

DEPARTMENT OF INTELLIGENT SYSTEMS

E-9

The Department of Intelligent Systems develops new methods and techniques for intelligent computer systems, with applications in the areas of the information society, computer science and informatics, and network communication systems. The main research areas are ambient intelligence, computational intelligence, agent modelling, language and speech technologies, and search algorithms. The department collaborates closely with the Faculty of Computer and Information Science of the University of Ljubljana on the joint research program "Artificial Intelligence and Intelligent Systems", led by Prof. Ivan Bratko.



Head:
Prof. Matjaž Gams

Intelligent systems simulate intelligence so that a typical user seemingly perceives them as truly intelligent. In reality, these systems use complex mechanisms and implement them on digital computers to imitate human behaviour as well as possible, and combine them with raw, exponentially growing, computer power.

Ambient intelligence is a quickly developing research area. It aims to introduce the technology into our everyday environment in a friendly way that is undemanding for the user. Due to the rapid aging of the population, one of the area's main goals is care for the elderly. We addressed it in the 7th Framework Program project **Confidence**. The project intends to extend the independent living of the elderly by improved care in their homes. Confidence users wear a number of tags on their bodies, whose locations are detected by radio sensors. From these locations, the posture and movement of the user is reconstructed. This makes it possible to detect falls and changes in behaviour that may indicate a health problem. In the past year the emphasis was on the automatic adjustment of the system to individual users and a variable number of tags. In the project we combined machine learning, expert knowledge and agent technologies. The final prototype was successfully demonstrated at several locations across Europe. One of them was the "Europe's ICT 2010: Digitally Driven" conference in Brussels, where the best 7th Framework Program projects from the area of information and communication technology were presented. The prototype was among those that attracted the most visitors, because it enabled live testing and thus demonstrated the advantages. We also extended the research on human-behaviour monitoring and analysis to other areas. In the European project **Chiron** we work on monitoring chronic heart-disease patients at home. Our goal is the interpretation of sensor data in a way that is usable for physicians. We also plan to automatically detect events dangerous to the patients' health. In the **iLab** project, the Lotrič company and we used sensors to monitor a laboratory that is storing sensitive substances. We raised warnings in cases of environmental changes that could adversely affect these substances. In the **Uvid** project, an intelligent natural-language assistant was designed with Amebis to help users communicate and control a TV based on the Net-Top-Box communicator by Iskratel.

Computational intelligence is a study of stochastic search, optimization and learning methods, inspired by physical and biological systems. Research in this area at the Department of Intelligent Systems focuses on evolutionary computation methods. We develop and analyze evolutionary algorithms, study their multi-objective optimization extensions and parallelization, and apply them in engineering design and optimization problems. A substantial part of our applied research is devoted to energy efficiency. In collaboration with partners from five European countries, we started the 7th Framework Program project **MIRACLE** in 2010. Its goal is to develop a computer infrastructure to efficiently balance between the generation and consumption of electrical energy with an increased amount of energy from renewable sources. It will rely on micro-requests for energy generation and consumption, their aggregation and scheduling. In addition, we extended our algorithm for energy-flow optimization in the distribution network that is a building block for an e-service developed in collaboration with the INEA company and other

- **The 7th Framework Program project Confidence intends to extend the independent living of the elderly by introducing a personal intelligent system that makes it possible to detect falls and changes in behaviour that may indicate a health problem.**
- **In the 7th Framework Program project MIRACLE we developed a computer infrastructure to efficiently balance between the generation and consumption of electrical energy with an increased amount of energy from renewable sources.**

