

# DEPARTMENT OF INTELLIGENT SYSTEMS

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*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, evolutionary computing, data mining, search algorithms, language and speech technologies, decision support, intelligent sensors, distributed supervisory systems and network services. The department collaborates closely with the Faculty of Computer and Information Science of the University of Ljubljana on the joint research programme "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 relatively new research area. It aims at introducing technology into our everyday environment in a friendly and unobtrusive way, making it usable without special knowledge. Due to the rapid aging of the population, one of the area's main goals is care for the elderly. The department has been developing methods for posture and movement recognition with an emphasis on fall detection. We were also investigating the recognition of common patterns of behaviour in general. To do this, we first needed to tackle the problem of the representation of human motion. The purpose of this research is the recognition of unusual events, be it signs of health problems or security threats.

**Evolutionary computing** deals with theoretical research, design and applications of search and optimization algorithms inspired by biological evolution. Our work in this area included the development and analysis of evolutionary algorithms for solving two demanding problems: the construction of markers for the production of clothes and vehicle assignment in cargo transportation. In the first problem, a sequence of markers needs to be found such that the production costs are as low as possible. In real problems the developed algorithm outperforms the algorithms used in practice up until now. The algorithm and its empirical evaluation were presented in the journal *Engineering Applications of Artificial Intelligence*. In the second problem, cargo of various types and amounts has to be transported between two sites, and the task is to assign cargo, loading positions at the origin, and unloading positions at the destination to the vehicles of various capacities in such a way that the total transportation time is minimised. The current version of our evolutionary algorithm improves the results of an available greedy heuristic algorithm for several problem instances, and we plan further improvements of its vehicle-assignment strategies.

Using **data-mining** techniques we tackled two tasks: genre identification and modelling of a tablet-manufacturing process. As part of a doctoral research in automatic web-genre identification, we used style-based categorization to identify genres of web pages. The impact of various types of features on the quality of identification was explored. Results showed that complex features - concepts - can be beneficial. We continued our research on an analysis of a pharmaceutical tablet-manufacturing process. For this purpose we developed a new method for process analysis. The method was successfully implemented on the data from the tablet-manufacturing process. We also developed an application for process visualization and modelling. The application contributed to a better understanding of the manufacturing process and achieving a higher quality for the produced tablets.

We study **search algorithms** for path-finding and other applications. We explained many cases of pathological behaviour of these

**We have been developing an intelligent system for the surveillance of the movement of personnel and equipment in buildings that require high security. The project is called "Commander's Right Hand" and is financed as a Targeted Research Project by the research program "Science for Security and Peace 2006-2010".**

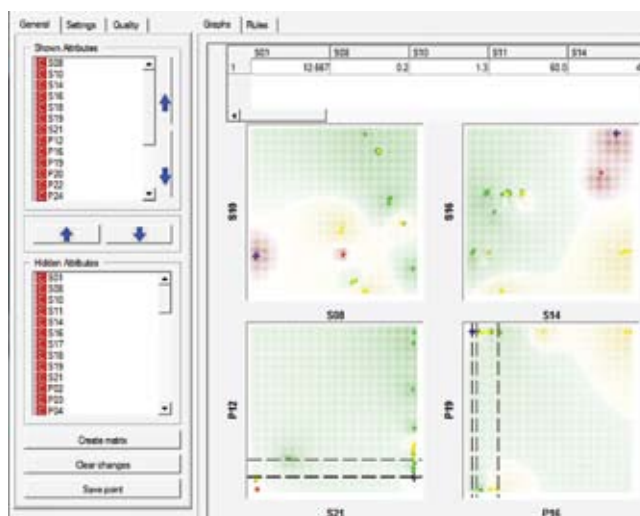


Figure 1: We have developed an application for the visualization and modelling of a pill-manufacturing process. It uses machine learning to achieve a high-quality product.

**The European project Confidence aims at helping the elderly stay independent for longer at home and providing them with a better quality of life. The system is based on new, ambient intelligence methods and tags attached to the ankles. With this unobtrusive surveillance, the system can detect falls or illnesses and call for help.**



Figure 2: The intelligent virtual assistant answers inquiries about the Jožef Stefan Institute on the web page [www.ijs.si](http://www.ijs.si).

