NEWSLETTER

BNVKI
AIABN

October 2006
Vol. 23, No. 5
ISSN 1566-8266

BNAIC 2006

Funding Research in Computer Science

AI@uni.lu

Genetic Process Mining

News from the Belgium-Netherlands Association for Artificial Intelligence

SG16 → TC14

Editor-in-Chief

First of all, this issue witnesses another successful occurrence in the BNAIC series. This year, the University of Namur acted as host. The organization, by Pierre-Yves Schobbens and his team, was very good and we had an excellent time in Namur, both scientifically and socially. A total of 94 papers were accepted and published in the proceedings, thus yielding a fruitful addition to the AI literature. The largest part of this issue of the Newsletter is devoted to this BNAIC, see pages 102-118.

Secondly, during the General Assembly Meeting of the BNVKI in Namur, October 6, four members of the board stepped down. Three of them, Han la Poutré, Catholijn Jonker, and Marc Denecker, were not re-eligible. Antal van den Bosch was, together with two new candidates, Ann Nowé of the Computational Modeling Lab of the Vrije Universiteit Brussel, and Virginia Dignum of the Cognition and Communication Group of the Universiteit Utrecht. We first of all thank Han, Catholijn, and Marc for all the work done during several years for our BNVKI community. Moreover, we welcome Ann and Virginia, and look forward to a fruitful cooperation. In the next meeting of the Board, the posts for officers (chair, secretary, treasurer and vice-chair) will be distributed. We will keep you informed.

Thirdly, at the IFIP (International Federation for Information Processing) General Assembly, August 27-28, 2006, in Santiago, Chile, the Specialist Group on Entertainment Computing (for some vague reason appointed SG16) was approved as a new Technical Committee, the fourteenth of IFIP (TC14). With this "promotion" the importance of the field of entertainment computing is recognized by the world's largest and most important organization in information processing. A big applause for the new committee, and especially its officers, Prof. Ryohei Nakatsu (chair), Prof. Matthias Rauterberg (vice-chair) and dr. Ben Salem (secretary).

Finally, with regret I have to inform you of the leaving of our editorial assistant, Els van Aernsbergen. She has performed this job for quite some time, and I thank her wholeheartedly for her devotion to our Newsletter. She has accepted a new job within our university, and I wish her all the luck. Els, thank you!

BNAIC: http://www.bnaic2006.be/
IFIP: http://www.ifip.or.at/

From left to right: Prof. Mikio Aoyama (IPSJ representative, Japan), Dr. Benjamin Salem (TC14 Secretary, Japan), Prof. Ryohei Nakatsu (TC14 chair, Japan), Prof. Tadao Saito (Japan IFIP Member), Prof. Klaus Brunnstein (IFIP President).

TABLE OF CONTENTS

The photographs in this issue are by courtesy of IFIP (p. 94) and Joke Hellemons (all other pictures).

Front cover: BNAIC 2006 Proceedings.

The deadline for the next issue is: **December 1, 2006**.

BNVKI-Board News

Antal van den Bosch

The yearly General Assembly, held this year during BNAIC 2006 in Namur, marks the beginning of a new BNVKI year, while closing the previous. As chair Han La Poutré reported during the meeting, the BNVKI has kept a steady course during the last year, and is set to follow it for the year (and years) to come – more on that below. Closing the General Assembly also marked the end of Han's chairmanship of BNVKI; simultaneously, board members Catholijn Jonker and Marc Denecker also ended their terms as board members. Thank you, Han, Catholijn, and Marc, for everything! A second board change determined during the General Assembly was the re-election of secretary and deputy chair Antal van den Bosch. And finally, during the meeting the membership approved and welcomed two new board members: prof. dr. Ann Nowé (Vrije Universiteit Brussel), and dr. Virginia Dignum (Universiteit Utrecht). Welcome Ann and Virginia!

As Han La Poutré detailed, last year the BNVKI saw two major BNVKI-endorsed events take place: the BNAIS in Nijmegen in June, and yet another great installment of BNAIC, in Namur on October 5-6. The board is thankful to the organizers and chairs of both events. Event-wise we are looking forward to a next great BNAIC 2007, to be held in Utrecht, under the chairmanship of Mehdi Dastani and Edwin de Jong. Also, the BNVKI endorses the organisation of ACAI-2007, ECCAI's summer school, to be held in Leuven. The newsletter and the mailing list will update you on these and other events as their organisation gets underway.

Following up on the formalization of BNVKI goals and strongholds such as a blueprint and financial model for BNAIC organizers, the board has been active in formulating recommendations and guidelines for the newsletter, the sponsorship of events by the BNVKI (which the board distinctly intends to increase), and the general format of the BNAIC. Although the BNAIC as it is does not need serious overhauling, the board is investigating elements such as having an industrial track (such as the one pioneered this year in Namur under the sponsorship of DECIS), and encouraging the alignment of BNAIC with master classes for Ph.D. students, the most important target group of BNAIC. The board is looking forward in working with you on the prosperous continuation of BNVKI in all its guises. We welcome your suggestions and criticisms, and aim to continue in the footsteps of Han, Catholijn and Marc.

Minutes of the BNVKI/AIABN General Assembly

Friday October 6, 2006
FUNDP, Namur, Belgium

Antal van den Bosch

Present: Han la Poutré, Cees Witteveen, Edwin de Jong, Sien Moens, Jos Uiterwijk, Catholijn Jonker, Marc Denecker, and 23 members

0. Opening
1. Minutes meeting general assembly October 18, 2005
2. Announcements
3. Financial Report 2005
4. Auditing committee 2006
5. Progress report 2005 and plans for 2006
6. BNAIC 2007
7. 25 years BNVKI
8. Board members (and elections)
9. End of meeting

0. Opening
Chair Han la Poutré opens the meeting at 13:25.

1. Minutes meeting general assembly October 18, 2005
The minutes are approved.

2. Announcements
Pierre-Yves Schobbens, programme chair of BNAIC 2006, reports on the conference, which is currently in its second day and proceeding with great success. BNAIC 2006 has welcomed 135 participants: 125 pre-registrations and 10 onsite registrations.

3. Financial Report 2005
Cees Witteveen, treasurer, delivers the financial reports for 2005 (estimated and realized) and 2007 (estimated). The 2005 budget shows a balance between benefits and expenses at 18260 Euro, with a profit of over 4000 Euro. Benefits are mainly composed of memberships and fees, and sponsorships. Expenses are largely composed of secretarial costs, newsletter printing and postage, ECCAI membership, and bank charges. The estimated budget for 2007 is based on a smaller expected amount of sponsoring, but also lowered secretary costs. There are no questions or remarks on the report.

4. Auditing committee
The auditing committee, consisting of members Annika Smit and Joost Vennekens, checked the financial report and accorded it. The meeting thanks Annika and Joost for their work, and discharges

them. Treasurer Cees Witteveen proposes for a new auditing committee, to check the financial report to be delivered at the next General Assembly, to consist of Ildiko Flesch (ICIS, Nijmegen) and Siegfried Nijssen (LIACS, Leiden). This proposal is accepted by the assembly.

5. Progress report 2005 and plans for 2006
La Poutré summarizes the activities of the BNVKI in 2005, and the activities planned for 2006. In 2005 the BNVKI endorsed and assisted with the organization of BNAIS in Nijmegen, in June 2006. For the next BNAIS negotiations are underway for a possibly fixed location. Also, in 2005 the board continued the line of the recent years to lay down guidelines for BNVKI processes, such as for organizing BNAIC, and for BNAIC finances (including a decision to provide a 10 Euro rebate for becoming a BNVKI member when registering for BNAIC). Also, the board produced position documents on what is currently perceived as the best procedures for BNAIC, the BNVKI newsletter, and sponsoring of events by the BNVKI. Currently, only 3% of the budget is spent on BNVKI sponsorships, while the board feels that 10% should be the aim.

6. BNAIC 2007
The board is very happy to announce that Mehdi Dastani and Edwin de Jong, University of Urecht, have offered to organize BNAIC 2007. Edwin de Jong delivers a presentation of the prospective venue. The assembly applauds the offer.

7. 25 years BNVKI
La Poutré marks the 25th birthyear of the BNVKI, and announces a special issue of the Newsletter, due for December 2006. La Poutré also hints at a celebratory event held later during the conference.

8. Board members (and elections)
As of this meeting, four board members step down: Marc Denecker, Catholijn Jonker, Han La Poutré, and Antal van den Bosch. This leaves four sitting members, which according to the bylaws should ideally be increased to seven (maximally eight). For the three positions, three candidates are presented: Virginia Dignum (not present in the meeting), Ann Nowé, and Antal van den Bosch (who is up for re-election). Ann Nowé motivates her candidacy, and raises the idea to involve Belgian students in BNAIS. The proposal of La Poutré to elect the new board members is met with approval of the Assembly.

9. End of meeting
There are no further comments or questions. The meeting is closed at 13:50.

Funding Research in Computer Science

Richard Starmans (UU)
and John-Jules Meyer (UU)

INTRODUCTION

In studying and accounting for developments in science, its history and foundations, traditionally two distinct and extreme approaches are recognizable. A purely *internalist* approach studies science as a sequence of new discoveries, ideas, theories, observations, experiments and theory revisions without taking into account its context. Cultural, political and commercial considerations on power, funding organizations, industrial involvement and conflicting interests of stakeholders and institutions are of no concern. Science is to be considered a rational and essentially value-free activity, which should be scrutinized and understood as such. This tradition started in the nineteenth century with William Whewell's famous monograph "History of the inductive sciences" (1837) and dominated history of science for a long time. In the Netherlands, Dijksterhuis' classical study "De mechanisering van het wereldbeeld" (1950) is generally considered to be a milestone in this tradition. On the other hand, one could also take an *externalist* stance by taking the historical, cultural and social context of the scientific enterprise into account. From this point of view one cannot fully understand or give a good account of science without knowing its environment, institutions and stakeholders, their values and interests. One of the pioneering works in this tradition was Robert K. Merton's doctoral dissertation "Science, technology and society in seventeenth-century England" (1938), explaining the scientific revolution in the 16th and 17th century in the context of English puritan orthodoxy. A nowadays less appreciated example is Boris Hessen's notorious interpretation of Newton's "Principia Mathematica", claiming that Newton's physics was just a mere attempt to serve the interests of the bourgeois class. Also the philosophers from the Frankfurter Schule habitually followed this line of argument, claiming science to be an essentially not value-free activity, primarily serving the interests of the ruling class. More mitigated, balanced and far more prominent was Thomas' Kuhn "The structure of scientific revolutions" (1962) according to Time Magazine one of the 100 most influential books of the 20th century. After Kuhn's, Paul Feyerabend's, and more recently Bruno Latour's work, many philosophers of science are inclined to agree that a full picture of the scientific enterprise should integrate elements from both the internalist and exernalist tradition.

Now, one need not exhibit a full and unconditional adherence to an extreme externalist position, to appreciate the idea that science is a human activity with many stakeholders, especially in a technological/engineering discipline like computer science. To name a few: the federal government, specific ministries, publicly financed research institutions, the European committee, the ICT-branch, and of course universities, departments, and the researchers themselves. Identification of the different types of stakeholders, their roles, interests, including their (financial) participation and involvement is worthwhile for several reasons. Those committed to safeguarding academic independence and integrity will undoubtedly refer to medical and pharmaceutical research, were the interests of companies producing pharmaceuticals or medical equipment, involved in financing and conducting experiments, have to be reported explicitly, and are watched closely by ethical committees following strict protocols and codes of conduct.

But apart from this ethical aspect, knowledge of the environment may also help to understand and assess current state of affairs in a research area, and it may facilitate policy makers and researchers to better anticipate on coming developments, both opportunities and threats. It may give information about the structure of the field, indicate the relative success of certain subfields or research programs, their international position and orientation, as well as their intended or alleged relevance for industrial companies or society as a whole, etc. This article is based on the assumption that a detailed analysis of the environment, its institutions and stakeholders, including different ways of funding in the field of computer science, can contribute to our understanding of the field and the assessment of its current state.

AIM

In this paper, we obviously cannot cover the entire research in information and computing sciences, but we confine ourselves to the research on information and knowledge systems (IKS), which still is a broad field. As a first explorative step towards this wished insight in the current state of IKS-research in the Netherlands, we will here examine how a large number of Ph.D. projects were funded, which stakeholders/institutions were involved, under which funding conditions the projects took place and relate these findings to the structure of the field as will be described in the next section.

POPULATION

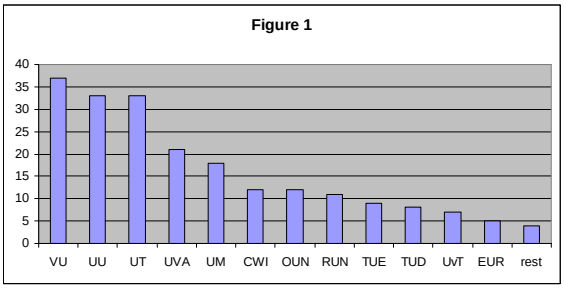
To this aim we examined the project-data of over 300 researchers working in the IKS-field. These researchers had two things in common; they were all involved in Ph.D. research in The Netherlands in the period 1998-2006 and in the same period they were all registered in the National Dutch Research School for Information and Knowledge Systems (SIKS). Founded in the mid-nineties by researchers in the field of Artificial Intelligence, Databases / Information Systems and Software Engineering, SIKS currently identifies eight research themes:

- Agent Technology
- Computational Intelligence
- Knowledge Representation and Reasoning
- Web-based Information Systems
- E-business Systems
- Human Computer Interaction
- Data Management, Storage and Retrieval
- Architecture-driven System Development

The over 300 researchers were employed at ten universities and the CWI. Although our research population is not a full representation of all research conducted in IKS in the Netherlands, it is sufficiently representative for our explorative purposes in this paper.