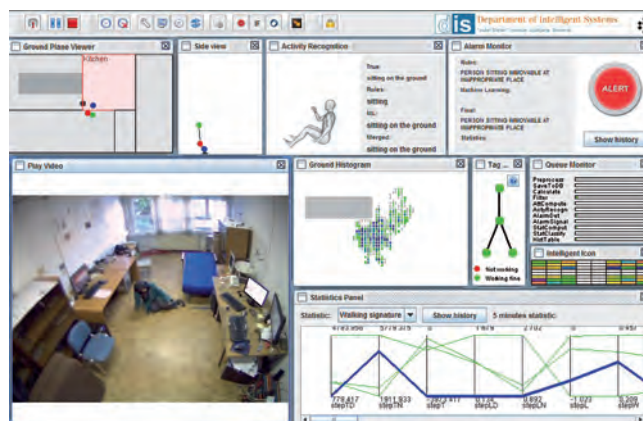


Figure 1: Project Confidence: detecting falls and changes in behavior

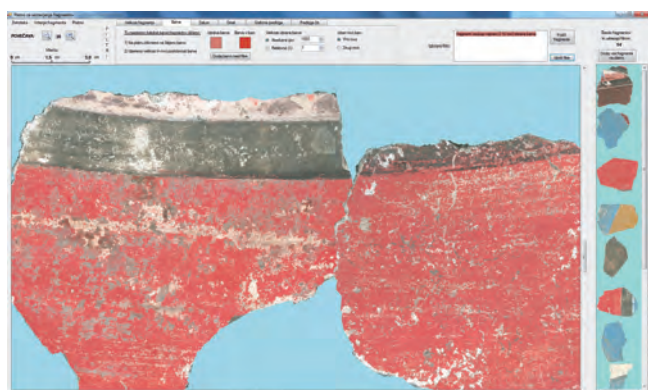


Figure 2: Computer-aided arranging of wall painting fragments with the Pedius program

academic and industrial partners. For the Restoration Center in Ljubljana, which is part of Institute for the Protection of Cultural Heritage of Slovenia, we developed the **Pedius** computer package aimed at keeping records of, and arranging, wall-painting fragments. The program is used in the restoration of antique frescos based on thousands of fragments obtained in archaeological excavations in the region of Celje, Slovenia.

Research in the field of **agent modelling** is focused on the behaviour analysis of individuals and groups. Most of the work is performed for the **EUSAS** (European Defense Agency) project. The scope of this project is to develop methods for multi-agent modelling of asymmetric conflicts. The aim is to develop a new approach to mission analysis and training for low-level units facing asymmetric threats in an urban environment. Our task is to discover the common agent strategy by knowing only low-level agent behaviour and basic domain knowledge. Moreover, the objective is to transfer some of the observed behaviour patterns into highly realistic and reusable models of human behaviour in riots. The constructed models will later be

used in simulations to provide a more realistic behaviour for training peace-keeping personnel.

In the field of **speech and language technologies** we dealt with speech synthesis, forensic speaker recognition, syntactic parsing and question answering. Together with the Amebis company we develop a new speech synthesizer for Slovene. In cooperation with the national television and radio, RTV Slovenia, a phonetically rich and balanced speech database for corpus-based speech synthesis has been designed and recorded. In speaker recognition, the influence of the sound quality transmitted over phone lines on the biometric/forensic speaker recognition has been studied. In syntactic parsing, further experiments using the extended version of the JOS Treebank (6150 sentences)

were conducted. Better parsing accuracy was achieved, compared to the results on the SDT Treebank.

We study **search algorithms** for path-finding and other applications. We explained many cases of pathological behavior of these algorithms, i.e., achieving worse results at greater search depth. We investigated the interplay of factors known to influence the benefits of deeper search, and identified some new such factors.

We co-organized the Fourth International Conference on Bioinspired Optimization Methods and their Applications – **BIOMA 2010**. The conference was dedicated to the theoretical and practical aspects of computer-optimization methods based on the models of biological processes and populations. The invited speaker was dr. Christian Blum, a research fellow at the Technical University of Catalonia, Barcelona, Spain, and a leading researcher in the fields of ant-colony optimization and the hybridization of metaheuristics.

From 11th to 15th October 2010, the 13th International Multiconference **Information Society** – IS 2010 took place at the Jožef Stefan Institute. It consisted of ten independent conferences with 203 papers, contributed by 326 (co)authors from 20 countries. The official speaker was dr. Pavel Gantar, the president of the National Assembly of the Republic of Slovenia. Two conference recognitions were awarded: for an exceptional contribution to the development and promotion of the information society, and for current achievements in the field of information society.

The main goal of the EUSAS project is to develop a new approach to mission analysis and training for low-level units facing asymmetric threats in an urban environment.



Figure 3: In the EUSAS project we develop methods for the multi-agent modeling of asymmetric conflicts to serve the needs of peace-keeping missions.