**In collaboration with the companies INEA, Elektro Ljubljana and Količevo Karton we carried out the project "Development of an e-service for power flow optimization in the distribution network by adaptable power consumption and power generation" (OPEDiOm). The service supports coordinated actions to reduce the gaps between the predicted and the actual power consumptions.**

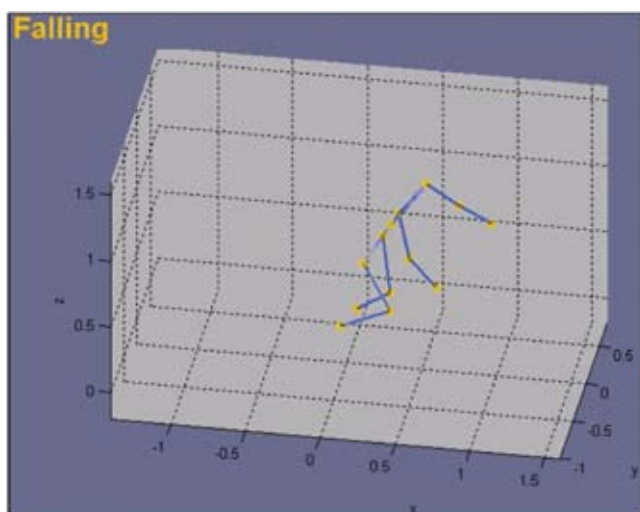


Figure 4: Visualization of the detection of a falling person, using the system for prolonging the independency of the elderly.

algorithms, i.e., achieving worse results at a greater search depth. We also identified several factors that influence the benefits of a deeper search. For path-finding algorithms we developed methods for the automatic selection of the optimal search depth and waypoints.

In the field of **speech and language technologies** we deal with speech synthesis, forensic speaker recognition and syntactic parsing. In cooperation with the Amebis company, a new speech synthesizer for Slovene has been developed. In speaker recognition the influence of the sound quality transmitted over phone lines on biometric/forensic speaker recognition has been studied. During syntactic parsing, standard algorithms have been

upgraded and adapted for Slovene. Into the process of parsing, clause and intra-clausal identification were included to decompose complex sentences into smaller, more easily manageable parts. With the upgrade, the parsing accuracy for Slovene has been increased.

The EU 7FP project **Confidence** intends to extend the independent living of the elderly by increasing their security at home and outdoors. Confidence users will wear a number of tags on their bodies. The locations of the tags will be detected by radio sensors, and from these locations, body posture and movement will be reconstructed. This will make it possible to detect falls, which are one of the main reasons for nursing-home admissions. Changes in behaviour that may indicate a disease or a similar problem will also be detected.

We have been developing an intelligent system for the surveillance of movement of personnel and equipment in buildings that require high security. This work is performed in collaboration with the Špica International company and the Faculty of Electrical Engineering, University of Ljubljana. The project is called "**Commanders Right Hand**" and is financed as a Targeted Research Project by the research program "Science for Security and Peace 2006–2010". The key novelty of the system is its ability to distinguish between usual and unusual (suspicious) behaviour based on patterns seen by the system in the past and directions and rules provided by the user. The system learns and adapts to the observed behaviour while notifying the user about unusual situations, such as thefts, infiltration, staff negligence and insubordination, etc. The system offers a suitable level of alarm, live video, graphical explanation and messages in natural language, describing the reason(s) for the alarm. We also implemented an applied version of the intelligent system developed in the successfully

concluded research project "**CIVaBiS**". It enables the intelligent control of people's movement in a building. The system will be marketed by the Špica International company.

In collaboration with the companies INEA, Elektro Ljubljana and Količevo Karton we carried out the project "**Development of an e-service for power flow optimization in the distribution network by adaptable power consumption and power generation**" (OPEDiOm). The project is funded by the Ministry of Higher Education, Science and Technology of the Republic of Slovenia, and the European Regional Development Fund. The result of the project is a prototype implementation of an innovative e-service intended for power distributors and industrial consumers. It supports coordinated actions to reduce the gaps between predicted and actual power consumption.

Within the "**Intelligent Home Telekom**" project we have developed a universal virtual interface for interactive user communications in various services and applications of the national telecom operator Telekom Slovenije. The virtual interface is implemented in a web-based intelligent conversational robot prototype and is experimentally available on the Jožef Stefan Institute's web page at <http://www.ijs.si>. The conversational robot interactively answers visitors' questions in natural language. The main advantage of our virtual user interface over similar commercially available applications is its adaptability for quick implementation in various applications where any kind of user interaction takes place, such as television, telemedicine, technical support help desks, web portals, etc.

A traditional activity of the Department of Intelligent Systems is the **organization of the International Multiconference Information Society**. In October 2008, the 11th multiconference was held in Ljubljana, consisting of eight independent conferences.