As a first orientation, Figure 1 shows how in 2006 about 200 IKS-projects (ongoing projects and projects completed in 2006) were distributed over the participating universities.

Figure 1



METHOD

Project-data of 300 IKS-research projects, all conducted between 1998 and 2006, or currently being conducted in the Netherlands, were provided by the administrative offices of the participating universities and were enriched with data obtained from the SIKS-monitor, a large-scale continuous survey among the Ph.D. researchers, explicating the research-profiles of all individual researchers and the structure of the IKS-field in the Netherlands [Starmans, 2005]. For each project we tried to answer the following related questions:

- On which formal money flows was the project based?
- Which stakeholders / third parties were involved and how?

- How was the research funding acquired (internal, external competition, no competition, other allocation mechanisms)?
- Which financial conditions were reported (matched funding, co-funding)?
- Which content involvement/conditions were reported (fundamental versus applied, specific versus generic program, etc.)?

To answer the first question we first categorized each project as a first-, second- or third-money flow project. First-money flow projects (= first flow of funding projects) usually refer to *indirect* research funding by the government through the universities. Universities first acquire funding from the government and then apply some allocation model to divide the money over faculties, research groups, enabling them to employ permanent staff and Ph.D. researchers. Often no (internal) competition is organized at the universities to divide the financial means. Also, typically no specific constraints/requirements regarding content, relevance and applicability are reported and no external stakeholders are involved in the projects.

Second-money flow projects (= second flow of funding projects) usually refer to government funding, channeled directly into research through NWO or STW. Typically, researchers or research groups acquire this funding after a national competition.

In NWO there are general programs with no specific program requirements (for example the Open Competition), but also special interest subsidiary programs, dedicated to specific research themes. Obviously, the latter category by definition has conditions related to the content of research proposals. In STW typically several external users play a role in the project.

Third-money flow-projects (= third flow of funding projects) include all projects funded by other resources. Usually, this very heterogeneous term refers to research funding acquired through contracts with third parties such as governments, ministries of Economic Affairs, European Union, European Committee, private foundations, individual companies, consortia of companies, charitable boards and other non-profit organisations, research organisations like TNO, etc. Due to the diversity of this category, general statements about competitions cannot be easily made, with the exception of European funding of course. Typically, in third-money flow projects several stakeholders are involved and many projects are focused on applied research. Our definition of third-money flow implies that all European projects are part of it, although it is sometimes informally called the "fourth-money flow", which we do not adopt here.

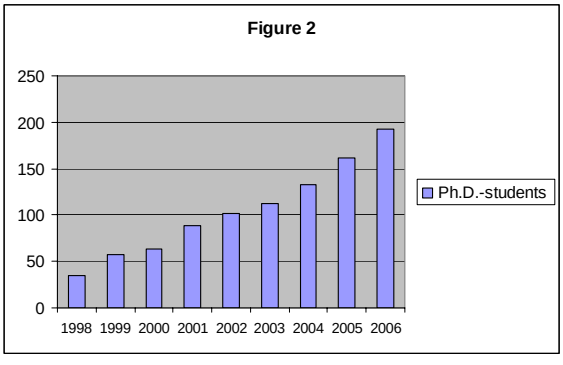
On the one hand this classification is not that informative anymore; the landscape of funding organisations, grants, subsidiary programs and instruments has rapidly grown complex over the last decade. We report it here, because it is still commonly used and gives a global impression already. However, to give a full picture and answer the remaining questions, the second- and third-money flow will be further analyzed or subdivided.

Therefore, as a second step we also checked for each second- or third-money flow project in our population what organisations were involved and in which program the projects participated. Special attention will be paid to the category of European funded projects, which formally belong to the third flow of funding.

As a third step we enriched the data with survey-data obtained from the SIKS-monitor, that tracks developments in the IKS-field, provides profiles of individual researchers and groups and identifies the structure in the field. The detailed characteristics provided by the IKS-monitor enable us to relate specific trends in funding to specific research areas in the IKS-field. In this short paper we will confine ourselves to some global comparisons.

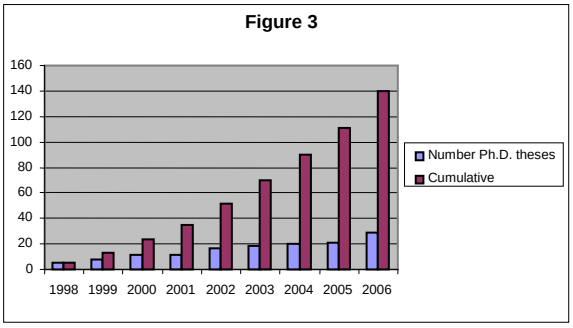
MAIN RESULTS

The obtained data allow for some straightforward and immediate global conclusions for the IKS-field. First and foremost, we observe that the period of the last 8 years shows a rather spectacular and unprecedented growth of IKS-research projects conducted at Dutch universities. Starting with 35 Ph.D. students in 1998, currently over 190 researchers are conducting IKS-research. See Figure 2.



Even if we acknowledge that the IKS-field might be somewhat underrepresented in our data with respect to the late nineties, this will not brush away the strong rise of the last five years. The real rise in

projects started in 2001 and with a time delay of 4 to 5 years, the results are visible in the number of successfully defended dissertations. The clustered bar chart of Figure 3 shows the annual growth of doctoral dissertations as well as the cumulative numbers over the period 1998-2006.



Secondly, it goes without saying that this rise in projects is only possible with a substantial raise of funding sources in the scientific community. Indeed, the plethora of funding sources that emerged in the last decade can all be reduced to the three categories of first-, second- and third-money flow. We tracked the relative importance of these three money flows over a period of nine years, resulting in the stacked bar chart of Figure 4, which for our purposes is quite illustrative.

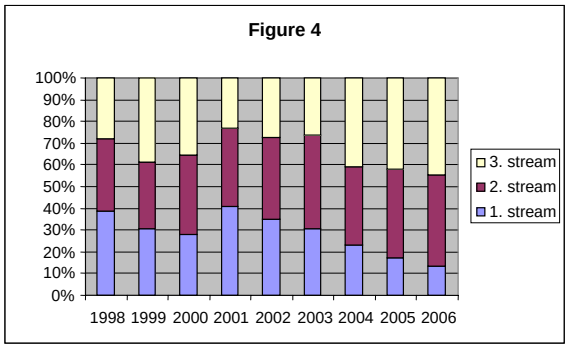


Figure 4 positively shows a dramatic decrease in first-money flow financed projects over the last few years. It dropped from 41% in 2001 to only 13% in 2006. A closer look at the data confirms that this trend is only slightly attributable to the rise in second- and third-money flow projects. Also the absolute numbers confirm that universities more and more do not spend their first-money flow resources to fund Ph.D. research. This applies to all IKS-sub areas: AI research, databases/information systems and software engineering.

Figure 4 also indicates that the share of second-money flow funding appears rather stable for a period of several years; it varies from 35% till 40%. Clearly, this means that the growth of NWO and STW-funded research is proportional to the growth of the population of all projects. So, combining Figure 2 and Figure 4 we can infer that the absolute growth of second-money flow funding of IKS-research is quite substantial!

The third-money flow strongly increased in the last period. In 2006 over 40% of the projects were funded this way. Considering the strong growth of the population, this means that in absolute numbers the rise of third-money flow funding increased even stronger. In fact, compared with 1998 the number of third-money flow projects in 2006 increased with a factor of 8 to 9.

To perform our second step we have a closer look at the data of the second- and third-money flow projects. Regarding the second flow this situation is rather straightforward. In fact, there are relatively few STW-financed projects; the vast majority is fully NWO-funded.

Restricting ourselves to the current population of all registered Ph.D. students in 2006, including those who graduated this year, we observe that in the second-money flow IKS-research depends heavily on

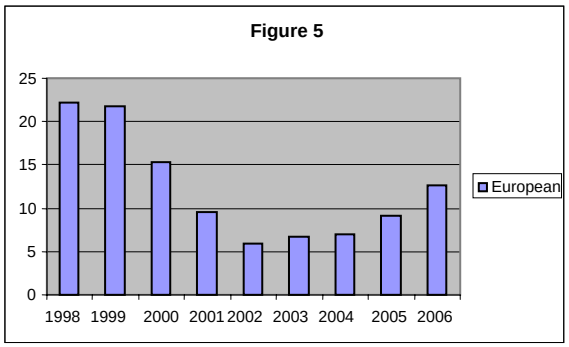
- The Open Competition
- Personal programs (VIDI, VICI, in the recent past: PIONIER)
- Special-interest programs like
  - TOKEN: Toegankelijkheid en Kennisont–sluiting in Nederland 2000
  - CATCH: Continuous Access To Cultural Heritage
  - JACQUARD: Joint Academic and Commercial Quality Research and Development (Software Engineering)
  - CLS: Computational Life Sciences

This list indicates that several important IKS-areas are recognized by / represented in the NWO special-interest programs, but these programs do not cover the entire IKS-field.

Regarding the increase of third-money flow our main observation is that for sure this rise is not accounted for by participation in European projects. On the contrary, Figure 5 shows a very modest role for this funding source in the IKS-field.

In the late nineties the percentage was rather substantial, it dropped in 2002 to nearly 6% of all funded projects (first-, second- and third-money flow) and then slowly increased to 12% in 2006. The latter trend may seem encouraging, but it is clear that participation of IKS-research in The Netherlands is very small. This is not unlike the

situation in the entire field of information and computing sciences in our country. The NOAG-ICT 2005 shows a strong concern about a weak participation of Dutch computer science research in European funded projects [NOAG-ICT, 2005].



So, definitely the strong rise of third-money flow based projects cannot be traced back to participation in European projects. Interestingly, it is not caused by cooperation between research groups and individual companies either. Contract research, based on bilateral agreements between a company and a research group c.q. researcher as to financing Ph.D. research is hardly manifest in the IKS-field as represented by our data.

In fact, the real impulse to third-money flow funded Ph.D. research is due to the installation of so-called BSIK-consortia. This acronym stands for 'Besluit Subsidies Investeringen Kennisinfrastructuur'. Giving shape to the idea of a "knowledge economy" the Dutch government started investing some of the earnings of its natural gas reserves into its economy's infrastructure. In recognition of the fact that scientific knowledge is part of a modern economy's infrastructure, part of the funds are reserved for strengthening the research and development capacity in The Netherlands.

In 2003, an ambitious program to subsidize investments in knowledge infrastructure (BSIK) was created. The BSIK scheme aims to bring together parties from public research and industry into BSIK-consortia and support their joint research efforts with funding of up to 50 percent. A total budget of EUR 802 million is available for research proposals focusing on one of five multidisciplinary themes, which are considered to be highly relevant for the economy and the Dutch society as a whole: information and communication technology is one of these themes.

Restricting ourselves to the current IKS-population of 2006 we observe that the following four BSIK consortia substantially triggered the rise of third money:

- BRICKS (Basic Research in Informatics for Creating the Knowledge Society)
- ICIS (Interactive Collaborative Information Systems)
- MULTIMEDIAN (Multimedian Netherlands)
- BIORANGE (Bioinformatics)

Similar to the NWO special-interest programs, these consortia indicate that they are important for specific sub-areas in the IKS-field, but do not cover it completely.

CONCLUSIONS

Undeniably research in IKS flourishes, witnessing a spectacular growth of Ph.D. projects and finished dissertations. The latter number is expected to increase even further the coming years. However, typically most of the funding is *non-structural*. Especially, the third-money flow projects depend heavily on the economic situation and there is no guarantee that BSIK-consortia (or its successors) will be continued at the same level the next years. For the near future, the SMARTMIX-program offers some interesting opportunities for specific subfields in IKS, but basically here the same argument applies.

Apart from its non-structural character the strong dependency on third-money funding may have some other disadvantages, especially in combination with the strong decrease in first-money flow projects. Typically, third-money projects, unlike first-money research, have several stakeholders and they tend to favor more applied research. Moreover, they often demand matched funding, which means that faculties, in order to meet this financial prerequisite, temporally buy out their permanent staff, to supervise and participate in the more applied third-money flow projects. One could state that the rise in third-money flow may occur at the expense of first-money stream research.

A third conclusion is that sub-areas in the IKS-field may run into trouble if they do not succeed in establishing / participating in a BSIK-consortium or NWO-funded special-interest program. For example Artificial Intelligence, Computational Intelligence, Web-based Systems, Database Technology are highly successful, but they do not represent the entire IKS-field. Especially, if a research area lacks its own BSIK-project or NWO-program, also fails in attracting European funding and depends strongly on the evaporating first-money stream, it may run into trouble.