Some outstanding publications in the past year

1. I. Fister, M. Mernik, B. Filipič, A hybrid self-adaptive evolutionary algorithm for marker optimization in the clothing industry. *Applied soft computing*, 10 (2010), 409–422.
2. D. S. Nau, M. Luštrek, A. Parker, I. Bratko, M. Gams, When is it better not to look ahead?, *Artificial Intelligence*, 174 (2010), 1323–1338.
3. M. Gams, M. Ožek, Model order reduction for large LTI control systems, *Journal of Computer and Systems Sciences International*, 49 (2010), 696–701.

Awards and appointments

1. Erik Dovgan: Best paper award on study programme Information and Communication Technologies at the 2nd Jožef Stefan International Postgraduate School Students Conference, Ljubljana, 27. 5. 2010, paper title “Multiobjective genetic discovery of driving strategies”

- Boštjan Kaluža, Matjaž Gams: Best student paper award at the International Conference on Machine Learning and Data Analysis (ICMLDA'10), San Francisco, California, USA, 20.-22. 10. 2010, paper title "Approach to analysis of daily living dynamics"

Organization of conferences, congress and meetings

- The Fourth International Conference on Bioinspired Optimization Methods and their Applications, BIOMA 2010, Jožef Stefan Institute, Ljubljana, 20.-21. 5. 2010
- 2nd Jožef Stefan International Postgraduate School Students Conference, Jožef Stefan Institute, Ljubljana, 27. 5. 2010
- 16th Workshop on Nature-Inspired Algorithms, AVN, Jožef Stefan Institute, Ljubljana, 16. 6. 2010
- 13th International Multiconference Information Society, IS 2010; independent conferences:
 - Intelligent Systems,
 - Collaboration, Software and Services in Information Society,
 - Data Mining and Data Warehouses (SIKDD 2010),
 - Education in Information Society,
 - Facing Demographic Challenges,
 - Cognitive Sciences,
 - Robotics,
 - Language Technologies,
 - MATCOS 2010, Mini-Conference on Applied Theoretical Computer Science, Jožef Stefan Institute, Ljubljana, 11.-15. 10. 2010
- SAME 2010, 3rd International Workshop on Semantic Ambient Media Experience (NAMU Series) in conjunction with First International Joint Conference on Ambient Intelligence (AmI-10), Malaga, Spain, 10.-12. 11. 2010

- We developed a new speech synthesizer for Slovene, for which a phonetically rich and balanced speech database for corpus-based speech synthesis has been designed and recorded in cooperation with the national television and radio, RTV Slovenia.**
- The department staff organized the Fourth International Conference on Bioinspired Optimization Methods and their Applications–BIOMA 2010, and the 13th International Multiconference Information Society – IS 2010.**



Figure 4: The Information Society 2010 multiconference recognition for the exceptional contribution to the development and promotion of the information society was awarded to Prof. Tomaž Kalin.

INTERNATIONAL PROJECTS

- Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution
MIRACLE
7. FP, 248195
EC; Sofía Martínez-Schmitt, Dr. Henrike Berthold, SAP AG, Walldorf, Germany
Prof. Bogdan Filipič
- Ubiquitous Care System to Support Independent Living
CONFIDENCE
7. FP, 214986
EC; Centro de Estudios e Investigaciones Técnicas de Guipuzcoa, San Sebastian, Spain
Prof. Matjaž Gams, Prof. Leon Zlajpah
- European Urban Simulation for Asymmetric Scenarios
EUSAS
Contract EADS DC
EADS N.V., Defense and Security Systems, Elancourt, France
Prof. Matjaž Gams
- Intelligent Information System for Health Laboratory Service: I-LAB
E-contents and E-services
3211-09-000535
Marko Lotrič, LOTRIČ d.o.o, Selca, Slovenia
Dr. Mitja Luštrek
- Universal Interface for Intelligent Home: UVID
E-contents and E-services
3211-09-000524
Tone Stanovnik, Podjetje Špica International d.o.o., Ljubljana-Črnuče, Slovenia
Prof. Matjaž Gams
- Cyclic and Person-Centric Health Management: Integrated Approach for Home, Mobile and Clinical Environments
CHIRON, ARTEMIS
3211-10-000214
Dr. Mitja Luštrek

R & D GRANTS AND CONTRACTS

- Simulation and Optimization of Casting, Rolling and Heat Treatment Processes for Competitive Production of Topmost Steels
Prof. Bogdan Filipič