## Some outstanding publications in the past three years

1. I. Fister, M. Mernik, B. Filipič, Optimization of markers in clothing industry, *Engineering Applications of Artificial Intelligence*, 21 (2008), 669–678
2. A. Pivk, P. Cimiano, Y. Sure, M. Gams, V. Rajkovič, R. Studer, Transforming arbitrary tables into logical form with TARTAR, *Data & Knowledge Engineering*, 60 (2007), 567–595
3. M. Možina, J. Žabkar, I. Bratko, Argument based machine learning, *Artificial intelligence*, 171 (2007), 922–937
4. A. Bratko, G. V. Cormack, B. Filipič, T. R. Lynam, B. Zupan, Spam filtering using statistical data compression models, *Journal of Machine Learning Research*, 7 (2006), 2673–2698
5. M. Luštrek, M. Gams, I. Bratko, Is real-valued minimax pathological?, *Artificial Intelligence*, 170 (2006), 620–642

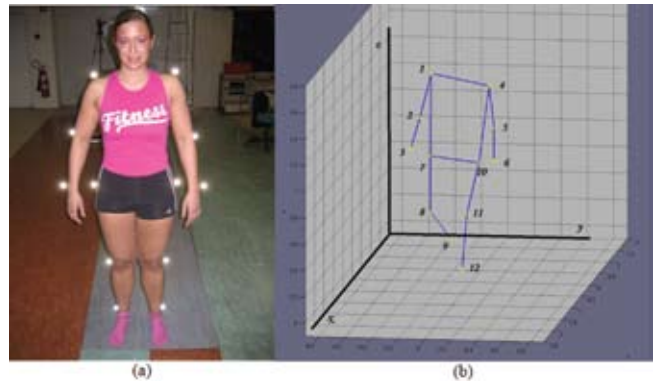
## Awards and appointments

1. Jožef Stefan Institute and Špica International d. o. o: Award for placement among 30 selected innovations in 2008, Ljubljana, 3. Slovenian Forum of Innovations, Public Agency of the Republic of Slovenia for Entrepreneurship and Foreign Investments, Innovation “Device for intelligent entry control”.
2. Boštjan Kaluža: Faculty Prešeren award, Faculty of Computer and Information Science, Ljubljana, Bachelor thesis: Analysis of pathological models of minimax and Pearl’s game.

## Organization of conferences, congress and meetings

1. 11th Workshop “Nature-Inspired Algorithms”, Jožef Stefan Institute, Ljubljana, Slovenia, 17 Jun. 2008
2. 11th International Multiconference Information Society IS 2008; independent conferences:
  - Intelligent Systems
  - Data Mining and Data Warehouses
  - Cognitive Sciences
  - Slovenian Demographic Challenges of the 21st Century
  - Collaboration, Software and Services in Information Society
  - Education in Information Society
  - BIOMA 2008 – The 3rd International Conference on Bioinspired Optimization Methods and their Applications
  - Language Technologies
 Jožef Stefan Institute, Ljubljana, 13–17 Oct. 2008
3. Meeting of the European FW7 project Confidence, Jožef Stefan Institute, Ljubljana, 13–14 Nov. 2008

**We participate in the European project WeGo, aimed at promoting e-government services, thus joining the efforts of the Western Balkan countries towards an easier transition into the European Union. Major applied projects are conducted for the Tax Administration of the Republic of Slovenia, Telekom Slovenije, and the Ministry of Defence of the Republic of Slovenia.**



*Figure 4: Placement of tags on the body (a) and visualization of the tags on the computer screen (b) of the system for prolonging the independence of the elderly, which we developed in the FP7 project Confidence and other research studies in the field of ambient intelligence. The methods that we develop, automatically and in real time detect falls and other health-related changes in the behaviour of the elderly, using the locations of tags on the body of the elderly.*

## INTERNATIONAL PROJECTS

1. Ubiquitous Care System to Support Independent Living  
CONFIDENCE  
7. FP, 214986  
EC; Centro de Estudios e Investigaciones Tecnicas de Guipuzcoa, San Sebastian, Spain  
Prof. Matjaž Gams, Prof. Leon Zlajpah
2. Enhancing Western Balkan eGovernment Expertise  
We-Go  
6. FP, 045472  
EC; Dr. Klaus Josef Gschwendtner, ARC Seibersdorf Research GmbH, Vienna, Austria  
Prof. Matjaž Gams
3. New Methods for Automatic Identification Based on Intelligent Devices and Intelligent Agents –IntelliDAM  
BI-RO/08-09/0015  
Dr. Vlad Madalin Stefan, Faculty of Automatic Control and Computer Science, University Politehnica, Bucharest, Romania  
Prof. Matjaž Gams