We will refrain here from trying to explain the small participation of IKS-research in European projects. Maybe the cumbersome and time-consuming application procedures associated with international

competitions do play a role, but a more thorough and qualitative examination should complement our exploratory steps to account for this. However, one could imagine that research areas or groups that fail to attract money in the aforementioned national programs (now or in the future) might consider stepping into international competitions. In fact, the KP7-program of the European Union, that starts as of 2007, offers some interesting opportunities for IKS-research.

REFERENCES

- NOAG-ICT (2005). Met vaste hand; nationale onderzoeksagenda informatie-en communicatie-technologie.
- Starmans, R. (2005). Current Topics in IKS-Research: a quantitative approach. *BNVKI Newsletter*, vol. 22, no.6, pp. 128-135.

BNAIC 2006 CONFERENCE

General Impressions

Pierre-Yves Schobbens
University of Namur

BNAIC 2006 took place in Namur, gateway to the Ardennes and capital city of the Walloon region, guarded by its famous citadel. BNAIC 2006 started on Wednesday 4th of October with a pre-registration and an informal gathering in Henry's bar, at the foot of the cathedral. A lively and informal atmosphere, full of interesting discussions, gave a nice start to the conference!

The next day, after the official opening by the BNVKI chairman, we started immediately the presentations. The programme is indeed rather dense, it consists of 94 papers: 41 full papers, 46 compressed papers, and 7 demonstration presentations. Due to time constraints, the programme committee selected 21 full papers, 19 compressed papers, and 6 demonstrations for presentations, and the remaining papers were presented as posters.

This year confirmed the success of the research on multi-agent systems, seen from a wide variety of complementary perspectives. This theme was largely pioneered by our first invited speaker, Prof. Nick Jennings from the University of Southampton. Professor Jennings helped pioneer the application of multi-agent technology; developing some of the first real-world systems. This focus led him into the areas of agent-based software engineering and the Semantic Grid. More recently, his focus is on automated bargaining, auctions, markets, mechanism design, coalition formation, decentralised control, and trust and reputation.

Keynote lecture by Professor Jennings.

Professor Jennings has been an invited speaker at numerous national and international conferences (including IJCAI, OOPSLA, ICMAS, PRICAI, AAMAS), he co-initiated the ACM's Autonomous Agents Conference and the Agent Theories, Architectures and Languages (ATAL) workshop series. He was the founding Editor-in-Chief of the International Journal of Autonomous Agents and Multi-Agent Systems and is on the editorial boards of ACM Transactions on Internet Technology, Computational Intelligence, Journal of Logic and Computation, The Knowledge Engineering Review, Int. Journal of Electronic Commerce Research, Int. Journal of Web Semantics, Int. Journal of Applied Logic and the Int. Journal of Autonomous Agents and Multi-Agent Systems. He is a series editor for Springer-Verlag's Agent Technology series, and a founding director of the International Foundation for Multi-Agent Systems. He has published over 300 articles on various facets of agent-based computing and holds 3 patents. He is in the top 100 most cited computer scientists according to the CiteSeer digital library and in the top 150 most cited engineers according to the ISI Web of Knowledge. He has received a number of awards for his research: the Computers and Thought Award (the premier award for a young AI scientist) in 1999 (this is the only time in the Award's 35 year history that it has been given to someone based in Europe), an IEEE

Achievement Medal in 2000, and the ACM Autonomous Agents Research Award in 2003. He is a Fellow of the Royal Academy of Engineering, the British Computer Society, the Institution of Electrical Engineers, and the European artificial intelligence association (ECCAI) and a member of the UK Computing Research Committee (UKCRC). In his talk, entitled *Agreement Technologies*, Prof. Jennings stressed the need for incentive-based agent architecture, borrowing from the large body of knowledge available in Economics. These techniques avoid the need for benevolent agents or central planning. Two real project examples illustrated the idea: an ad-hoc network of sensors disseminated in a glacier, where an incentive to relay messages from distant nodes decreases the power consumption and increase the useful life of the network, and a system of surveillance helicopters between which information is exchanged according to market rules.

This talk was followed by a special session on 25 years of BNVKI and 50 years of AI where eminent experts looked back in the past to help steer the future (see separate report).

Then a quiz on the history of AI gathered all participants in a friendly but difficult competition, whose prize was a magnum of champagne!
We then moved on to a lively banquet with many informal discussions.

The next day, we started with parallel sessions including the demo presentations. A new type of track, the Industrial Track, was inaugurated this year following the suggestion of Decis Labs. Its goal is to make academia more aware of the needs and constraints of the industry. We had a high-quality panel headed by Kees Nieuwenhuis from Decis Lab, that reflected the diversity of views in the field: Ann Nowé (VU Brussels), Antal van den Bosch (U. Tilburg), Hans Abbink (Almende BV), Michel van den Bossche (Mission Critical), Jaap van den Herik (U. Maastricht).

This was followed by a very exceptional invited talk given by Professor Donald Michie, whose experience spawns more than the 50 years of AI that we are celebrating! Donald Michie was born on 11 November 1923, and was educated at Rugby School and Balliol College, Oxford. He obtained the MA, DPhil, and DSc degrees from Oxford University for studies in biological sciences. For contributions to artificial intelligence he was elected a founding Fellow of the American Association of Artificial Intelligence. He has received honorary degrees from the UK's National Council of Academic Awards, from Salford University, Aberdeen University, the University of York and the University of Stirling. His awards include the 1995 Achievement Medal of the Institution of Electrical Engineers (UK) for contributions to computing and control, and the 1996 Feigenbaum Medal of the World Congress on Expert Systems for his development of machine learning into an industrial-strength tool. In 2001 he received the IJCAI Award for Research Excellence. His interest in programming human intelligence into machines originated during his membership of the British code-breaking group at Bletchley Park during World War 2. Professor Michie was founder and Editor-in-Chief of the Machine Intelligence series, of which nineteen volumes have appeared to date. He is a Fellow of the British Computer Society, a Fellow of the Royal Society of Edinburgh, Honorary Fellow of the American Academy of Sciences and of the Slovenian Academy of Sciences and Professor Emeritus of Machine Intelligence at the University of Edinburgh. He is also founder and Treasurer of the Human-Computer Learning Foundation, a charity registered in the UK.

Keynote lecture by Prof. Michie, preparing his chat-bot SOPHIE.

In his talk, entitled *Educating SOPHIE: progress towards Turing's test using his 'child machine' concept*, Professor Michie gave an entertaining introduction to his ongoing research on conversational agents (sometimes called chatterbots) as envisioned by Alan Turing and nowadays pursued by the Loebner competition. SOPHIE's strong points are that it takes the previous conversational context into account, and progressively builds a model of its interlocutor. It uses a dedicated pattern-based

language PatternScript both to generate answers and to discover context.

After the lunch and the general assembly of BNVKI, we had our last parallel session, including the demos.

Two awards were handed out this year, the best demonstration award sponsored by SKBS, and the Best Paper Award sponsored by SNN. The entries for the best paper award were evaluated by a jury composed of Antal van den Bosch (U. Tilburg), Jean-Marie Jacquet (U. Namur), Edwin de Jong (U. Utrecht), Ann Nowé (VU Brussels), Hendrik Blockeel (KU Leuven). The five full papers best rated by the programme committe were nominated for this competition, namely:

- *Active Object Detection*
  G. de Croon and E.O. Postma
- *Robot Companion Localization at Home and in the Office*
  Arnoud Visser, Jurgen Sturm, and Frans Groen
- *Stable Patterns: Fixed Intervals in Between*
  Edgar de Graaf and Walter A. Kosters
- *On The Modularisation of Independence in Dynamic Bayesian Networks*
  Ildiko Flesch, Peter Lucas, and Stefan Visscher
- *Monte-Carlo Tree Search in Production Management Problems*
  Guillaume Chaslot, Steven de Jong, Jahn-Takeshi Saito, and Jos Uiterwijk

The jury found all these papers excellent, but specially appreciated the pedagogical effort done in presenting a difficult topic, and therefore chose as best paper: *On The Modularisation of Independence in Dynamic Bayesian Networks* by Ildiko Flesch, Peter Lucas, and Stefan Visscher.

Ildiko Flesch receiving the Best-paper Award.

The jury for the SKBS best demonstration was composed of Jaap van den Herik (chair, U. Maastricht), Pierre Yves Schobbens (U. Namur), Catholijn Jonker (U. Nijmegen), Kees Nieuwenhuis (DECIS Lab), Cees Witteveen (TU Delft). Again, the demonstrations submitted were of very good quality, and the jury had a hard time to compare their merits. The final vote gave the SKBS best demonstration award to: *Procarsur: a System for Prognostic Reasoning in Cardiac Surgery*, by Marion Verduijn, Niels Peek, Peter Rosseel, Evert de Jonge, and Bas de Mol.

Congratulations to the recipients of these two awards!

This concluded a very rich BNAIC 2006, and we hope to see you all next year in Utrecht for BNAIC 2007!

SESSION REPORTS

Agents I

Report by Cees Witteveen
Delft University of Technology

In this session we had presentations of the following three papers:

- *Agent-based Scheduling for Aircraft Deicing* by Xiaoyu Mao, Adriaan ter Mors, Nico Roos, and Cees Witteveen
- *Towards a Framework for Goal Revision* by Célia da Costa Pereira and Andrea Tettamanzi
- *An Agent Program Logic with Declarative Goals* by Koen Hindriks and John-Jules Ch. Meyer

Xiaoyu Mao started with a discussion of the problems of anti-icing and deicing of planes at airports. These activities are required in winter time when snow or ice can form on wings and fuselage of an airplane. In our temperate climate zone, such activities are not part of the original flight plan and have to be taken care for in the operational phase of the planning. Since there are several self-interested parties (such as airlines, pilots, traffic control, the airport, ground handling companies) involved in the scheduling of the deicing process, a centralized approach is infeasible. Therefore, the authors propose to follow a distributed multi-agent approach, where agents will schedule their activities independently and feasibility of the total schedule is guaranteed by imposing a coordination mechanism.

In this paper, the authors investigated a combination of a simple First-Come-First-Serve (FCFS) strategy to reserve deicing resources employed by the individual aircraft agents and a coordination mechanism that makes use of decommitment penalties in case an aircraft does not use the time slot it has reserved earlier. Their preliminary

experimental results indicated that in this way delays can be reduced and more evenly distributed over the aircraft if compared with FCFS without coordination.

Célia da Costa Pereira discussed an interesting framework for changes in the mental state of an agent after the acquisition of new information and/or after new desires came onto stage. In their set-up, simple logic-program-like rules for beliefs, desires and planning describe the beliefs and the desires an agent has, the way desires and beliefs can be used to generate new desires, and the way desires can be achieved. In this framework, the planning for desires is dependent upon the desires currently considered by the agent, while these desires in turn are dependent upon both beliefs and other more basic desires of the agent.

Due to changes in the belief set or the set of desires, some beliefs and desires loose their current support and need to be retracted while others might be added. To describe the effect such changes will have on the resulting mental state of the agent, the authors provided a precise description of a justified and coherent set of desires to realize and provided three alternative methods to find the most preferable goal set under different schemes of desire preference information. Due to the absence of features like non-classical negation and disjunction in the head of their rules, the authors could show that these preferable goal sets are computable in polynomial-time.

Koen Hindriks started his talk remarking that the intersection between agent frameworks underlying current agent programming languages and logical agent theories was empty. Ideally, of course, one would like to have an agent programming theory that provides an agent programming *language* as well as an agent programming *logic* to verify the programs written in the programming language. Koen discussed an approach where the language as well as the logic is developed concurrently to ensure an exact correspondence between syntax and programming logic semantics. To this end he introduced a modal agent logic containing the core concepts of action, knowledge and goals and he showed how goal adoption could be included by using the concept of second-order goals.

Agents II

Report by Koen Hindriks
TU Delft

The agent II session covered an interesting and diverse range of topics, including trust, agent identity, autonomy, and dialogue management. Even though diverse, the topics can be viewed as related and each contributes in its own way to the construction of agents in open and heterogeneous environments.

- *A Versatile Approach to Combining Trust Values for Making Binary Decisions* by Tomas Klos and Han La Poutré

Trust is an important issue in open and heterogeneous computing environments in which agents can be added and removed at will. One of the important issues in trust management is how to value the trust that can be put in another agent. Various approaches have been proposed in the literature, but one interesting alternative is to determine a trust value based on input from other agents. In that case the question arises how to aggregate this input. Tomas Klos presented and discussed three approaches for combining trust values: (i) an approach based on majority voting, (ii) an evidence-based approach that additionally takes into account the agent's own experiences with those agents that provide input on trust, and (iii) an approach based on likelihood taking into account the given observations. Experimental results show that the third approach typically seems to produce optimal results. The computational complexity of the proposed methods is not yet established. This would be interesting in relation to applications concerning large sensor networks where sensors may fail and cannot always be trusted.

- *Identity Management in Agent Systems* by David R.A. de Groot and Francess M.T. Brazier

In open and heterogeneous environments it is important for various reasons that agents can track the identity of other agents. In particular, the rights and obligations of all entities in an agent system need to be secured. Additionally, meta-level data can be made available in an agent system to decide on the interaction with other agents and to coordinate plans of agent collectivities. David de Groot presented a framework for evaluating the facilities in various agent frameworks for *digital identity management* (DIDM). Four main entities are distinguished: (a) agent platforms, (b) hosts, (c) agents, and (d) services, and four dimensions are proposed to evaluate DIDM in agent frameworks: (i) representation, (ii) confidentiality, (iii) integrity, and (iv) availability.