RESEARCH PROGRAM

- Artificial Intelligence and Intelligent Systems
Prof. Matjaž Gams

MENTORING

Ph. D. Thesis

- Matjaž Depolli, *Parallelization of an evolutionary algorithm for multiobjective optimization* (mentor Bogdan Filipič; co-mentor Roman Trobec)

VISITORS FROM ABROAD

- Jan Marincek, Skopje, Republic of Macedonia, 1. 3.-30. 4. 2010
- mag. Peter Dueholm Justesen, Aarhus University, Department of Computer Science, Aarhus, Denmark, 20. 5.-21. 5. 2010
- dr. Rasmus Kjaer Ursem, Grundfos Management A/S, Bjerringbro, Denmark, 20.-21. 5. 2010
- Hristijan Gjoreski, Faculty of Electrical Engineering and Information Technologies, Ss Cyril and Methodius University, Skopje, Republic of Macedonia, 4. 6.-31. 7. 2010
- dr. Dmitry Gimon, Moscow, Russia, 9. 6.-31. 7. 2010

STAFF

Researchers

1. Prof. Ivan Bratko*
2. Prof. Bogdan Filipič
3. **Prof. Matjaž Gams, Head**
4. *Prof. Vladislav Rajkovič*, left 01.10.10*
5. Dr. Tomaž Šef

Postdoctoral associates

6. Dr. Andraž Bežek*
7. Dr. Aleš Dobnikar*
8. Dr. Matija Drobnič*
9. Dr. Matej Guid*
10. Dr. Mitja Luštrek
11. Dr. Domen Marinčič
12. Dr. Aleksander Pivk*

Postgraduates

13. Andrej Bratko*, B. Sc.
14. Božidara Cvetkovič, B. Sc.
15. Erik Dovgan, B. Sc.
16. Boštjan Kaluža, B. Sc.
17. Simon Kozina, B. Sc.

18. Jana Krivec, B. Sc.
19. Damjan Kužnar, B. Sc.
20. Miha Mlakar, B. Sc.
21. *Matej Ožek, M. Sc., left 07.07.10*
22. Rok Piltaver, B. Sc.
23. Bogdan Pogorelc*, B. Sc.
24. *Blaz Strle, B. Sc., left 01.05.10*
25. Aleš Tavčar, B. Sc.
26. Tea Tušar, M. Sc.

Technical officers

27. Robert Blatnik, B. Sc.
28. Mitja Kolbe*, B. Sc.
29. Gašper Pintarič*, B. Sc.
30. Peter Reinhardt*, B. Sc.

Technical and administrative staff

31. Dr. France Dacar
32. Lana Jelenkovič
33. Mitja Lasič
34. Liljana Lasič

Note:

* part-time JSI member

BIBLIOGRAPHY

ORIGINAL ARTICLES

1. Matea Curkova, Vladislav Rajkovič, "Izbira šolskih in obšolskih dejavnosti otrok s pomočjo odločitvenega modela", In: *Education in information society*, (Organizacija, vol. 43, 2010, no. 1), Vladislav Rajkovič, ed., Mojca Bernik, ed., Eva Jereb, ed., Tanja Urbančič, ed., Kranj, Moderna organizacija, 2010, pp. A23-A34.
2. Erik Dovgan, Boštjan Kaluža, Tea Tušar, Matjaž Gams, "Improving user verification by implementing an agent-based security system", *Journal of ambient intelligence and smart environments*, vol. 2, no. 1, pp. 21-30, 2010.
3. Iztok Fister, Marjan Mernik, Bogdan Filipič, "A hybrid self-adaptive evolutionary algorithm for marker optimization in the clothing industry", *Applied soft computing*, vol. 10, no. 2, pp. 409-422, 2010.
4. Matjaž Gams, Matej Ožek, "Model order reduction for large LTI control systems", *J. comput. syst. sci. int.*, vol. 49, no. 5, pp. 696-701, 2010.
5. Matej Guid, Martin Možina, Aleksander Sadikov, Ivan Bratko, "Deriving concepts and strategies from chess tablebases", In: *Advances in computer games: 12th international conference, ACG 2009, Pamplona, Spain, May 11-13, 2009: revised papers*, (Lecture notes in computer science, 6048), H. Jaap van den Herik, ed., Pieter Spronck, ed., Berlin, Heidelberg, Springer, cop. 2010, pp. 195-207.
6. Domen Marinčič, "Parsing with intraclausal coordination and clause detection", *Informatica (Ljublj.)*, vol. 34, no. 2, pp. 263-264, 2010.
7. Dana S. Nau, Mitja Luštrek, Austin Parker, Ivan Bratko, Matjaž Gams, "When is it better not to look ahead?", *Artif. intell.*, vol. 174, no. 16/17, pp. 1323-1338, 2010.