## R & D GRANTS AND CONTRACTS

1. Forensic Speaker Identification  
Dr. Tomaž Šef
2. Intelligent home Telekom  
Prof. Matjaž Gams
3. The role of Luka Koper in logistic support of the Slovenian Armed Forces and allies  
Asst. Prof. Bogdan Filipič
4. AuID: Audio Visual IDentification and Detection of Speaker Credibility to Give an Assurance of Secure Communication  
Dr. Tomaž Šef
5. Commanders right hand  
Prof. Matjaž Gams
6. Knowledge technology and decision support in medical information portals  
Prof. Matjaž Gams

7. Knowledge technology and decision support in medical information portals  
Prof. Matjaž Gams
8. MEANING: Semantic analyser (for Slovenian language): POMEN  
Dr. Tomaž Šef
9. Development of an e-service for power flow optimization in the distribution network by adaptable power consumption and power generation: OPEDIOM  
Asst. prof. Bogdan Filipič

## RESEARCH PROGRAM

1. Artificial Intelligence and Intelligent Systems  
Prof. Matjaž Gams

## NEW CONTRACTS

1. Intelligent home Telekom  
Telekom Slovenije, d. d., Ljubljana  
Prof. Matjaž Gams
2. Intelligent home Telekom  
Telekom Slovenije, d. d., Ljubljana  
Prof. Matjaž Gams
3. A prototype application of Slovenian text to speech system GOVOREC  
Src.si, d. o. o., Ljubljana  
Prof. Matjaž Gams

## VISITORS FROM ABROAD

1. Prof. Veljko Milutinović, Faculty of Electrical Engineering, University of Belgrade, Serbia, 2-4 Apr. 2008
2. Bojana Milasinović, Faculty of Electrical Engineering, University of Belgrade, Serbia, 15 Jun. 2008
3. Prof. dr. Kalyanmoy Deb, Helsinki School of Economics, Faculty of Business Tehnology, Helsinki, Finland, 12-14 Oct. 2008
4. Dr. Tanja Schultz, Carnegie Mellon University, Pittsburgh, USA 15-17 Oct. 2008
5. Dr. Marco Baroni, Center for Mind/Brain Sciences, University of Trento, Trento, Italy, 15-18 Oct. 2008
6. Martin Doolan, Lancon d. o. o., Zagreb, Croatia, 19-22 Oct. 2008
7. Carlos Canto, Ikerlan, Arrasate-Mondragón, Spain, 13 Nov. 2008
8. Iñaki Val, Ikerlan, Arrasate-Mondragón, Spain, 13 Nov. 2008

9. Dr. Igone Vélez, Centro de Estudios e Investigaciones Técnicas de Gipuzkoa, San Sebastián, Spain, 13-14 Nov. 2008
10. Naiara Arrue, Centro de Estudios e Investigaciones Técnicas de Gipuzkoa, San Sebastián, Spain, 13-14 Nov. 2008
11. Dr. Michal Pietrzyk, Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany, 13-14 Nov. 2008
12. Dr. Matthias Schaefer, Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany, 13-14 Nov. 2008
13. Kristina Larsson, Umeå Municipality, Umea, Sweden, 13-14 Nov. 2008
14. Eva Bergstrom, Umeå Municipality, Umea, Sweden, 13-14 Nov. 2008
15. Dr. Claudio Sdogati, COOSS Marche Onlus, Ancona, Italy, 13-14 Nov. 2008
16. Dr. Narciso González Vega, University of Jyväskylä, Jyväskylä, Finland, 13-14 Nov. 2008
17. Stephane Gomes, eDevice, Mérignac, France, 13-14 Nov. 2008
18. Stefan Gonnet, eDevice, Mérignac, France, 13-14 Nov. 2008
19. Patrik Karlsson, ZENON S.A. Robotics & Informatics, Athens, Greece, 13-14 Nov. 2008

## STAFF

### Researchers

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

### Postdoctoral associates

6. Dr. Andraž Bežek
7. Dr. Aleš Dobnikar\*
8. Dr. Matija Drobnič\*
9. Dr. Mitja Luštrek
10. Dr. Aleksander Pivk\*

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11. Andrej Bratko\*, B. Sc.
12. Erik Dovgan, B. Sc.
13. Boštjan Kaluža, B. Sc.
14. Dr. Domen Marinčič

15. Matej Ožek, M. Sc.
16. Rok Piltaver, B. Sc.
17. Bogdan Pogorelc\*, B. Sc.
18. Tea Tušar, M. Sc.

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19. Robert Blatnik, B. Sc.
20. Dr. France Dacar
21. Mitja Kolbe\*, B. Sc.
22. Gašper Pintarič\*, B. Sc.
23. Peter Reinhardt\*, B. Sc.