In the discussion it became clear that an assumption of the proposed framework is that the middleware on which the agents run can be trusted. This provided an answer to the question whether agents can avoid being traced by other agents since it may be assumed that the middleware will ensure privacy. Other more

technical properties like the capability to deal with fault-tolerance are specific to agent frameworks, but not specific to the DIDM framework proposed.

- *Influence-based Autonomy Levels in Agent Decision-Making* by B. van der Vecht, A.P. Meyer, R.M. Neef, F. Dignum, and J.-J. Ch. Meyer

The level of autonomy of an agent is another dimension that is important in agent systems. In a system comprised of various entities this notion is supposed to distinguish agents from non-agents. E.g., typically, (web) services are not considered autonomous and are not conceptualized as agents. Bas van der Vecht argued that there are various levels of autonomy and that these levels can be defined in terms of various influences that act upon an agent. Using a definition of autonomy provided by a.o. Suzanne Barber, autonomy of an agent is analyzed as a gradual property that is related to the degree of intervention of other agents in the agent's decision process. The levels of autonomy identified are derived from the Observe, Orient, Decide, Act framework (OODA). The external influences recognized in relation to an agent's decision process are: (i) the environment wrt observations, (ii) direct influence on agent's beliefs (e.g., through messages), and (iii) direct influence on goal or task determination (e.g., through commands, master-slave relations). Various agent systems can be classified using these dimensions of influence. Additionally, by means of experiments it may be established which dimensions require autonomous decisions of the agent.

From the discussion it became apparent that an important next step is to clarify the decision-making of an agent in order to be able to explain the importance of the notion of autonomy in more detail.

- *Context Specification and Update Mechanisms for Dialogue Management* by Simon Keizer and Roser Morante

Simon Keizer presented a framework for updates of the context of conversation in a dialogue management system. He first presented a rich context model for dialogue management systems. A context model contains all information considered relevant for interpretation and dialogue act generation, including components such as (i) dialogue history, (ii) information about the task and domain of dialogue, (iii) cognitive processing states of participants, and (iv) social context. The context update algorithm precisely specifies the effect or update that a communicative act has on the information state.

It seems that intentions of speakers are not explicitly represented in the proposed context model, but coded as goals of the speaker represented using a *want* operator in the processing state of a context. It may be advantageous nevertheless to add an intention slot explicitly in order to allow for intention recognition to determine the overall conversational goals of the participants.

Evolutionary Computing

Report by Tibor Bosse
Vrije Universiteit Amsterdam

The session on Evolutionary Computing consisted of four presentations. Despite the fact that this session was held on Friday afternoon, all presenters gave very inspiring talks, which led to some vivid discussions on the topic.

The first presentation was given by Max Manfrin of the Université Libre de Bruxelles. Together with his colleagues, he investigated to what extent the performance of metaheuristics could be improved by parallelizing them. As a case study, they created a parallel version of the MAX – MIN Ant System, consisting of multiple parallel colonies that periodically exchange their best-so-far solutions. They tested this parallel algorithm on the Traveling Salesman Problem, using various settings for, among others, interconnection topologies and communication strategies. In accordance with their hypotheses, the experiments pointed out that the parallel models performed better than the equivalent sequential algorithm. However, surprisingly, the best performing approach turned out to be the parallel independent runs (PIR) model, which uses parallel colonies, but no exchange of solutions. Based on this finding, Max discussed a number of possible reasons for this, and showed that, in follow-up experiments, the implementation of some extensions to deal with these factors indeed seemed to increase the performance of the parallel algorithms with exchange of solutions.

After that, Rui Li talked about a joint research project with his colleagues from Leiden University and Leiden University Medical Center. In their work, they compared Mixed-Integer Evolution Strategies (MI-ES) with standard Evolution Strategies in their ability to find optimal parameter settings for coronary vessel image segmentation problems. The talk started with an interesting description about the problem statement, which boils down to detecting the boundary of the *lumen* in IntraVascular UltraSound images, i.e., two-dimensional images showing the inside of arteries. Next, Rui explained that a main difficulty of this

type of problem is that it involves different types of parameters, namely continuous, integer, and nominal discrete variables. For this reason, they explored the ability of MI-ES to optimize the settings for these parameters. They performed a number of experiments, in which both the MI-ES and standard Evolution Strategies were tested on several instances of the image segmentation problem. As a fitness function, they used the distance between the solution found by the algorithm and an expert-drawn solution. The results indicated that the MI-ES performed significantly better than the standard Evolution Strategies.

Third, Dirk Thierens of Utrecht University discussed some challenging issues involving exploration and exploitation biases in combinatorial optimization problems. To start, he explained that the crossover operator suffers from a potential drawback when compared to more local search operators, since its computational complexity is usually much higher. However, this problem can be solved by implementing crossover in a way that only local changes to the current solution are made, namely by constructing a path through the search space, via a number of intermediate solutions. Dirk then observed that this approach is very similar to the path relinking approach in scatter search, which resulted in the main goal of this paper: comparing the search bias of crossover to that of path relinking, for a specific type of permutation problems. Based on some calculations, he showed that uniform permutation crossover is more exploratory than random path relinking, which is more exploratory than greedy path relinking. In contrast, greedy path relinking has the highest exploitation bias of the three operators (and uniform permutation crossover the lowest). In a number of experiments on the quadratic assignment problem, he demonstrated that this causes greedy path relinking to be more successful in most cases, but also to be more sensitive to finding suboptimal solutions.

To conclude the session, Jeroen de Jong of Thales Research & Technology gave an insightful presentation about his research on scheduling the tasks of radar systems on naval vessels, in collaboration with CAMS-Force Vision. In a warfare setting, such radar systems may have to perform a number of tasks at the same time (e.g., tracking flying objects, performing horizon searches, and illuminating targets to be destroyed), using limited capacity. Therefore, a fast and accurate scheduling algorithm is required. In this research, Jeroen compared the performance of four scheduling approaches (1 - a straightforward heuristic approach, 2 - fuzzy Lyapunov synthesis, 3 - an Evolutionary Algorithm, 4 - a hybrid approach, combining 2 and 3) in a simulated environment. The results pointed out that the hybrid approach showed the best overall performance, followed by both the fuzzy Lyapunov synthesis and the Evolutionary Algorithm, and that the simple heuristic approach performed worst. Moreover, it was found that the only situations in which the hybrid scheduler performed slightly worse were cases in which a low-scoring episode was followed by a bigger reward in the near future.

All in all, this was a very interesting session, which illustrated that the field of Evolutionary Computing in Belgium and the Netherlands is vivid and dynamic. An interesting concluding observation is the fact that there seems to be a growing interest in the development of hybrid metaheuristics. To see whether this trend continues, those who are interested are already invited to attend the same session at BNAIC 2007!

Games

Report by Jos Uiterwijk
Universiteit Maastricht

This year's BNAIC saw only four papers on games, combined within one session. All four were type-A papers, so they were not published before.

In *Monte Carlo Strategies for Computer Go* by Guillaume Chaslot, Jahn-Takeshi Saito, Bruno Bouzy, Jos Uiterwijk, and Jaap van den Herik (presented by Guillaume Chaslot) the challenge of building a strong program for Go was faced. So far, and notwithstanding a lot of research effort, this goal remains unachieved: the best programs today are easily beaten by mediocre human Go players. Recently Monte Carlo strategies have shown to constitute a promising approach for this problem. The authors propose an improvement, dubbed *Objective Monte Carlo*, shown to outperform previous Monte Carlo strategies. The audience got the impression that, after many years of hardly any progress in the strength of Go programs, the time is ripe to make major steps forward in this challenging domain.

Monte Carlo methods as described in the previous presentation are not uniquely applicable to the area of computer games (or even computer Go), as was demonstrated in *Monte Carlo Tree Search in Production Management Problems* by Guillaume Chaslot, Steven de Jong, Jahn-Takeshi Saito, and Jos Uiterwijk (presented by Steven de Jong). It was shown that Monte Carlo easily outperforms a previously suggested learning method, especially for larger production management problems. Monte Carlo used considerably less time to find solutions (except for the very easy problems) and

consequently was also able to solve large problems unsolvable before.

In *Next-Generation Language Games: The Guessing Game Revisited* by Joris Bleys, the author showed how a guessing game can be re-implemented combining two recently developed formalisms, i.e., the Fluid Construction Grammar, and the Incremental Recruitment Language. The Incremental Recruitment Language is a constraint programming language. It includes an automatic constraint network generation system which combines several predefined constraints in an incremental fashion such that it is capable of achieving a predetermined goal. The Fluid Construction Grammar is developed by Luc Steels in 2001 with a fully operational grammar formalism and implementation for representing, learning and applying lexical and grammatical inventories. The author gave a proof of concept how these systems can interact. This approach seems very promising. For more information the reader is referred to a webpage with information on these formalisms: http://arti.vub.ac.be/FCG/

Finally, in *A General Matching Framework: Combining Matchmaking and Coalition Formation* by Jeroen Valk and Duco Ferro (presented by the second author) a new match-making component was introduced to be used in the communication platform ASK, developed by ASK Communication Systems, a spin-off from the research institute Almende. The new framework allows a variety of match-making techniques to be applied in a single match-making system. An interesting aspect of the framework is that it can model coalition formation with groups of variable size. For more information on the framework, see http://www.ask-cs.com/.

All in all this was a very interesting session. A pity that not more than these four papers on games were presented at this year's BNAIC.

Knowledge Representation & Management I

Report by Siegfried Nijssen
Katholieke Universiteit Leuven

A broad number of issues were discussed in the first session on knowledge representation and management. First, there was a presentation by Joost Vennekens, Marc Denecker and Maurice Bruynooghe, discussing how to deal with causality in probabilistic modeling. The main idea behind their work is to see the world as the result of a probabilistic process in which events happen with a certain probability if the conditions for the events are fulfilled. To uniquely define a probability distribution, it is necessary to exactly define when a condition for an event is considered to be fulfilled. Details of how to specify these conditions, were presented, where the key idea was that an event cannot occur before its possible causes. The resulting framework was compared to several other approaches, among which causal Bayesian networks. A benefit is that the approach deals more easily with cyclic causal dependencies and deals nicely with independent conditions that can lead to the same event.

In the second presentation, by Tamás Máhr and Mathijs de Weerdt, the problem of representing preferences in multi-attribute auctions was discussed. In such auctions, there are multiple attributes for which bidders can express their preferences; even if there are total orders for the individual attributes (such as price), Máhr and de Weerdt contend that it can be hard to express an order on the combinations of attributes. They propose modifications of the Vickrey auction in which the bidders and the auctioneer define partial orders on their preferences, instead of value functions. They argue that the resulting auction mechanism still has many desirable properties of Vickrey auctions, for instance, that bidders are forced to express their true preferences.

In the last presentation, by Antoine Isaac *et al*., a case study of how to align ontologies was discussed. Two collections were used for this purpose, one from the Dutch National Library, and one from the Rijksmuseum. A main target of the study was to test the applicability of existing techniques, so for all aspects of the approach existing tools were used. The vocabularies of the two collections were formalized using SOKS; the Falcon and S-Match tools were used to match the resulting vocabularies. A browsing tool was implemented to make the results accessible. The investigation showed that existing tools are usable with reasonable success, but that they also have shortcomings, one of which is the lack of parameters, which makes it hard to tune the algorithms to this special application area.

Knowledge Representation & Management II

Report by Edwin de Jong
Utrecht University

In the second session of the first day, the Knowledge Representation & Management track was continued. The first paper by Bex and others dealt with the lingua franca for data exchange on the internet:

XML. The work considered how document type definitions can be extracted from XML data.

The second presentation, by Jef Wijsen, considered how in databases with functional dependencies, queries can be answered in a consistent manner. The example given was a database that contained people from Mons and Bergen; these are two names for the same city, perhaps not coincidentally the university where the author resides. Using the information that the zip codes for these two different place names are the same, he proposed a mechanism that can repair the inconsistent place names.

The third presentation, on work by Arjen Hommersom, Perry Groot, and Peter Lucas, discussed modular model checking in the context of medical protocols.

The final talk, also from the group of Peter Lucas and presented by Ildiko Flesch, also featured modularisation, but here this versatile concept was applied to independence relations in non-repetitive dynamic Bayesian networks. A main idea underlying the solid and important work that was presented is to separate the temporal and atemporal independence relations. Impressively, the presentation started from the very basics of dynamic Bayesian networks and continued all the way through to the main results in a very clear manner; well-deserved, this paper received the Best-Paper Award of the BNAIC 2007.

Knowledge Representation & Management III

Report by Peter Bosman
Centre for Mathematics and Computer Science (CWI)

The third session on knowledge representation and management provided an interesting, versatile, mix of AI topics: reasoning (both model-based and qualitative), ontologies, Bayesian networks and evolutionary computation.