REVIEW ARTICLES AND CHAPTERS IN BOOKS

1. Matjaž Gams, Andraž Bežek, "Multi-agent strategic modeling in a specific environment", In: *Handbook of ambient intelligence and smart environments*, Hideyuki Nakashima, ed., Hamid K. Aghajan, ed., Juan Carlos Augusto, ed., New York [etc.], Springer, cop. 2010, pp. 731-750.
2. Matjaž Gams, Matej Ožek, "Use of data mining techniques for process analysis on small databases", In: *Dynamic and advanced data mining for progressing technological development: innovations and systemic approaches*, A. B. M. Shawkat Ali, ed., Yang Xiang, ed., Hershey, Information Science Reference, cop. 2010, pp. 422-436.
3. Zdravko Pečar, Ivan Bratko, "The use of data mining for assessing performance of administrative services", In: *Data mining in public and private sectors: organizational and government applications*, (Premier reference source), Antti Syväjärvi, ed., Jari Stenvall, ed., Hershey, New York, Information Science Reference, cop. 2010, pp. 67-82.
4. Vesna Prijatelj, Uroš Rajkovič, Olga Šušteršič, Vladislav Rajkovič, "Reengineering of nursing process: e-documentation case", In: *Nursing and informatics for the 21st century: an international look at practice,*

education anf EHR trends, Charlotte A. Weaver, ed., Connie White Delaney, ed., Patrick Weber, ed., Robyn L. Carr, ed., 2nd ed., Chicago, HIMSS, cop. 2010, pp. 447-454.

PUBLISHED CONFERENCE PAPERS

Invited papers

1. Vladislav Rajkovič, "Group decision making and leveraging of interests", In: *Človek in organizacija: zbornik vabljenih predavanj in povzetkov referatov: conference proceedings of invited lectures and abstracts*, Tomaž Kern, ed., Marko Ferjan, ed., Vladislav Rajkovič, ed., Björn Paape, ed., Kranj, Moderna organizacija, 2010, pp. 66-41.

Regular papers

1. Peter Benedik, Vladislav Rajkovič, Andraž Jakelj, Mirjana Kljajić Borštnar, Marjana Pikec, Peter Benedik, "Prenova podatkovne baze registra za tuberkulozo", In: *Človek in organizacija: zbornik 29. mednarodne konference o razvoju organizacijskih znanosti: proceedings of the 29th International Conference on Organizational Science Development*, 29. mednarodna konferenca o razvoju organizacijskih znanosti, 24.-26. marec 2010, Portorož, Slovenija = 29th International Conference on Organizational Science Development, 24-26 March 2010, Portorož, Slovenia, Tomaž Kern, ed., Vladislav Rajkovič, ed., Björn Paape, ed., Marko Ferjan, ed., Kranj, Moderna organizacija, 2010, pp. 100-107.
2. Robert Blatnik, Tomaž Šef, "Meritve vpliva kakovosti govora v VoWLAN na samodejno razpoznavanje govorcev", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 59-62.
3. Ksenča Bokovec, Talib Damij, Tanja Rajkovič, Vladislav Rajkovič, "Evaluating ERP projects with global efficiency factors", In: *Bridging the socio-technical gap in decision support systems: challenges for the next decade: [15th IFIP Working Group 8.3 International Conference DSS 2010, July 7-10, 2010, Lisbon, Portugal]*, (Frontiers in artificial intelligence and applications, vol. 212), Ana Respício, ed., Amsterdam [etc.], IOS Press, pp. 395-406.
4. Božidara Cvetkovič, Erik Dovgan, Boštjan Kaluža, Mitja Luštrek, Matjaž Gams, Violeta Mirčevska, "Improving the quality of life for elderly by adapting to each specific user", In: *Tangible information technology for a better ageing society*, Narciso Vega González, ed., Jyväskylä, University of Jyväskylä, Agora Center, 2010, pp. 99-108.