### Technical and administrative staff

24. Liljana Lasič
25. Mitja Lasič

Note:

\* part-time JSI member

# BIBLIOGRAPHY

## ORIGINAL ARTICLES

1. Vadim Bulitko, Mitja Luštrek, Jonathan Schaeffer, Yngvi Björnsson, Sverrir Sigmondarson, "Dynamic control in real-time heuristic search", *J. artif. intell. res. (Print)*, vol. 32, pp. 419-452, maj-avg. 2008.
2. Andreja Cundrič, Tomaž Kern, Vladislav Rajkovič, "A qualitative model for road investment appraisal", *Transp. policy (Oxf)*, vol. 15, no. 4, pp. 225-231, jul. 2008.
3. Iztok Fister, Marjan Mernik, Bogdan Filipič, "Optimization of markers in clothing industry", *Eng. appl. artif. intell.*, vol. 21, no. 4, pp. 669-678, 2008.
4. Matjaž Gams, Jana Krivec, "Demographic analysis of fertility using data mining tools", *Informatica (Ljublj.)*, vol. 32, no. 2, pp. 147-156, 2008.
5. Matej Guid, Martin Možina, Jana Krivec, Aleksander Sadikov, Ivan Bratko, "Learning positional features for annotating chess games: a case study", In: *Computers and games: 6th international conference, CG 2008, Beijing, China, September 29 - October 1, 2008: proceedings*, (Lecture notes in computer science, LNCS 5131), H. Jaap van den Herik, ed., Xinhe Xu, ed., Zongmin Ma, ed., Mark H. M. Winands, ed., Berlin, Heidelberg, New York, Springer, cop. 2008, pp. 192-204.

6. Igor Karnet, Vladislav Rajkovič, Miroslav Kljajić, "Računalniški model evalvacije delovanja revizorjev", *Organizacija (Kranj)*, ilustr., vol. 41, no. 6, pp. A 262 - A 271, 2008.
7. Borut Kralj, Vladislav Rajkovič, Mirjana Kljajić Borštnar, "Vrednotenje dejavnikov razvoja kariere medicinskih sester in bobic", *Organizacija (Kranj)*, vol. 41, no. 1, pp. A 37 - A 46, jan.-feb. 2008.
8. Dejan Lavbič, Matjaž Gams, "Agenti ali samo še en objektno usmerjen pristop?", *Uporab. inform. (Ljublj.)*, vol. 16, no. 3, pp. 162-170, 2008.
9. Gregor Leban, Jure Žabkar, Ivan Bratko, "An experiment in robot discovery with ILP", In: *Inductive logic programming: 18th International Conference, ILP 2008, Prague, Czech Republic, September 10-12, 2008: proceedings*, (Lecture notes in computer science, Lecture notes in artificial intelligence, LNAI 5194), 18th International Conference, ILP 2008, Prague, Czech Republic, September 2008, Filip Zelezny, ed., Nada Lavrač, ed., Berlin, Heidelberg, New York, Springer, cop. 2008, pp. 77-90.
10. Mitja Luštrek, "Pathology in heuristic search", *AI commun.*, vol. 21, no. 2/3, pp. 211-213, 2008.



## REVIEW ARTICLES AND CHAPTERS IN BOOKS

1. Tatjana Kovač, Metod Resman, Vladislav Rajkovič, "Kriteriji ocenjevanja kakovosti šol na podlagi ekspertnega modela: moč participacije učencev", *Sodob. pedagog.*, vol. 59, no. 2, pp. 180-201, jun. 2008.
2. Gregor Leban, Minca Mramor, Blaž Zupan, Janez Demšar, Ivan Bratko, "Finding patterns in class-labeled data using data visualization", In: *Data mining patterns: new methods and applications*, Pascal Poncelet, ed., Maguelonne Teisseire, ed., Florent Masseglia, ed., Hershey, New York, Information Science Reference, cop. 2008, pp. 106-123.