In the first talk, Alexander Feldman introduced and discussed LYDIA (Language for sYstem DIAgnosis). The LYDIA package was developed by the research team Alexander Feldman, Jurryt Pietersma, and Arjan van Gemund. LYDIA offers a means to express formally a system under diagnosis. It also offers a means to perform diagnostic inference. In the talk, Alexander demonstrated how the language core of LYDIA consists of enhanced propositional logic that aims to ease modeling. A toolset that offers diagnostic engines and a simulator tool is also available. In addition to the many features that LYDIA offers, an important contribution is that the algorithms in LYDIA allow compiling models into a form that allows automated reasoning to go faster.

The second talk was given by Peter Bosman. The talk described joint work with Han La Poutré regarding a particular view on solving dynamic optimization problems. The problem under study is dynamic vehicle routing where loads are announced while trucks are driving. The focus of the talk was on the importance of considering the impact of current routing decisions on the future routing situation. If the future is known, current routing decisions can take this future into account (i.e., start driving to a location where a load will appear soon). It was shown how the profits of routing in a simulation could be improved up to 100% if such information can be learned and predicted reliably.

In the third talk, the expressiveness of the Web Ontology Language (OWL) was explored by Jochem Liem (presenter) and Bert Bredeweg for the purpose of performing qualitative reasoning. To do so, the authors have attempted to create the concepts required to do qualitative reasoning in OWL. It is found that it is not possible to use an OWL reasoner to perform the specific task of classification. Therefore, a new pattern is proposed by the authors that allows the re-use of relations. Additional patterns were introduced that avoid information redundancy.

The fourth and last paper in the session was by Marion Verduijn (presenter), Niels Peek, Peter Rosseel, Evert de Jonge, and Bas de Mol about prognostic Bayesian networks. Bayesian networks provide a probabilistic means to model and reason with knowledge. The authors showed however, that for the task of prognosis there are specific additional requirements. Therefore, an adaptation of the Bayesian network methodology is developed as well as a learning algorithm to perform learning from data. The resulting methodology, named prognostic Bayesian network, is applied by the authors in the field of cardiac surgery to predict the probability of a patients' death during hospitalization. The authors show clear improvements over the use of existing methods found in the literature.

Machine Learning & Data Mining I

Report by Hendrik Blockeel
Katholieke Universiteit Leuven

The first speaker in this session was Edgar de Graaf, who presented the paper *Mining for Stable Patterns: Regular Intervals between Occurrences* by himself and Walter Kosters. In this work, the authors consider the task of finding frequent patterns in

sequences, under the constraint that these patterns must occur at regular times (such patterns are called "stable" patterns). The authors first explain how counting only pattern occurrences that are (approximately) in the middle of two other occurrences of the same pattern allows one to identify (more or less) stable patterns, then propose a modification of the ECLAT algorithm to find stable patterns. Experimental results demonstrate the feasibility of the approach.

The second speaker was Sander Bakkes, who presented work with Pieter Spronck on *Gathering and Utilising Domain Knowledge in Commercial Computer Games*. The speaker first explained why it is important for AI in computer games to be adaptive. Machine-learning techniques can be used to achieve this, but these should be computationally cheap if the learning is to be integrated in a real-time game. The speaker next proposed a case-based reasoning approach: previous situations and actions are stored together with some evaluation (a fitness value), and in new situations the computer uses this information to decide which action a non-player character (NPC) should take. Experiments were performed to assess the quality of this approach and to compare different variants of it. They showed that a "situated" case-based reasoning approach, where the environment is looked at from the point of view of the non-player character, performs better than a non-situated approach.

The speaker left ample time for discussion after his presentation, and a lively discussion was indeed held, among other things on the connections between this work and reinforcement learning. It is obvious that the topic of learning in computer games still catches many people's interest.

The last paper presented in this session was *Applying Data Mining for Early Warning in Food Supply Networks*, authored by Yuan Li, Mark Kramer, Adrie Beulens, and Jack van der Vorst, and presented by Yuan Li. The societal relevance of this application is obvious, given the problems we have witnessed the last decade with guaranteeing the quality of, e.g., chicken and pork meat. Yuan Li presented a study of how data mining can be used to analyze possible reasons for problems with food supply (such as the dead-on-arrival problem, where shipments of live chickens were analyzed and correlations were sought between, e.g., the type of chicken, duration of transport and other parameters, and whether the chicken survives the transport), and also how a system could be built that detects possible problems in the food supply chain early on. An overview was given of different data-mining tasks and methods, and their possible use for this application.

Machine Learning & Data Mining III

Report by Walter Kosters
Universiteit Leiden

All papers in this session were also published elsewhere.

In the first presentation Jan Ramon discussed *Frequent Subgraph Mining in Outerplanar Graphs* (co-authored by Tamas Horvath and Stefan Wrobel). An outerplanar graph is a planar graph that can be drawn in such a way that all vertices can be reached from the outside without crossing any edges. Many graphs from real life have this property. A special notion of subgraph isomorphism is introduced in order to decide how often a pattern (i.e., graph) occurs in a database of outerplanar graphs. The ideas are successfully applied to a database of molecules. Special attention is given to the complexity of the mining algorithm.

The second talk, entitled *Monotone Classification by Function Decomposition*, was given by Viara Popova (co-author: Jan C. Bioch). The authors are interested in classification for monotone datasets: if an instance y dominates an instance x on all attributes, the classification of y should also dominate that of x. They now look at monotone decomposition. Suppose that the set of all attributes is split into two disjoint subsets S and T; schemes of the type $f = g(S, h(T))$ are the subject of research. An algorithm to find a function h is constructed, and applied to the Nursery dataset.

The third presented paper was *A Fast Implementation of the EM Algorithm for Mixture of Multinomials*, by Jan Peter Patist. He proposed several simple techniques that dramatically reduce both the memory demand and computational effort in building multinomial mixture models using the EM algorithm. Sparse data and the occurrence of duplicate records are the main properties to be employed. In a weighted dataset these duplicates are represented by one unique record together with their frequency – a technique also very successful in FP-trees for frequent itemset mining. Typical usage is within click-stream and retail data.

The fourth and last presentation was by Leander Schietgat, who talked on *Decision Trees for Hierarchical Multilabel Classification: A Case Study in Functional Genomics* (co-authored by Hendrik Blockeel, Jan Struyf, Saso Dzeroski and Amanda Clare). In this classification setup instances can be labelled with multiple classes, organized in a hierarchy. The first idea would be to learn a binary classifier for each class separately, and then to

combine the predictions. Surprisingly, new decision-tree methods that at once predict multiple classes give better results, at least when applied to some biological datasets. The decision-tree learner views the examples in a leaf as clusters.

Machine Learning & Data Mining IV

Report by Maurice Bruynooghe
Katholieke Universiteit Leuven

This Friday morning session consisted of three presentations. In the first presentation, Celine Vens represented joint work with Jan Ramon and Hendrik Blockeel on *Refining Aggregation Conditions in Relational Learning*, work that was recently presented at PKKD 2006 in Berlin. The use of aggregates in relational learning tends to blow up the search space of refinements. The work shows how a careful exploitation of monotonicity and anti-monotonicity can be used to limit the number of refinements and defines a so-called refinement cube for generalized averages.

The second presentation was by Anneleen Van Assche. This was another work co-authored by Hendrik Blockeel and was about *Bagging using Statistical Queries*. It situated itself also in the realm of relational learning and had also been presented in Berlin, but at the ECML track of the ECML/PKDD event. It addressed the setting where the original training set is not available and learning has to be based on statistics about the training set. Whereas bagging normally requires resampling the dataset, this is not possible in this setting. The paper works out a solution that samples the statistics.

The final presentation by Edwin D. de Jong was about a very different topic: Evolutionary computing. The work *DECA: Dimension Extracting Coevolutionary Algorithm*, co-authored by Anthony Bucci, was last summer presented at GECCO 2006 in Seattle. Previous work had shown that a solution space can be structured around a small number of underlying objectives (dimensions). The current work presents an algorithm that can construct and refine these dimensions. Experiments on games confirm that the algorithm is efficient, while providing accurate and reliable information.

Multi-Agent Systems I

Report by Tomas Klos
Centre for Mathematics and Computer Science (CWI)

The first of four sessions on Multi-Agent Systems featured three papers. The first was an A-type paper, *Argumentation to Compose Plans* by Maxime Morge (University of Pisa), Jean-Christophe Router and Yann Secq (University of Lille), page 237 in the proceedings. It is an example of how the BNAIC is viewed as an AI- rather than a BeNeLux-conference, which is refreshing. The paper presented a framework for inter-agent dialogue on plans, although the title of the paper in the proceedings says "Services" instead of "Plans". This framework allows cooperative agents to resolve conflicts between alternative plans which have different strengths for the agents, enabling them to reach mutually satisfying solutions.

The other 2 papers in the session were B-type papers. The first of these, *Modelling Trade and Trust across Cultures*, by Gert Jan Hofstede, Catholijn Jonker, Sebastiaan Meijer and Tim Verwaart (page 389 in the proceedings), was originally published at the 4th International Conference on Trust Management, May 16-19, 2006, Pisa, Italy. This paper described experiments with the Trust and Tracing game, which the authors are playing with both human and artificial subjects. The presentation highlighted the differences in outcomes when the game was played in universities in The Netherlands vs. the USA. Such differences were related to the different scores of these countries on one of Hofstede's famous cultural dimensions, namely the Cooperation/Performance orientation, where The Netherlands are more cooperation-oriented and the US are more performance-oriented. These countries hardly differ on the other 4 of Hofstede's dimensions.

The final paper in the session was also a B-type paper, *A Collaborative Filtering Method for Constructing Utility Graphs Used in Multi-Issue Negotiations*, by Valentin Robu and Han La Poutré (page 421 in the proceedings), originally published at the 2nd International Workshop on Rational, Robust and Secure Negotiations, May 8, 2006, Hakodate, Japan. This paper builds on previous work by the authors in which an online shop learns the strengths of connections between goods in a 'utility graph' with known structure, which is used to represent buyers' preferences. The presentation explained how the structure of the utility graph itself can also be learned, namely by collaborative filtering of historical sales data.

Multi-Agent Systems II

Report by Catholijn M. Jonker
Technische Universiteit Delft

- *Action-Reaction Learning in Multi-Agent Games* by P.J. 't Hoen, S.M. Bohte, J.A. La Poutré. Presented by Pieter Jan 't Hoen.

Pieter Jan presented the StrOPM algorithm that models opponent policy and learns how an opponent changes as a function of the agent's own actions. Using a number of examples in which the main actions that a player can take are to defect or to cooperate. Pieter Jan demonstrated how the algorithm converges to a most profitable strategy, that closely monitors the opponent to exploit its behaviour. For example, consider a game in which the most profitable strategy is to cooperate with the opponent, as long as the opponent also does so. The StrOPM agent will defect at some point in time (assuming that a Defect-Cooperation move is more profitable for StrOPM than a Cooperation-Cooperation move), if the opponent is always cooperating. The discussion that followed addressed questions about the transferability of learned strategies in games having many iterations from one opponent to games in which the number of iterations is low and different partners are use for every game. The main point explained is that StrOPM learns the policy of a specific opponent, which necessarily does not transfer to another opponent. Furthermore, he explained that games with many iterations have a different nature than those with only a few iterations. In reaction to a question the StrOPM agent is capable of learning to find the alternating solution of (D-C, C-D) with another StrOPM agent if sequences of these two moves would result in a higher profit for both agents than sequences of C-C or D-D moves.

- *Improving Patient Activity Schedules by Multi-Agent Pareto Appointment Exchanging* by Ivan Vermeulen, Sander Bohte, Koye Somefun, Han La Poutré. Presented by Ivan Vermeulen.

Ivan Vermeulen introduced an agent-based rescheduling system for hospitals in which the agents represent the interests of patients. The patients get an initial schedule of appointments from the hospital agents that is clearly suboptimal from an overall view. The agents representing the patients can now contact each other to find swaps that are beneficiary to at least one of them and not worse for any of them. In the discussion that followed, it became clear that the order in which the agents start swapping appointments is important for the overall quality of the resulting schedule. This could be solved by applying a more dynamic version of his idea, involving several iterations, instead of the semi-static variant presented here. Ivan also showed that if the hospitals would use a first-come random-served strategy instead of a first-come first-served strategy, the result of applied his agents will be considerably better. Privacy issues of patients that don't want other patients to know that they need certain appointments at the hospital, is to be solved by way of the agents.

- *Coordinated Communication, a Dynamical Systems Perspective* by Bart de Vylder. Presented by Bart de Vylder.

Bart presented an approach to analyse and compare different models of coordinated communication. The approach is based on dynamical systems theory, in which he distinguishes interpretation behaviour from communication behaviour (outgoing communications). The models he studied addressed agent communities with one-to-one communication only and no central control. The question addressed by all models, is whether or not the agent communities converge to some kind of optimal communication system, in which words have one meaning only (no ambiguity) and there are no synonyms around. His analysis focuses on the question of whether the models studied are attracted to optimal behaviours and repelled from suboptimal behaviours. The evolution of such communication systems could lead to fixed points, for which the interesting question is how stable and how optimal these fixed points are. For one of the models his analysis showed the existence of a suboptimal but stable fixed point. Questions addressed his choice for one-to-one communication only. Why not also consider broadcast communication. The discussion that followed suggested that his approach should be easily adaptable to broadcast communication and that it might be interesting to test how these models would behave under broadcast in which the locality of the broadcast can be varied.