5. Božidara Cvetković, Boštjan Kaluža, Matjaž Gams, "Prilaganje modela za razpoznavanje aktivnosti človeka z aktivnim delno nadzorovanim učenjem", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 63-66.
6. Božidara Cvetković, Violeta Mirčevska, Erik Dovgan, Boštjan Kaluža, Matjaž Gams, "Adaptation of the confidence system to the user characteristics and his/her needs", In: *Odporna delavnica projekta Confidence: zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 12. oktober 2010: zvezek D: proceedings of The 13th International Multiconference Information Society - IS 2010, October 12th, 2010, Ljubljana, Slovenia: volume D*, (Informacijska družba), Igone Velez, ed., Matjaž Gams, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 9-12.
7. Božidara Cvetković, Violeta Mirčevska, Erik Dovgan, Boštjan Kaluža, Matjaž Gams, "Short-term validation method for confidence system", In: *Odporna delavnica projekta Confidence: zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 12. oktober 2010: zvezek D: proceedings of The 13th International Multiconference Information Society - IS 2010, October 12th, 2010, Ljubljana, Slovenia: volume D*, (Informacijska družba), Igone Velez, ed., Matjaž Gams, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 5-8.
8. Matjaž Depolli, Erkki Laitinen, Bogdan Filipič, "Parallel differential evolution for simulation-based multiobjective optimization of a production process", In: *Bioinspired optimization methods and their applications: proceedings of the Fourth International Conference on Bioinspired Optimization Methods and their Applications, BIOMA 2010, 20-21 May 2010, Ljubljana, Slovenia*, Bogdan Filipič, ed., Jurij Šilc, ed., Ljubljana, Jožef Stefan Institute, 2010, pp. 141-152.
9. Erik Dovgan, Božidara Cvetković, Violeta Mirčevska, Boštjan Kaluža, Mitja Luštrek, Matjaž Gams, "Confidence interpretation and prevention system", In: *Odporna delavnica projekta Confidence: zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 12. oktober 2010: zvezek D: proceedings of The 13th International Multiconference Information Society - IS 2010, October 12th, 2010, Ljubljana, Slovenia: volume D*, (Informacijska družba), Igone Velez, ed., Matjaž Gams, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 13-16.
10. Erik Dovgan, Matija Javorski, Bogdan Filipič, "Searching for driving strategies according to conflicting objectives", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 67-70.
11. Erik Dovgan, Tea Tušar, Bogdan Filipič, "Parameter tuning in an evolutionary algorithm for commodity transportation optimization", In: *Proceedings, 2010 IEEE World Congress on Computational Intelligence, WCCI 2010, [composed of] IJCNN 2010, FUZZ-IEEE 2010, and IEEE CEC 2010, July 18-23, Barcelona, Spain, [S. l.], IEEE, 2010, pp. 3704-3711.*
12. Matjaž Gams, "Podrobno preiskovanje ali strateška usmeritev?", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 302-305.
13. Matjaž Gams, Božidara Cvetković, Violeta Mirčevska, Boštjan Kaluža, Mitja Luštrek, "CONFIDENCE stand-alone SW systems", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 71-74.
14. Dmitry Gimón, Hristijan Gjoreski, Boštjan Kaluža, Matjaž Gams, "Using accelerometers to improve position-based activity recognition", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 15-18.
