskalik and Tomasz Wachowicz **Formal and behavioral issues in MCDM** (Hall II)	(SS5) Chairs: Andrej Košir and Drago Bokal **Optimization in Human Environments** (Hall III)
S5.1 - Dávid Balázs: A Tabu Search Method for Optimizing Heterogeneous Structural Frames	SS2.4 - Ayşegül Engin and Rudolf Vetschera: Overconfidence in Electronic Reverse Auctions	SS5.1 - Petra Fic and Drago Bokal: Innovative Veristic Perceptions do Have a Chance: An Instance of Artificial Technological Valley of Death
S5.2 - Aua-aree Boonperm and Wutiphol Sintunavarat: An Artificial-Variable-Free Simplex Method Involving the Choices of Initial Solutions	SS2.5 - Tomasz Wachowicz, Ewa Roszkowska and Marzena Filipowicz-Chomko: Decision Making Profile and the Choices of Preference Elicitation Mode – A Case of Using GDMS Inventory	SS5.2 - Drago Bokal and Špela Tertinek: Bounded Time Availability is What Narrative Incohesion, Behavioral Sink, Behavioral Addiction, and Online Social Bubbles Have in Common
S5.3 - Zsolt Darvay, Petra Renáta Rigó and Eszter Szénási: Infeasible Interior-Point Algorithm for Linear Optimization Based on a New Search Direction	SS2.6 - Tomasz Wachowicz and Ewa Roszkowska: Investigating the Self-Serving Bias in Software Supported Multiple Criteria Decision Making Process	SS5.3 - Andreja Smole, Timotej Jagrič and Drago Bokal: Principal-Leader-Follower Model with Internal Signal
S5.4 - Marianna E.-Nagy: Linear Complementarity Problem and Sufficient Matrix Class	SS2.7 - Marija Vuković, Snježana Pivac and Marijana Šemanović: Waste Management Consequences - Case Study on the Island of Brač	SS5.4 - Drago Bokal, Robert Repnik, Špela Tertinek, Alen Vegi Kalamar and Tadej Žerak: Optimality of Flipped Learning Experience: A Case Study of Using 2-Crossing-Critical Graphs for Early Research Exposure

16.00 – 16.30 Coffee break

16.30 – 17.45 Parallel sessions:

(S5) Chair: Katarína Cechlárová **Mathematical Programming and Optimization** (Hall I)	(S7) Chair: Vesna Čančer **Human Resources** (Hall II)	(SS5) Chairs: Andrej Košir and Drago Bokal **Optimization in Human Environments** (Hall III)
S5.5 - Milan Hladík: Interval Robustness of Matrix Properties for the Linear Complementarity Problem	S7.1 - Andrea Furková and Michaela Chocholatá: Spatial Interactions and the Regional Employment in the EU	SS5.5 - Dean Lipovac, László Hajdu, Sølvi Therese Strømmen Wie and Anders Qvale Nyrud: Minimizing Human Stress in Social Networks with Targeted Interventions
S5.6 - Jaroslav Janáček and Marek Kvet: Usage of Uniformly Deployed Set for P-Location Min-Sum Problem with Generalized Disutility	S7.2 - Blaženka Knežević, Petra Škrobot and Berislav Žmuk: Perceptions on Social Supermarkets' Managers in Croatia, Lithuania, Poland and Serbia	SS5.6 - Evin Aslan Oğuz and Andrej Košir: Multimedia-Content-Index Based Experimental Content Selection
S5.7 - Miroslav Rada, Elif Garajová, Jaroslav Horáček and Milan Hladík: A New Pruning Test for Parametric Interval Linear Systems	S7.3 - Maja Rožman and Vesna Čančer: Structural Equation Modeling in the Case of Older Employees in Financial Service Companies	SS5.7 - Ľudmila Jánošíková, Peter Jankovič and Stanislav Mikolajčík: Demand Point Aggregation in Urban Emergency Medical Service: A Case Study from Slovakia
S5.8 - Anita Varga, Marianna E.-Nagy and Tibor Illés: Interior Point Heuristics for a Class of Market Exchange Models	S7.4 - Lorena Mihelač and Janez Povh: The Impact of Harmony on the Perception of Music	SS6.8 - Nataša Erjavec, Boris Cota and Saša Jakšić: Barriers to International Trade and Export Competitiveness of the EU New Member States
S5.9 - Dragan Jukić and Kristian Sabo: An Existence Criterion for the Sum of Squares		
S5.10 - Tibor Illés and Dávid Tollner: Models and Solution Methods for the Pooling Problem		

18.00 – 19.30 Social event
We will meet at the hotel Astoria lobby and take a walk to Hotel Toplice. We will first listen to a piano concert performed by prof. dr. Tadeusz Trzaskalik and then taste the »kremšnita« (vanilla–custard–cream cake), one of the best known Slovenian desserts that is coming from Bled (http://www.bled.si/en/what-to-see/symbols-of-bled/cream-cake).