- *Norm Negotiation Power* by Guido Boella and Leendert van der Torre. Presented by Leon van der Torre.

Leon explained how norms might arise as a result of first a social goal negotiation, followed by norm negotiation, finalised by the decision of the individual agents to adopt that norm. The distinction made between useful norms or laws and quasi-stable laws was made. Useful laws mean that every agent has (or can have) a strategy that guarantees a profit of at least e (where e is some number associated with the law). Quasi-stable laws are laws for which agents see no profit in violating them. In the discussion that followed a link was made to the presentation of Pieter Jan 't Hoen: can't the decision to obey or violate a norm be compared to the n-player Prisoners Dilemma? Leon explained that he is

not interested in playing games, that basically depart from the point where the norm is already in play, but in the process of norm acceptance. Another question was how his theoretical framework would scale up from a low to socially realistic numbers of agents. Leon stressed the difference between the logical absolute and the more stochastic behaviour of the multitudes (if the chair captures his answer adequately in this way).

Multi-Agent Systems III

Report by Mathijs de Weerdt
Technische Universiteit Delft

The BNAIC organization combined an interesting set of papers in this third session on multi-agent systems. All except for the last one were B papers, so they have been published elsewhere already. The first paper was on multi-issue negotiation.

- *Eliminating Interdependencies between Issues for Multi-Issues Negotiation* by Koen Hindriks, Catholijn M. Jonker, and Dmytro Tykhonov.

In the presentation Dmytro Tykhonov first presented the problem of negotiating over items with multiple attributes. Each bidder has a utility function that assigns a value for each combination of attributes. When attributes are interdependent, such a function can be quite complicated. Thus, it may cost a lot of computation to use such a function in the negotiation process. Dmytro showed how to linearly approximate such a function by a weighted sum of utility functions for each of the attributes. In his experiments he used the example problem of a job negotiation over the number of working days and the number of days the employer is going to pay for child care.

- *Multiagent Control of Electricity Demand and Supply* by Koen Kok, Cor Warmer, and René Kamphuis.

The second talk was presented by Koen Kok. Koen not only works for the Vrije Universiteit Amsterdam, but also for the Energy research Center for the Netherlands (ECN). He first stressed an important change in the energy market: lately, power is partly generated distributedly, for example even by households. He then introduced the idea of having a time window for energy consumption. Especially heating and cooling seems to be quite flexible. He gave an idea about how a market-based mechanism can use this flexibility to create a better match between supply and demand, in other words a more even spread of the energy demand over time. He concluded with presenting the real setting in which they experimented with this new approach, and showed that it gave a significant improvement.

- *Stochastic Optimal Control of Continuous Space-Time Multi-Agent Systems* by Wim Wiegerinck, Bart van den Broek, and Bert Knappen.

Training the optimal coordinated behavior in a multi-agent system is a difficult problem. Often Markov Decision Processes are used, but such approaches have difficulties with the enormous search space. Bart van den Broek showed that a continuous model allows for relatively efficient central computations to obtain the optimal solutions. After some complicated linear partial differential equations, the audience was relieved to see the system work in a situation where a couple of firemen were finding the optimal way to extinguish multiple burning fires.

- *Coordinating Autonomous Planning Agents with Temporal Constraints* by Pieter Buzing, Renze Steenhuisen, and Cees Witteveen.

The last (but not least) speaker of this session was Renze Steenhuisen. Renze proposed a way to deal with the problem of coordinating autonomous planning agents in a task-oriented domain that includes time. The approach introduced in the presentation consisted of two steps. The first step was to prevent cyclic dependencies between agents that may result from planning by adding extra constraints. The second step consisted of preventing time windows that introduce unwanted dependencies by relating the time window of a task of one agent to the time window of the task of another agent that is dependent on this task. After these steps, the agents can autonomously plan (and schedule) their tasks.

Multi-Agent Systems IV

Report by Perry Groot
Radbout University Nijmegen

Three papers were presented in the 4th session on Muli-Agent Systems. Session chair: Perry Groot.

The first paper, titled *Two Description-Logic-Based Methods for Auditing Medical Ontologies*, was presented by Ronald Cornet As the talk was at 9.00 o'clock in the morning, Ronald was kind enough for his audience to focus on the methodological part and not so much on the Desciption Logic (DL) details. The methods presented are based on a migration from a frame-based representation to a DL-based representation of medical ontologies. Clearly, as a DL-based system has a different semantics than a frame-based system, assumptions need to be made for the DL-representation. Nevertheless, a DL reasoner can be used to identify parts of the frame-based system that may be incorrect or incomplete,

which can then be validated using human experts. Ronald *et al*. have used a DL reasoner to identify a number of equivalent definitions and inconsistencies in the Foundational Model of Anatomy (FMA). Taking a step back, to me this work resembles the migration of a legacy system to either an updated version or a completely new system. In practice, this is quite an important problem and much more difficult than most people realise.

The second paper, titled *Enhancing Cooperative Transport using Negotiation of Goal Direction*, was presented by Alexandre Campo. The work focusses on the movement of an object (the prey) using multiple agents (robots) to a specific location (the nest). However, it is not assumed that each robot has perfect knowledge about the location of the nest, as measurements of directions can easily be imperfect. However, it is assumed that each robot has some knowledge about the true direction. Using negotiation, the robots have to make up their mind for a direction to move their prey. Several experiments have been performed by Alexandre *et al*. using four robots and a prey that is too heavy to be moved by three robots. Hence, the robots need to collaborate when moving the prey and jointly move it into the same direction. Alexandre nicely demonstrated several negotiation strategies with different levels of noise for the robots sense of direction and different control strategies with a number of videos. Future work will also take into account the (collaborative) search of a prey by several robots.

The third paper, titled *Processing-Based Concept Kinds for Actor-Agent Communities*, was presented by Manuela Viezzer. In actor-agent communities, for agents and actors to collaborate with each other they will need to communicate such that they are able to 'understand' each other, which can be done by identifying concepts. However, no well-established theory of concepts exists yet. Instead of the natural object kinds (chair, bird, stool, etc.), Manuela *et al*. propose to differentiate concepts by the way they are used when processing the concepts. This may also help in designing an agent by identifying the support needed for processing concept kinds. Manuela *et al*. identify taxonomic concepts and goal-based concepts, which is not supposed to be a complete identification. The first concept kind is based on the processing mechanism of concept acquisition, the second concept kind on reasoning with concepts (i.e., the first is exampler-based whereas the second is not). Furthermore, affordance concepts are identified, which can be defined along similar lines as goal-based concepts, which will be the focus for future research.

Natural Language Processing

Report by Sien Moens
Katholieke Universiteit Leuven

The session on Natural Language Processing hosted three interesting papers.

The first paper by D. Prescher, R. Scha, K. Sima'an and A. Zollmann (*What are Treebank Grammars?*) and presented by the first author gave a very systematic overview of parsing/disambiguation systems in natural language among which are Treebank grammars, i.e., probabilistic grammars directly acquired from annotated corpora. The authors clearly showed that Treebank grammars based on sufficiently rich grammar formalisms can closely approximate arbitrary parse-tree probability distributions at the cost of a grammar that is large when the training corpus grows. Probability estimation by means of frequency counts will never be an adequate predictor for future utterances due to the fact that new words and new syntactic combinations keep appearing when the corpus grows. These phenomena justify the use of smoothing techniques within the scope of estimation theory, i.e., reserving probability mass for the unseen events and redistribute this mass on the basis of various heuristics.

The second paper was presented by Sander Canisius and co-authored by Antal van den Bosch and Walter Daelemans. It made a relevant comparison between discrete and probabilistic sequence classifiers for named-entity recognition (*Discrete versus Probabilistic Sequence Classifiers for Domain-specific Entity Chunking*). In named-entity recognition tasks a sequence of words (e.g., in a sentence) is very often mapped to a sequence of semantic classes. One can take here two approaches. In a windowed, discrete approach each word is classified in isolation based on its contextual features found in a surrounding window (e.g., by using a memory-based or a decision-tree learner). However, it is also possible to compute the most likely sequence of classifications to be assigned to the whole sequence of words (also called context-dependent classification, e.g., by using a maximum entropy Markov model or conditional random fields), where often class-dependency is restricted to the previous state in the Markov chain. Very interestingly, the results on the GENIA biomedical dataset and on general medical encyclopedic texts show no significant difference between the two approaches computed in terms of classification recall, precision or their combination in the F-measure.

The last presentation of this session, *A Cross-Language Approach to Historic Document Retrieval* by Marijn Koolen (presenter), Frans Adriaans, Jaap Kamps and Maarten de Rijke discussed retrieval from an historic collection (here 17th century Dutch law texts) by means of queries in current Dutch. Modern language queries are not very effective for retrieving historic sources, but the retrieval results for a set of 25 topics could be substantially improved by translating the historic words in the corpus into their modern counterparts. The authors successfully and automatically acquired rules for this rewriting, for instance, based on matching phonetic transcriptions of historic and modern words, aligning the words' vowel and consonant sequences and learning rules for their spelling differences. This paper was also presented at the 2006 European Conference on Information Retrieval.

Robotics

Report by Jaap van den Herik
MICC-IKAT

The session on robotics consisted of four lectures, each with a different focus on the robotics theme. The lectures were to the point, well prepared, and arose some fruitful discussion.

The first lecture was titled *A Computational Model of Intention Reading in Imitation* by Bart Jansen (Vrije Universiteit Brussel) and Tony Belpaeme (University of Plymouth). The lecture was given by Bart Jansen. He explained the concepts *imitation* and *intention reading*. The ideas originated from psychology and the computational model has been developed accordingly. It contained three features: (1) the imitating agent needs repeated trials, (2) the imitating agent needs a learning method, (3) there is no external measure: the attempted imitation was assessed by the demonstrator. Of course, at this point several measures were introduced for measuring the quality. Four experiments were described and the conclusion was that "the quality of the imitative attempts improves as the demonstration of a limited set of behaviours is repeated".

The second contriubution was by Arnoud Visser, Jurgen Sturm and Frans Groen (Universiteit van Amsterdam), titled *Robot Companion Localization at Home and in the Office*. The regular visitor of BNAICs knows that the group of Frans Groen is specialised in *vision* and in particular in *localization*. Previously, localization was a topic in large environments, later on it was focussing on one building, where it may play an important role in rescuing situations. In the current contribution the idea of localization was confined to the awareness of the Aibo robot of its place in a room or in an office. The Aibo starts its orientation by spotting the walls of the room and storing colour transitions as well as angles formed by the walls. Other fixed points are also taken into account. Some of the techniques described are adopted from the RoboCup project. A reference to SLAM (Simultaneous Localization and Mapping) makes clear what ideas are involved. The new element in the contribution was in "position estimation with panoramic localization". During the lecture several experimental settings were shown and the public was convinced that "as the training on a single spot can be completed in less than one minute on a Sony Aibo in an arbitrary place, robot research can move outside the laboratory into non-prepared places".

The third contribution was titled *Active Object Detection* by Guido de Croon and Eric Postma (Universiteit Maastricht). De Croon is known for his interactive lectures; he always has a challenging question for the public, or starts with showing a kind of puzzle sheet. In Namur that was the case too. In particular the notion of *active scanning* was explored in this way. Active scanning is characterized by using the feature extractions to constrain the further scanning processs in order to detect the object as efficient as possible. The application domain was licence plate recognition. The experiments were telling; the new method achieved a performance of 91.75 per cent. So, the conclusion was that active scanning will be a viable alternative to passive scanning.

The fourth lecture was titled *Formal Analysis of Damasio's Theory on Core Consciousness* by Tibor Bosse, Catholijn M. Jonker and Jan Treur. Bosse and Treur are with the Vrije Universiteit Amsterdam. Jonker recently changed from the Radboud University Nijmegen (in the proceedings) to the Delft University of Technology. The lecture was given by Catholijn Jonker. The proceedings contain an abstract only, since the paper has been published in full in the ICCM '06 (7th International Conference on Cognitive Modelling). The topic that was mainly addressed was Damasio's notion of *(consciously) feeling a feeling*. With such a topic in an AI environment it is no wonder that a stimulating and enthusiastic discussion arose. As session chariman it was my duty to stop the session in time, which was a pity. The advantage, however, was that during the break for many participants the topic of the coffee talk was established. The session as a whole was considered to have achieved its goals: a fruitful exchange of ideas.

Session on AI History

Report by Edwin de Jong
Utrecht University

The final session of the first day, somewhat mysteriously titled Session on AI History, consisted of a discussion forum on the current position of Artificial Intelligence research; what has AI achieved in the past, where do we stand, and most importantly: to what extent can artificial intelligent systems be realized, and how should research proceed to achieve this?

The panel and public were quite fortunate, in that Donald Michie, who was one of the invited speakers, was present to join the discussion panel. Michie is one of the founding fathers of artificial intelligence, and has received numerous awards. As a personal friend of Alan Turing in the period when his ideas on artificial intelligence were shaped, Michie had many interesting thoughts and memories to share with the audience on his personal perception of the history of artificial intelligence. Moreover, as he also showed in his invited lecture, at the age of 83 he is still infected with a youthful enthusiasm for artificial intelligence research.