## PUBLISHED CONFERENCE PAPERS

## Regular papers

1. Robert Blatnik, "Inteligentni vodniki po TV programih", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 7-10.
2. Robert Blatnik, Tomaž Šef, "Meritve kakovosti zvoka v telefoniji za verifikacijo govorcev v forenzične namene", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 53-56.
3. Borut Čampelj, Vladislav Rajkovič, "Primer indikatorjev za (samo)evalvacijo e-kompetentnosti šole", In: *Mednarodna konferenca Splet izobraževanja in raziskovanja z IKT, SIRIKT 2008, Kranjska Gora, 16.-19. april 2008*, Mojca Orel, ed., Ljubljana, Arnes, 2008, pp. 134-142.
4. Erik Dovgan, Bogdan Filipič, "Evolucijsko optimiranje prevoza raznovrstnega tovora s skupino vozil", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 119-122.
5. Erik Dovgan, Matjaž Gams, "Ambient intelligence for entry control", In: *New aspects of computers: proceedings of the 12th WSEAS International Conference on Computers, Heraklion, Greece, July 23-25, 2008. [Part 2]*, (Recent advances in computer engineering), Nikos E. Mastorakis, ed., [S. l.], WSEAS Press, cop. 2008, pp. 555-559.
6. Erik Dovgan, Matjaž Gams, "Makro učenje v sistemu za nadzor dostopa", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 157-160.
7. Erik Dovgan, Matjaž Gams, "Prepoznavanje nenavadnih vstopov v objekt", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 11-14.
8. Bogdan Filipič, Mitja Bizjak, Peter Nemček, "Analiza optimalnosti ukrepov z izravnavo konic pri industrijskem odjemalcu električne energije", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 15-18.
9. Bogdan Filipič, Tea Tušar, Erkki Laitinen, "Analyzing production processes performance through evolutionary multiobjective optimization", In: *Programme & proceedings, NISIS 2007, 3rd European Symposium on Nature-inspired Smart Information Systems, 26-28 November 2007, St. Julians, Malta, Aachen, Druck und Verlagshaus Mainz, 2008*, pp. 87-92.
10. Carolina Fortuna, Mihael Mohorčič, Bogdan Filipič, "Multiobjective optimization of service delivery over a heterogeneous wireless access system", In: *ISWCS'08: proceedings of the 2008 IEEE International Symposium on Wireless Communication Systems, 21-24 October 2008, Reykjavik, Iceland*, Guangzhi Qu, ed., Karl Gudmundsson, ed., Sæmundur Þorsteinsson, ed., Piscataway, Institute of Electrical and Electronics Engineers, 2008, pp. 133-137.
11. Carolina Fortuna, Mihael Mohorčič, Gorazd Kandus, Bogdan Filipič, "SmartA: developing an architecture for cognitive wireless networks", In: *LANMAN2008, The 16th IEEE Workshop on Local and Metropolitan Area Networks*, September 3-6, 2008, Cluj-Napoca, Transylvania, Romania, Stein Gjessing, ed., [S. l.], Institute of Electrical and Electronics Engineers, 2008, 2 pp.
12. Matjaž Gams, "Ali smo stroji z empatijo?", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 311-314.
13. Matjaž Gams, "Smo ljudje stroji?", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 149-152.
14. Matjaž Gams, Jana Krivec, "Demografski pojavi in vzroki nekoliko drugače", In: *Slovenija pred demografskimi izzivi 21. stoletja: zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-14. oktober 2008: zvezek B: proceedings of the 11th International Multiconference Information Society - IS 2008, October 13th-14th, 2008, Ljubljana, Slovenia: volume B*, (Informacijska družba), Janez Malačič, ed., Matjaž Gams, ed., Ljubljana, Institut "Jožef Stefan", 2008.
15. Matjaž Gams, Jana Krivec, Matej Ožek, Tea Tušar, "Implementacija procesno analitske tehnologije (PAT) s pomočjo tehnik strojnega učenja", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 153-156.
16. Matjaž Gams, Mitja Luštrek, Boštjan Kaluža, "Patologija končno razložena", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 19-21.
17. Dejan Hrnčič, Bogdan Filipič, Marjan Mernik, "Uglaševanje parametrov rotacijskega gozda in klasifikatorjev v paketu Weka z genetskim algoritmom", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 111-114.
18. Boštjan Kaluža, Matjaž Gams, "Intelligent access control system based on users behavior", In: *Proceedings of the 2008 Networking and Electronic Commerce Research Conference (NAEC2008), Riva del Garda, Italy, September 25-28, 2008*, [S. l., s. n.], 2008, pp. 305-308.
19. Boštjan Kaluža, Matjaž Gams, "Odkrivanje terorističnih vstopov s pomočjo ambientalne inteligence", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 145-148.
20. Boštjan Kaluža, Mitja Luštrek, "Fall detection and activity recognition methods for the confidence project: a survey", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 22-25.
21. Boštjan Kaluža, Robert Rozman, "Razpoznavanje števke pri varnostnem geslu zvočne CAPTCHA zaščite", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 371-373.
22. Tatjana Kovač, Metod Resman, Vladislav Rajkovič, "Kaj je kakovost v šoli in kako jo izmeriti?", In: *Znanje za trajnostni razvoj: zbornik 27. mednarodne znanstvene konference o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008: proceedings of the 27th International Conference on Organizational Science Development, Slovenia, Portorož, March, 19th-21th, 2008*, 27. mednarodna znanstvena konferenca o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008, Vladislav Rajkovič, ed., Eva Jereb, ed., Tomaž Kern, ed., Mirosljub Kljajič, ed., Milan Pagon, ed., Goran Vukovič, ed., Kranj, Moderna organizacija, 2008, pp.1141-1153.
23. Borut Kralj, Vladislav Rajkovič, Mirjana Kljajič Borštnar, "Razvoj kariere zdravstvenih delavcev v Strokovno poslovni skupnosti Ginekološka klinika", In: *Znanje za trajnostni razvoj: zbornik 27. mednarodne znanstvene konference o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008: proceedings of the 27th International Conference on Organizational Science Development, Slovenia, Portorož, March, 19th-21th, 2008*, 27. mednarodna znanstvena konferenca o razvoju organizacijskih znanosti, Slovenija, Portorož,