15. Boštjan Kaluža, Matjaž Gams, "An approach to analysis of daily living dynamics", In: *WCECS 2010. Vol. 1*, (Lecture notes in engineering and computer science, vol. 2186), World Congress on Engineering and Computer Science 2010, 20-22 October 2010, San Francisco, USA, Sio-long Ao, ed., Hong Kong, IAENG, = International Association of Engineers, 2010, pp. 485-490.
16. Boštjan Kaluža, Violeta Mirčevska, Erik Dovgan, Mitja Luštrek, Matjaž Gams, "An agent-based approach to care in independent living", In: *Ambient intelligence: First International Joint Conference, Aml 2010, Malaga, Spain, November 10-12, 2010: proceedings*, (Lecture notes in computer science, vol. 6439), Boris De Ruyter, Berlin, Heidelberg, Springer, 2010, vol. 6439, pp. 177-186, 2010.
17. Igor Karnet, Eva Jereb, Vladislav Rajkovič, "Model ocenjevanja kariernega razvoja revizorjev informacijskih sistemov", In: *Urvnotežite naložbe, tveganja in razvoj za uspeh: zbornik prispevkov, Dnevi slovenske informatike 2010 - DSI, Portorož, Slovenija, 14.-16. april 2010, Ljubljana, Slovensko društvo Informatika, 2010, 9 pp.*
18. Mirjana Kljajić Borštnar, Vladislav Rajkovič, Miroslav Kljajić, Andrej Škraba, Davorin Kofjač, "Simulation based learning about complex management systems: a simulation experiment", In: *Conference proceedings*, [S. l.], Institute for Systems and Technologies of Information, Control and Communication, INSTICC, cop. 2010, pp. 27-32.
19. Igor Korelič, Vladislav Rajkovič, Mirjana Kljajić Borštnar, "Optimizacija večrazsežnostnih podatkovnih modelov z uporabo metode večkriterijskega odločanja", In: *Človek in organizacija: zbornik 29. mednarodne konference o razvoju organizacijskih znanosti: proceedings of the 29th International Conference on Organizational Science Development, 29. mednarodna konferenca o razvoju organizacijskih znanosti, 24.-26. marec 2010, Portorož, Slovenija = 29th International Conference on Organizational Science Development, 24-26 March 2010, Portorož, Slovenia, Tomaž Kern, ed., Vladislav Rajkovič, ed., Björn Paape, ed., Marko Ferjan, ed., Kranj, Moderna organizacija, 2010, pp. 664-674.*
20. Jana Krivec, Robert Blatnik, Matjaž Gams, "Univerzalni vmesnik inteligentnega doma (UVID)", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 75-78.
21. Damjan Kužnar, Domen Marinčič, "Sprotna avtomatična detekcija in klasifikacija izrednih dogodkov v časovnih vrstah", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 79-81.
22. Artur Lugmayr, Bjoern Stockleben, Juha Kaario, Bogdan Pogorelc, Thomas Risse-Kappen, "3rd Workshop on semantic ambient media experience (SAME) - in conjunction with AMI-2010", In: *Ambient intelligence: First International Joint Conference, Aml 2010, Malaga, Spain, November 10-12, 2010: proceedings*, (Lecture notes in computer science, vol. 6439), Boris De Ruyter, Berlin, Heidelberg, Springer, 2010, vol. 6439, pp. 342-345, 2010.
23. Violeta Mirčevska, Boštjan Kaluža, Mitja Luštrek, Matjaž Gams, "Real-time alarm model adaptation based on user feedback", In: *Lisbon ECAI 2010, [13] Workshop on Ubiquitous Data Mining, UDM 2010, in conjunction with the 19th European Conference on Artificial Intelligence, ECAI2010, August 16-20, 2010, Lisbon Portugal, João Gama, ed., [S. l., s. n.], 2010, pp. 39-43.*
24. Miha Mlakar, Valentin Koblar, Bogdan Filipič, "Optimizacija klasifikacijske točnosti in velikosti odločitvenih dreves za napovedovanje kakovosti grafitnih polizdelkov", In: *Zbornik devetnajste mednarodne Elektrotehniške in računalniške konference ERK 2010, Portorož, Slovenija, 20.-22. september 2010*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2010, zv. B, pp. 119-112.