In addition to Michie, the panel consisted of Nick Jennings, who was also an invited speaker; Walter Daelemans; Frans Groen; Bert Kappen; and Jaap van den Herik. This panel formed an excellent basis for a discussion on artificial intelligence, as soon became clear; the panel members were not afraid to express their standpoint and defend it, leading to a lively discussion. Some key topics that featured in the discussion included A*, reinforcement learning, real world systems, inductive logic, machine knowledge, the merger between symbolic and subsymbolic approaches, pattern recognition, and the ability of a machine to understand and explain its own behavior, rather than just choose its actions.

Panel discussion on the history of AI. From left to right: Edwin de Jong (panel chair), Walter Daelemans, Bert Kappen, Jaap van den Herik, Donald Michie, Nick Jennings, and Frans Groen.

As a take home message, attendants of the discussion received Michie's advice to read the final section 7 of Turing's 1950 paper, which may hold the key to one day achieve the holy grail of artificial intelligence.

Links: Donald Michie:
http://www.aiai.ed.ac.uk/~dm/dm.html
Alan Turing: http://www.turing.org.uk/turing/

Industry Track well Received

Report by Kees Nieuwenhuis
DECIS Lab

The innovative character of AI research is also noticeable in the programming of the yearly BNAIC Conference. This year's conference, in Namen, Belgium, presented the try-out of a new element: the BNAIC Industry Track. The idea of this track is to invite a sponsor from industry (or close to industry) to sponsor and organize a track that focuses on non-research topics that affect the AI community.

The 2006 version of the Industry Track featured 6 invited speakers that were asked to present and defend a statement in a short presentation of about 6 minutes. The central theme for these statements was: Differences and Resemblances between Industrial and Academic Research. After their presentations, the floor was opened for a short debate with the AI community members present to find out which statements are supported and which are not.

Invited speakers this year were:

- Prof.dr. Ann Nowé, Vrije Universiteit Brussel, and her statement is: *Applied Research, a contradictio in terminis?*
- Dr. Antal van den Bosch, Tilburg University, with his statement: *There is a genuine gap between AI research in academia and industry caused by the constraints of application domains. Academic research does not want to be bounded by constraints; industry is necessarily bound to their clients' domains.*
- Hans Abbink, director of Almende B.V., with his statement: *Work on intelligent systems, not intelligent agents.*
- Michel Vandenbossche, director of Mission Critical IT, with his statement: *Many IT projects fail because of lack of formalization of business knowledge and the key role of Logic and thus AI is undermined by market pragmatism. IT teaching at our academic institutes should therefore stress, from the very beginning, the importance of formal representation of knowledge instead of programming.*

- Prof.dr. Jaap van den Herik, Universiteit Maastricht, with his statement: *Applied Research has the future! And as a direct consequence the captains of industry must be involved in establishing the national research agenda.*
- Dr. Kees Nieuwenhuis, Thales Research & Technology and DECIS Lab: *For national and international subsidized research programs the funding for universities and industries should be the same: 100%.*

The general conclusion from the debate is that there is value in the differences between the two research approaches, but more effort in bringing them closer together will definitely have a better pay-off.

The 2006 SKBS Prize

Jaap van den Herik
Director of SKBS

The Foundation for Knowledge Based Systems (SKBS) continued its policy of awarding the SKBS prize to the best demonstration of the Demo-session of the BNAIC 2006. The referee committee consisted of Jaap van den Herik (chair), Pierre-Yves Schobbens, Catholijn Jonker, Kees Nieuwenhuis, Antal van den Bosch and Mathijs de Weerdt.

The referee committee had to consider six submissions which were eligible for the SKBS Prize. In Table 1 we list them by author (in the order of the two programme sessions).

(1)	Gerald de Jong. *Darwin at Home.*
(2)	Karen K. Fullam, Tomas Klos, Guillaume Muller, Jordi Sabater-Mir, K. Suzanne Barber, and Laurent Vercouter. *The Agent Reputation and Trust (ART) Testbed.*
(3)	Han Noot, Koye Somefun, Tomas B. Klos, Valentin Robu, and Han La Poutré. *Visualization of Agent-Mediated Bargaining over Bundles of Goods.*
(4)	Marjolein van Gendt, Antoine Isaac, Lourens van der Meij, and Stefan Schlobach. *Faceted Access to Heterogeneous Cultural Heritage Collections using Semantic Web Techniques.*
(5)	Stefan Raeymaekers. *Demonstration of Wrapper Learning for Information Extraction Using (k,l)-Contextual Tree Languages.*
(6)	Marion Verduijn, Niels Peek, Peter Rosseel, Evert de Jonge, and Bas de Mol. *Procarsur: a System for Prognostic Reasoning in Cardiac Surgery.*

Table 1: The 2006 candidates of the SKBS prize.

Up to 2005 we organized this Demo-session as an industrial exhibition and the referee committee then interviewed the demo-presenters one after another. They did so together with the visits of the interested participants of the BNAIC. In Brussels 2005 we changed the procedure. There were two pre-sessions in which poster-presenters and demo-presenters were allotted three minutes to give an overview (in practice it was an overview of an overview) of their work. This turned out to be a great success and was repeated in Namur albeit in another setting, viz. as a kind of regular session. The performances of the six presentations were attended by a large audience and after every presentation there was a lively discussion (of five minutes). Gerald de Jong (the SKBS Prize recipient of 2005) started the series of presentations with *Darwin at Home*. He again made a good impression. His demo was a very good demonstration of moving and growing creatures, it was educative and was an improvement of his last year demonstration. In some respect he had the same particular position as last year (namely emphasising the educative nature of the demo), but now the competition in the field of demos (not research tools) was larger. The referee committee had a difficult task, since three programs turned out to be eligible for the prize. There were many pros and cons, and the opinion of the members went forwards and backwards. The verdict should come from a voting by writing down the precise evaluation of the three candidates. This procedure took place and led to a clear winner.

Handing out the SKBS Best-Demo Award.

Marion Verduijn *et al*. received the SKBS prize. The committee's judgement was based on (a) the quality of the submissions, (b) the originality, (c) the scientific element, (d) the relation with AI, and (e) the applicability (in industry or education). The spirit of the SKBS prize is in criterium (e). The committee assessed that three of the six "demos" were best characterized as very good research tools, but not precisely as an original demo.

In Table 2 we provide an overview of the winners of the SKBS prize so far.

1999 Maastricht M. van Wezel, J. Sprenger, R. van Stee, and H. La Poutré *Neural Vision 2.0 - Exploratory Data Analysis with Neural Networks*
2000 Kaatsheuvel (shared prize) E. Zopfi *HKT* G. Schram *LubeSelect*
2001 Amsterdam Alexander Ypma, Rob Kleiman, Jan Valk, and Bob Duin *MINISOM – A System for Machine Health Monitoring with Neural Networks*
2002 Leuven F. Brazier, D. Mobach, and B. Overeinder *AgentScape Demonstration*
2003 Nijmegen Bert Kappen, Wim Wiegerinck, Ender Akay, Marcel Nijman, Jan Neijt, and André van Beek *Promedas: A diagnostic decision rapport system*
2004 Groningen Wouter Teepe *The Secret Prover: Proving Possession of Arbitrary Files While not Giving Them Away*
2005 Brussels Gerald de Jong *Fluidiom: The Evolution of Locomotion*
2006 Namur Marion Verduijn, Niels Peek, Peter Rosseel, Evert de Jonge, and Bas de Mol. *Procarsur: a System for Prognostic Reasoning in Cardiac Surgery.*

Table 2: Overview of SKBS prizes.

AI@uni.lu

Pascal Bouvry, Christoph Schommer, Ulrich Sorger, Leon van der Torre, and Emil Weydert
University of Luxembourg

ILIAS

The University of Luxembourg, with its focus on research, was founded in 2003 and is now expanding fast. While it is presently distributed over three sites, a new common campus will open its doors in Esch Belval in 2011. The Computer Science and Communications research unit is currently located on Kirchberg, next to the buildings of the European Institutions. It encompasses 15 professors, 8 postdocs or senior researchers, and 48 Ph.D. students, which are organized in three labs. The AI-lab is called ILIAS – Interdisciplinary Lab for Intelligent and Adaptive Systems.

ILIAS counts four professors: Pascal Bouvry (evolutionary techniques), Christoph Schommer (information mining and management), Ulrich Sorger (information theory and stochastic inference), and Leon van der Torre (knowledge representation and multi-agent systems).

We are a cross-disciplinary research group combining expertise from computer science, information theory, mathematics, and logic. Our overarching subject is information processing in complex and dynamic environments given limited resources and incomplete or uncertain knowledge. We investigate the theoretical foundations and the algorithmic realizations of systems performing complex problem solving with a high degree of autonomy, i.e., intelligent, and exploiting learning to deal with opaque and dynamic contexts, i.e., adaptive.

These subareas are characterized by multiple cross-fertilizations, e.g., information-theoretic or evolutionary methods for information mining, or logical frameworks for multi-agent systems and stochastic inference, to name just a few.

The three laboratories of the CSC research unit are reflected in the specializations in the master in computer science, and intelligent systems is therefore one of the specializations for master students in computer science.

PARALLEL AND EVOLUTIONARY COMPUTING

The team of professor Pascal Bouvry is researching on parallel and evolutionary computing, in particular how different species may co-evolve featuring different individuals taking local decisions while ensuring global objectives (e.g., search and

optimization). This target is approached through various facets like loosely coupled genetic algorithms, distributed immune systems, and the iterated multi-players prisoner dilemma. The main application domain of this team is security, trust and reliability, for example, cryptology, intrusion detection, and reliable scheduling and routing on new generations of networks such as p2p, ad-hoc, and hybrids.

The team is currently composed of one senior researcher (post-doc) and seven Ph.D. students. Cooperation with key academic partners like the Polish Academy of Sciences, Ecole des Mines de Saint-Etienne, University of Le Havre, University of Malaga , University of Metz, is achieved through co-supervision of Ph.D. students, exchanges of researchers/trainees, lecturing and joint projects. Major projects are undertaken in collaboration with other research units, e.g., the laboratory of Algorithms, Cryptography and Security (LACS) in the faculty of law and economics, public research centers, for example the CRP Tudor, and industrial partners, including SUN micro-systems, KBL, CETEREL, P&T, and Telindus.

ADAPTIVE DATA MINING AND INFORMATION MANAGEMENT (MINE)

The team of Christoph Schommer concerns both with the intelligent processing of massive data streams that is continuous, fluent and potentially infinite and the dynamic management of information that comes out of it. Whereas more traditional static processing systems refer to data collected in the past, the research interests of MINE focus on the explorative discovery of data streams through adaptive learning algorithms, novel dynamic management concepts for discovered patterns and relationships, and its presentation.

Currently, the MINE group consists of several doctoral, master and (external) diploma students. We work on the generation of associative and adaptive mindmaps, on a novel (bio-inspired) computer network protection system, and on future streaming concepts, for example on the individual information retrieval in web-data streams or on the adaptive modeling of conviviality in digital cities (together with the City of Luxembourg/e-city). A forthcoming research topic is the dynamic analysis of text streams for the detection of indicators that may cause plagiarism in texts. Contact: http://mine.uni.lu/

INFORMATION THEORY AND STOCHASTIC INFERENCE

Basic areas of competence of the team of Ulrich Sorger are probability, information, and coding theory. The main directions are decoding of error control codes and stochastic interference, where the decoding of error correcting codes can be considered as a stochastic inference problem respectively the inversion of a stochastic map. Recent results show that encoding / decoding techniques exist that perform well close to theoretical limits. The team investigates these techniques and their applicability to other stochastic inference problems.

Network Traffic Modeling concerns the development of stochastic network traffic models which can help to improve performance of data transfers and network security. The aim is to use these network traffic models to derive useful conclusions from the monitored traffic concerning local congestions, localization of spam sources or denial of service (flood) attacks. Particular attention is focused on elaboration of a new approach to the detection of local network congestions based on spectral analysis of multivariate stationary processes. Current members of the team are Foued Melakessou and Tomasz Ignatz (Ph.D. students) and Zdzislaw Suchanecki (senior researcher).

KNOWLEDGE REPRESENTATION AND MULTI-AGENT SYSTEMS

The team of Leon van der Torre studies the use of logic for knowledge representation and multi-agent systems. The work on multi-agent systems is driven by the development of the Boella-van der Torre model of the game-theoretic approach to normative multi-agent systems, based on input/output logics and the BOID architecture, with applications in trust, virtual communities, electronic commerce and security. Gabriella Pigozzi is working on issues in knowledge representation such as revising and merging beliefs and norms, and the relation with social choice theory.

Emil Weydert and Jonathan Ben-Naim are working on the logic of trust for cognitive agents in science, which calls for a bundling and extension of these formal tools for qualitative and quantitative approaches to knowledge representation and inductive reasoning, as well as to model the dynamics of complex epistemic states in the context of multi-agent systems. This is done in the context of the TRIAS project in collaboration with the team of Christoph Schommer for the use of text-mining to extract trust information from scientific articles.

OUTLOOK

The University of Luxembourg has recently defined seven research priorities in its four-year plan for 2006-2009, including research priority P1 on security and reliability. This is therefore the main area for future expansion of the CSC research unit, including several new professor positions and research projects. In ILIAS, we will be studying the

use of AI techniques for applications in the domain of security, trust and reliability.