- 19.-21. marec 2008, Vladislav Rajkovič, ed., Eva Jereb, ed., Tomaž Kern, ed., Miroljub Kljajič, ed., Milan Pagon, ed., Goran Vukovič, ed., Kranj, Moderna organizacija, 2008, pp. 1238-1254.
24. Jana Krivec, Matjaž Gams, "Računalniški sistemi za avtomatski dialog", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 26-29.
25. Mitja Luštrek, Matjaž Gams, "Prepoznavanje položaja telesa s strojnimi učenjem", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 30-33.
26. Lijana Martinc, Vladislav Rajkovič, "Model samovrednotenja učiteljev", In: *Vzgoja in izobraževanje v informacijski družbi: zbornik referatov: conference proceedings*, Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Kranj, Fakulteta za organizacijske vede, 2008, pp. 88-99.
27. Barbara Močan, Vladislav Rajkovič, "Model za pomoč pri ocenjevanju ključnih kompetenc v postopku izbora kandidata za vpis na akademijo za ples", In: *Vzgoja in izobraževanje v informacijski družbi: zbornik referatov: conference proceedings*, Vladislav Rajkovič, ed., Tanja Urbančič, ed., Mojca Bernik, ed., Kranj, Fakulteta za organizacijske vede, 2008, pp. 100-108.
28. Martin Možina, Matej Guid, Jana Krivec, Aleksander Sadikov, Ivan Bratko, "Fighting knowledge acquisition bottleneck with argument based machine learning", In: *ECAI 2008: proceedings*, (Frontiers in artificial intelligence and applications, vol. 178), Malik Ghallab, ed., Amsterdam ... [etc.], IOS Press, cop. 2008, pp. 234-238.
29. Peter Nemček, Mitja Bizjak, Zoran Marinšek, Bogdan Filipič, Matjaž Gams, Tomaž Šef, Igor Podbelšek, Matjaž Glavič, Igor Volf, Rado Kunavar, Jože Kopač, Štefan Sabol, "Razvoj e-storitev za optimiranje pretokov električne energije v distribucijskem omrežju s prilaganjem odjema in razpršene proizvodnje", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. A, pp. 287-290.
30. Darja Ovijač, Vladislav Rajkovič, Olga Šušteršič, Majda Pahor, "Medicinske sestre - sodelavke v zdravstvenem timu", In: *Znanje za trajnostni razvoj: zbornik 27. mednarodne znanstvene konference o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008: proceedings of the 27th International Conference on Organizational Science Development, Slovenia, Portorož, March, 19th-21th, 2008*, 27. mednarodna znanstvena konferenca o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008, Vladislav Rajkovič, ed., Eva Jereb, ed., Tomaž Kern, ed., Miroljub Kljajič, ed., Milan Pagon, ed., Goran Vukovič, ed., Kranj, Moderna organizacija, 2008, pp. 1950-1958.
31. Darja Ovijač, Vladislav Rajkovič, Olga Šušteršič, Majda Pahor, "Spoštovanje, temelj poklicnega sodelovanja - tudi v zdravstvu", In: *Znanje za trajnostni razvoj: zbornik 27. mednarodne znanstvene konference o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008: proceedings of the 27th International Conference on Organizational Science Development, Slovenia, Portorož, March, 19th-21th, 2008*, 27. mednarodna znanstvena konferenca o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008, Vladislav Rajkovič, ed., Eva Jereb, ed., Tomaž Kern, ed., Miroljub Kljajič, ed., Milan Pagon, ed., Goran Vukovič, ed., Kranj, Moderna organizacija, 2008, pp. 1959-1966.
32. Matej Ožek, Matjaž Gams, Jana Krivec, Tea Tušar, "Klasifikacija in vizualizacija procesov z metodami strojnega učenja", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 34-36.
33. Rok Piltaver, "Strojno učenje pri načrtovanju algoritmov za razpoznavanje tipov gibanja", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 37-40.