25. Martin Možina, Matej Guid, Aleksander Sadikov, Vida Groznik, Jana Krivec, Ivan Bratko, "Conceptualizing procedural knowledge targeted at students of different skill levels", In: *Educational data mining 2010*, Ryan S. J. D. Baker, ed., Agathe Merceron, ed., Philip I. Pavlik, ed., [S. l., s. n., 2010, pp. 309-310.
26. Rok Piltaver, "Iskanje točnih in razumljivih hibridnih klasifikacijskih dreves", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 82-85.
27. Bogdan Pogorelc, "Automatic disease recognition from movement analysis", In: *Odprta delavnica projekta Confidence: zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 12. oktober 2010: zvezek D: proceedings of The 13th International Multiconference Information Society - IS 2010, October 12th, 2010, Ljubljana, Slovenia: volume D*, (Informacijska družba), Igone Velez, ed., Matjaž Gams, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 38-41.
28. Bogdan Pogorelc, Matjaž Gams, "Diagnosing health problems from gait patterns of elderly", In: *Proceedings of the 32nd Annual international conference of the IEEE engineering in medicine and biology society, August 31 - September 4, 2010, Buenos Aires, Argentina: "Merging medical humanism and technology": EMBC 2010*, (Conf. Proc. IEEE Eng. Med. Biol. Soc., 32), 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 31 - September 4, 2010, Buenos Aires, Argentina, [New York, IEEE, 2010], pp. 2238-2241.
29. Bogdan Pogorelc, Matjaž Gams, "Discovery of gait anomalies from motion sensor data", In: *Proceedings, ICTAI 2010, 22nd International Conference on Tools with Artificial Intelligence, 22-29 October 2010, Arras, France, Denvers, IEEE*, = Institute of Electrical and Electronics Engineers, 2010, zv. 2, pp. 331-336.
30. Bogdan Pogorelc, Matjaž Gams, "Identification of gait patterns related to health problems of elderly", In: *Ubiquitous intelligence and computing: 7th international conference, UIC 2010, Xi'an, China, October 26-29, 2010: proceedings*, (Lecture notes in computer science, vol. 6406), Zhiwen Yu, ed., Berlin, Heidelberg, Springer, 2010, vol. 6406, pp. 179-191, 2010.
31. Bogdan Pogorelc, Matjaž Gams, "Learning abnormal gait patterns of elderly from motion capture system", In: *Lisbon ECAI 2010*, [13] Workshop on Ubiquitous Data Mining, UDM 2010, in conjunction with the 19th European Conference on Artificial Intelligence, ECAI2010, August 16-20, 2010, Lisbon Portugal, João Gama, ed., [S. l., s. n.], 2010, pp. 57-61.
32. Vladislav Rajkovič, Olga Šušteršič, Uroš Rajkovič, "Modeling decision knowledge for group decision making", In: *Advances in simulation-based decision support: [papers presented at the 22nd International Conference on Systems Research, Informatics and Cybernetics held August 2-6, 2010 in Baden-Baden, Germany]*, Miroslav Kljajić, ed., George Eric Lasker, ed., Tecumseh (Canada), The International Institute for Advanced Studies in Systems Research and Cybernetics, 2010, pp. 16-20.
33. Tomaž Šef, Robert Blatnik, "Govorni korpus za potrebe izvajanja raziskav in ovrednotenja rezultatov na področju razpoznavanja govorcev", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 90-93.
34. Aleš Tavčar, Violeta Mirčevska, Matjaž Gams, "EUSAS: European urban simulation for asymmetric scenarios", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 86-69.
35. Vedrana Vidulin, Matjaž Gams, "Searching for meaningful models in macroeconomic domain", In: *Zbornik 13. mednarodne multikonference Informacijska družba - IS 2010, 11.-15. oktober 2010: zvezek A: volume A*, (Informacijska družba), Marko Bohanec, ed., Matjaž Gams, ed., Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Dunja Mladenič, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Urban Kordeš, ed., Olga Markič, ed., Jadran Lenarčič, ed., Leon Žlajpah, ed., Andrej Gams, ed., Andrej Brodnik, ed., Ljubljana, Institut Jožef Stefan, 2010, pp. 94-97.
36. Jure Žabkar, Tadej Janež, Martin Možina, Ivan Bratko, "Active learning of qualitative models with Padé", In: *QR 2010*, [S. l., s. n.], 2010, pp. 97-104.
37. Jure Žabkar, Martin Možina, Ivan Bratko, Janez Demšar, "Learning qualitative relations from categorical data", In: *QR 2010*, [S. l., s. n.], 2010, pp. 105-111.
38. Jure Žabkar, Martin Možina, Tadej Janež, Ivan Bratko, Janez Demšar, "Preference learning from qualitative partial derivatives", In: *ECMLPKDD 2010*, [S. l., s. n.], 2010, pp. 1-13.

THESES

Ph. D. Thesis

1. Matej Guid, *Search and knowledge for human and machine problem solving: doctoral dissertation*, Ljubljana, [M. Guid], 2010.

B. Sc. Theses

1. Simon Kozina, *Development of a system for monitoring changes in human gait: undergraduate thesis*, Ljubljana, [S. Kozina], 2010.
2. Miha Mlakar, *Accuracy of cancer diagnosis models inferred by machine learning from gene expression data sets: undergraduate thesis*, Ljubljana, [M. Mlakar], 2010.