Friday
September 27, 2019

8.15 – Registration

9.00 – 9.50 **Plenary lecture** (Hall I, Chair: Vladislav Rajkovič)

PL5 - **Matej Praprotnik**: Scientific Case for Computing in Europe 2018-2026

10.00 – 11.15 Parallel sessions:

(S3) Chair: Eloy Hontoria **Finance and Investments** (Hall I)	**(SS3)** Chair: Sandi Klavžar **Graph Theory and Algorithms** (Hall II)	**(S1)** Chair: Ksenija Dumičić **Econometric Models and Statistics** (Hall III)
S3.1 - Erzsébet Kovács and Ágnes Vaskövi: Rational or Irrational? - Pension Expectations in Hungary S3.2 - Michaela Chocholatá: Co-Movements of Exchange Rate Returns: Multivariate Garch Approach S3.3 - Margareta Gardijan Kedžo and Ana Škrlec: Are Investment Constraints of Mandatory Pension Funds Restricting their Performance: Case of Croatia S3.4 - Tihana Škrinjarić and Mirjana Čižmešija: Investor Attention and Risk Predictability: A Spillover Index Approach	SS3.1 - Kolos Csaba Ágoston, Snježana Majstorović and Vaskövi Ágnes: Spectral Clustering of Survival Curves SS3.2 - Immanuel Bomze, Michael Kahr and Markus Leitner: Robust Clustering in Social Networks SS3.3 - Sergio Cabello and Éric Colin de Verdière: Hardness of Minimum Activation Path SS3.4 - Radoslaw Cymer and Miklós Krész: On the Complexity of a Filtering Problem for Constraint Programming: Decomposition by the Structure of Perfect Matchings SS3.5 - Sandi Klavžar: The general position problem on graphs	S1.1 - Samo Drobne and Metka Mesojedec: Multi-Constrained Gravity Model of Labour Commuting: Case Study of Slovenia S1.2 - Aljaž Ferencek, Mirjana Kljajić Borštnar, Davorin Kofjač, Andrej Škraba and Blaž Sašek: Deep Learning Predictive Models for Terminal Call Rate Prediction During the Warranty Period S1.3 - Ljubica Milanović Glavan: Determining Business Process Maturity Levels by Using Cluster Analysis: Case of Croatia S1.4 - Petra Tomanová: Clustering of Arrivals and Its Impact on Process Simulation S1.5 - Ksenija Dumičić and Ivana Cunjak Mataković: Challenges of Benford's Law Goodness-of-Fit Testing in Discovering the Distribution of First Digits: Comparison of Two Industries

11.15 – 11.45 Coffee break

Friday
September 27, 2019

11.45 – 13.30 Parallel sessions:

(S3) Chair: Tihana Škrinjarić **Finance and Investments** (Hall I)	(SS3) Chair: Janez Žerovnik **Graph Theory and Algorithms** (Hall II)	(S1) Chair: Mirjana Pejić-Bach **Econometric Models and Statistics** (Hall III)
S3.6 - Vladimír Holý: Score-Driven Count Time Series S3.7 - Marko Jakšič: Benefits of Inventory Information Sharing in a Hybrid MTS/MTO System S3.8 - Kolos Csaba Ágoston, Márton Gyetvai and László Kovács: Optimization of Transition Rules Based on Claim Amounts in a Bonus-Malus System S3.9 - Aleš Kresta and Anlan Wang: Efficiency Test as the Benchmark for Minimum-Risk Portfolio Optimization Strategies S3.10 - Petr Volf: Optimization of Costs of Preventive Maintenance S3.10 - Tihana Škrinjarić and Boško Šego: Grey Systems Modeling as a Tool for Stock Price Prediction	SS3.6 - Boštjan Gabrovšek, Tina Novak, Janez Povh, Darja Rupnik Poklukar and Janez Žerovnik: Five Heuristics for the k-Matching Problem SS3.7 - Boštjan Gabrovšek, Aljoša Peperko and Janez Žerovnik: On the Independent Rainbow Domination Numbers of Generalized Petersen Graphs P (n, 2) and P (n, 3) SS3.8 - Nicolò Gusmeroli and Angelika Wiegele: An Exact Penalty Method over Discrete Sets SS3.9 - Tina Novak and Janez Žerovnik: k-Fair Domination Problem in Cactus Graphs SS3.10- Darja Rupnik Poklukar and Janez Žerovnik: Networks with Extremal Closeness SS3.11 - Gregor Rus and Alenka Brezavšček: Graph Theory Applications in Computer Network Security: A Literature Review SS3.12 - Anja Žnidaršič, Manja Krajnčič and Drago Bokal: Fraud Detection in Transactions Using Social Network Analysis	S1.6 - Ksenija Dumičić, Berislav Žmuk and Anita Harmina: Clusters of European Countries Regarding Recent Changes in Business Demography Statistics S1.7 - Josipa Višić: Predicting Future Markets for Personal Service Robots S1.8 - Bože Vuleta, Elza Jurun and Nada Ratković: Statistical Analysis of the Public Opinion Survey on Free Sunday S1.9 - Jovana Zoroja, Anton Florijan Barišić and Mirjana Pejic-Bach: E-Government Usage in European Countries: Gender and Educational Differences S1.10 - Berislav Žmuk and Anita Čeh Časni: Nonresponse in Business Web Surveys: Sources and Measures

13.40 – 14.20 Closing ceremony (Hall I)

The 15ᵗʰ International Symposium on Operations Research in Slovenja - SOR'19

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Program Committee:

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