34. Rok Piltaver, Matjaž Gams, "Poveljniskova desna roka", In: *Zbornik sedemnajste mednarodne Elektrotehniške in računalniške konference ERK 2008, 29. september - 1. oktober 2008, Portorož, Slovenija*, (Zbornik ... Elektrotehniške in računalniške konference ERK ...), Baldomir Zajc, ed., Andrej Trost, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2008, zv. B, pp. 141-144.
35. Iztok Prislán, Črtomir Podlipnik, Matjaž Gams, "Genetski algoritem in metoda Monte Carlo v programu AutoDock", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 85-88.
36. Uroš Rajkovič, Olga Šušteršič, Vladislav Rajkovič, "Upravljanje procesov bolnišnične zdravstvene nege z e-dokumentacijo", In: *Od e-zdravja k zdravju: zbornik kongresa Slovenskega društva za medicinsko informatiko, Zreče, 5.-7. oktober 2008*, Ljubljana, Slovensko društvo za medicinsko informatiko, 2008, pp. 88-99.
37. Uroš Rajkovič, Olga Šušteršič, Jože Zupančič, Vladislav Rajkovič, "Dokumentiranje v bolnišnični zdravstveni negi z uporabo novega organizacijsko-informacijskega pristopa", In: *Znanje za trajnostni razvoj: zbornik 27. mednarodne znanstvene konference o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008: proceedings of the 27th International Conference on Organizational Science Development, Slovenia, Portorož, March, 19th-21th, 2008*, 27. mednarodna znanstvena konferenca o razvoju organizacijskih znanosti, Slovenija, Portorož, 19.-21. marec 2008, Vladislav Rajkovič, ed., Eva Jereb, ed., Tomaž Kern, ed., Miroljub Kljajič, ed., Milan Pagon, ed., Goran Vukovič, ed., Kranj, Moderna organizacija, 2008, pp. 2261-2272.
38. Vedrana Vidulin, Matjaž Gams, "Impacts of education and R & D on economy: analysis by data mining techniques", In: *VIPSI - 2008 conferences*, International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research, Amalfi, Italy, March 27-30, Opatija, Croatia, April 3-6, Belgrade, IPS, Academic Mind, 2008, 5 pp.
39. Vedrana Vidulin, Matjaž Gams, "Is science important for economic welfare?", In: *Zbornik 11. mednarodne multikonference Informacijska družba - IS 2008, 13.-17. oktober 2008: 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., Ljubljana, Institut "Jožef Stefan", 2008, pp. 41-44.
40. Jure Žabkar, Ivan Bratko, Gregor Jerše, Johann Prankl, Matthias Schlemmer, "Learning qualitative models from image sequences", In: *22nd International Workshop on Qualitative Reasoning, 24-26 June 2008, University of Colorado, Boulder CO USA*, Elizabeth Bradley, ed., Louise Travé-Massuyès, ed., [S. l., s. n.], 2008, pp. 146-149.
41. Jure Žabkar, Ivan Bratko, Ashok C. Mohan, "Learning qualitative models by an autonomous robot", In: *22nd International Workshop on Qualitative Reasoning, 24-26 June 2008, University of Colorado, Boulder CO USA*, Elizabeth Bradley, ed., Louise Travé-Massuyès, ed., [S. l., s. n.], 2008, pp. 150-155.

## TEXTBOOKS AND LECTURE NOTES

- Ivan Bratko, Sašo Džeroski, *Analysis of environmental data with machine learning methods: Ljubljana, March 17-21, 2008. Part 1*, Ljubljana, Jožef Stefan Institute, Center for Knowledge Transfer in Information Technology, 2008.

## THESES

### Ph. D. Thesis

- Domen Marinčič, *Strojno razčlenjevanje besedila z iskanjem stavkov in naštevanj: doktorska disertacija: doctoral dissertation*, Ljubljana, [D. Marinčič], 2008.

### M. Sc. Thesis

- Matej Ožek, *Numerične metode za redukcijo modela: magistrsko delo*, Ljubljana, [M. Ožek], 2008.

## PATENT APPLICATION

- Matjaž Gams, Tea Tušar, Andrija Pušič, Mitja Kolbe, *Procedure and device for intelligent entry control: patent application P-200800160*, Ljubljana, Urad RS za intelektualno lastnino, 2008.