Ph.D. Thesis: Genetic Process Mining

Ana Karla Alves de Medeiros – Ph.D. student
Eindhoven University of Technology

Process mining targets the *automatic* discovery of information from an event log. This discovered information can be used to deploy new systems that support the execution of business processes or as a feedback tool that helps in auditing, analyzing and improving already enacted business processes. The main benefit of process-mining techniques is that information is *objectively* compiled. Depending on the type of data present in an event log, three different *perspectives* of process mining can be discovered. The *control-flow* perspective relates to the "How?" question (e.g., "How are the processes actually been executed?"), the *organizational* perspective to the "Who?" question (e.g., "Who is handing over work to whom?"), and the *case* perspective to the "What?" question (e.g., "What is the average throughput time of cases for a certain process?"). All these three perspectives are complementary and relevant for process mining. However, *in this thesis we have focused on the control-flow perspective of process mining*.

Control-flow mining techniques discover a process model that depicts possible flows that were followed by process instances in an event log. Because the flow of tasks is to be portrayed, control-flow mining techniques need to support the correct mining of the common control-flow constructs that appear in process models. These constructs are: *sequences, parallelism, choices, loops, and non-free-choice, invisible tasks and duplicate tasks*. In fact, there has been quite a lot of work on mining the control-flow perspective of process models. However, *none of the current control-flow process-mining techniques is able to mine all constructs at once*. Furthermore, many of the current techniques have problems while dealing with another factor that is common in real-life logs: *the presence of noise*. Noise is low-frequent behavior that can appear in two situations: event traces were somehow incorrectly logged (for instance, due to temporary system misconfiguration) or event traces reflect exceptional situations. Either way, most of the techniques are unable to distinguish between high-frequent and low-frequent behavior.

Given all these reasons, we decided to investigate if *it is possible to develop a control-flow process-mining algorithm that can discover all the common control-flow structures while being robust to noisy logs*. We did so by applying genetic algorithms to perform process mining, and we call it *genetic process mining*. The choice for using genetic algorithms was mainly motivated by the absence of good heuristics that can tackle all the constructs, and by the fact that genetic algorithms are intrinsically robust to noise. This investigation resulted in two main contributions: (i) the genetic process-mining algorithms themselves and (ii) the analysis metrics that quantify the quality of the mined models.

Any genetic algorithm has three main building blocks: the internal representation of individuals, the fitness measure and the genetic operators. In our approach, the *internal representation* supports the modeling of all common structural constructs, the *fitness* (i) guides benefits individuals that correctly model the most frequent behavior in the log and (ii) punishes for over-general/specific individuals, and the *crossover and mutation* operators respectively interchange and modify the flow relations between tasks of individuals.

The analysis metrics mainly *quantify* how much behavior two individuals have in common while parsing an event log. We had to develop these analysis metrics because two individuals could model the same behavior in the log, but have completely different structures. Furthermore, because it is unrealistic to assume that event logs are exhaustive (i.e., contain all the possible behavior that can be generated by original models), metrics that would compare the coverability graphs of individuals or metrics based on branching bisimilarity were not applicable anymore.

The results of our experiments and case study show that the developed genetic algorithm mines process models that indeed precisely portray the most frequent behavior of an event log. However, the approach has a drawback that cannot be neglected: the computational time. This happens because the quality of an individual is based on how well it replays the event log.

As a final remark, we highlight that both the genetic algorithms and the analysis metrics are implemented as plug-ins in the open-source tool ProM Framework. This tool can be download at www.processmining.org.

Beyond Ph.D. Theses

Jaap van den Herik
MICC-IKAT, Maastricht

The scope of Artificial Intelligence is as wide as the scope of (Human) Intelligence. Apparently, this holds true for the Ph.D. thesis topics too, in particular when they are AI related. In the list of announcements below, there are many titles and there is a large variety. Moreover, one may wonder why the Editor has included a Ph.D. thesis that has been successfully defended as far back as February 24, 2006. The reason is that the contents is related to AI from the perspective of a psychologist. For any computer scientist who is in AI, the ideas *On the Underlying Mechanisms of Nonconscious Goal Pursuit* may be fruitful to attempt in an actual computer program. I became aware of the existence of this thesis during my summer holidays. The thesis has been published in the "Kurt Lewin Institute Dissertation Series".

Next to psychology and cognitive sciences we see many other domains in which ICT and AI have found applications, such as law, economics, and information systems. The latter topic's focus opened its contents for AI applications, such as data mining and process mining. A nice example of process mining is the thesis by Ana Karla Alves de Medeiros. In this issue (see the above contribution) she informs us on the contents of her thesis, with an emphasis on the control-flow perspective of process mining. We congratulate Ana Karla and Professor Wil van der Aalst (together with Dr. Ton Weijters) with the successful start of a new research dirfection. I am sure that process mining has a bright future.

Our research school SIKS is doing well in this list. With much pleasure I wholeheartedly congratulate all other promovendae and promovendi as well as all promotores and co-promotores with the successes achieved.

Ruud Custers (February 24, 2006). *On the Underlying Mechanisms of Nonconscious Goal Pursuit*. Universiteit Utrecht. Promotor: Prof.dr. H. Aarts (UU).

Remko Tronçon (October 5, 2006). *Techniques for More Efficient ILP Data Mining Engines.* Katholieke Universiteit Leuven. Advisors: Prof.dr. B. Demoen, Prof.dr.ir. G. Janssens.

Boban Arsenijević (October 11, 2006). *Inner Aspect and Telicity*. Universiteit Leiden. Promotor: Prof.dr. G.A.M. Kempen (UL). Co-promotor: dr. C.L.J.M. Cremers (UL). Referent: Prof.dr. A.G.B. ter Meulen (RUG).

Stacey Fusae Nagata (October 12, 2006). *User Assistance for Multitasking with Interruptions on a Mobile Device*. Universiteit Utrecht. Promotores: Prof.dr. J. van den Berg (UU), Prof.dr. M. Neerincx (TUD). Co-promotor: dr. H. van Oostendorp.

A.S. Lim (October 12, 2006). *Power Battles in ICT Standards-Setting Process Lessons from Mobile Payments.* Technische Universiteit Eindhoven. Promotores: Prof.mr.dr. J.M. Smits, Prof.dr. G.M. Duijsters.

Ion Juvina (October 19, 2006). *Development of Cognitive Model for Navigating on the Web*. Universiteit Utrecht. Promotor: Prof.dr. J. van den Berg (UU). Co-promotor: dr. H. van Oostendorp (UU).

Matthijs Spaan (October 20, 2006). *Approximate Planning under Uncertainty in Partially Observable Environments.* Universiteit van Amsterdam. Promotor: Prof.dr.ir. F.C.A. Groen. Co-promotor: dr. N. Vlassis.

Carsten Riggelsen (October 23, 2006). *Approximation Methods for Efficient Learning of Bayesian Networks.* Universiteit Utrecht. Promotor: Prof.dr. A.P.J.M. Siebes (UU). Co-promotor: dr. A.J. Feelders (UU).

M. Birna van Riemsdijk (October 25, 2006). *Cognitive Agent Programming: A Semantic Approach*. Universiteit Utrecht. Promotor: Prof.dr. J.-J. Ch. Meyer (UU). Co-promotores: dr. F.S. de Boer (CWI / LIACS / UU), dr. M. Dastani (UU).

Mark Vluggen (November 1, 2006). *Enterprise Resource Planning Systems: an Empirical Study of Adoption and Effects*. Universiteit Maastricht. Promotores: Prof.dr. F. Moers (UM), Prof.dr. E. Vaassen RA (UM).

Jelle Kok (November 3, 2006). *Coordination and Learning in Cooperative Multiagent Systems*. Universiteit van Amsterdam. Promotor: Prof.dr.ir. F.C.A. Groen. Co-Promotor: Dr. N. Vlassis.

Ana Karla Alves de Medeiros (November 7, 2006). *Genetic Process Mining*. Technische Universiteit Eindhoven. Promotor: Prof.dr.ir. W.M.P. van der Aalst. Co-promotor: Dr. A.J.M.M. Weijters.

Marina Velikova (November 13, 2006). *Monotone Models for Prediction in Data Mining*. Universiteit van Twente. Promotores: Prof.dr.ir. H.A.M. Daniels

(UvT / EUR), Prof.dr. J.P.C. Kleijnen (UvT). Co-promotor: dr. A.J. Feelders (UU).

Laura Hollink (November 16, 2006). *Semantic Annotation for Retrieval of Visual Resources.* Vrije Universiteit Amsterdam. Promotores: Prof dr. A.Th. Schreiber (VU), Prof.dr. B.J. Wielinga (UVA). Co-promotor: dr. M. Worring (UVA).

Madalina Drugan (November 27, 2006). *Conditional log-likelihood MDL and Evolutionary MCMC*. Universiteit Utrecht. Promotor: Prof.dr.ir. L. C. van der Gaag (UU). Co-promotor: dr.ir. D. Thierens (UU).

Valentin Zhizhkun (November 28, 2006). *Graph Transformation for Natural Language Processing.* Universiteit van Amsterdam. Promotor: Prof.dr. M. de Rijke (UvA).

Stefano Bocconi (November 30, 2006). *Vox Populi: Generating Video Documentairies from Semantically Annotated Media Repositories.* Centre for Mathematics and Computer Science. Promotor: Prof.dr. L. Hardman (CWI/TUE). Co-promotor: dr. F. Nack (CWI).

Vojkan Mihajlovic (December 7, 2006). *Score Region Algebra: A Flexible Framework for Structured Information Retrieval*. Universiteit Twente. Promotor: Prof.dr. P.M.G. Apers (UT). Co-promotor: dr. D. Hiemstra (UT).

Bas van Gils (December 8, 2006). *Aptness on the Web*. Rijksuniversiteit Nijmegen. Promotores: Prof.dr. H.A. Proper (RUN), Prof.dr.ir. Th.P. van der Weide (RUN).

Paul de Vrieze (December 13, 2006). *Fundaments of Adaptive Personalisation.* Rijksuniversiteit Nijmegen. Promotor: Prof.dr.ir. Th.P. van der Weide (RUN). Co-promotor: dr. P. van Bommel (RUN).

Niek Althuizen (December 15, 2006). *Analogical Reasoning as a Decision Support Principle for Weakly-Structured Marketing Problems.* Erasmus Universiteit Rotterdam. Promotor: Prof.dr. B. Wierenga (EUR).

Ruben Sietsma (January 10, 2007). *Gegevens–verwerking in het Kader van de Opsporing. Toepassing van datamining ten behoeve van de opsporingstaak: afweging tussen het opsporings-belang en het recht op privacy.* Universiteit Leiden. Promotor: Prof.mr. H. Franken (Universiteit Leiden). Referent: Prof.mr. Y. Buruma (RUN).

INAUGURAL ADDRESSES

In the last two years several appointments to full professor have taken place. One of the academic tasks for the new professors is to deliver an inaugural address. We are pleased to announce three of such addresses below.

Prof.dr. Maarten de Rijke (October 20, 2006). *Levens zoekbaar*. Chair in Informatieverwerking en internet. Universiteit van Amsterdam.

Prof.dr. Guus Schreiber (November 24, 2006). *Over grenzen en grijpbaarheid van kennis*. Chair in Intelligente Informatiesystemen. Vrije Univesiteit Amsterdam.

Prof.dr. Cees Witteveen (January 17, 2007). De prijs van onafhankelijkheid. Chair in Algoritmiek. Technische Universiteit Delft.

ANNOUNCEMENTS

Call for Papers

ICAIL 2007

Eleventh International Conference on ARTIFICIAL INTELLIGENCE and LAW (ICAIL 2007)
June 4 – June 8, 2007
Stanford University
Palo Alto, CA USA
http://iaail.org

ICAIL 2007 will be held under the auspices of the International Association for Artificial Intelligence and Law (IAAIL), an organization devoted to promoting research and development in the field of AI and Law with members throughout the world. ICAIL provides a forum for the presentation and discussion of the latest research results and practical applications and stimulates interdisciplinary and international collaboration. Previous ICAIL conferences have been held biennially since 1987, with proceedings published by ACM.

Authors are invited to submit papers on topics including but not restricted to: legal knowledge-based systems; advanced judicial support systems; conceptual or model-based legal information retrieval; case-based legal reasoning; computational models of legal reasoning and argumentation; representation of legal and related commonsense knowledge; representation of other norm-governed systems (e.g., business rules, organization rules,

security regulations, and rules of order); applications of machine learning to law; automated extraction of information from legal texts; intelligent legal tutoring systems; advanced legal document drafting systems; evidential reasoning with uncertainty; legal applications of knowledge-based electronic commerce; advanced internet legal research aids; knowledge discovery in legal databases; legal XML for integration with information retrieval, document drafting and knowledge-based systems; advanced tools for legal knowledge management; online dispute resolution; modeling norms for multi-agent interaction or electronic institutions; modeling contracts and other speech acts for electronic agents; semantic web applications in the legal field; legal ontologies.

Also invited are survey papers affording perspective on particular areas of recent work and including extensive bibliographies. All papers, however, should make clear their relation to prior work.

Papers on theoretical issues in AI and in jurisprudence or legal philosophy are invited, provided that the relevance to AI and Law is clearly demonstrated.

Papers on applications are welcome; they should describe clearly the motivations behind the project, the techniques employed, and the current state of implementation together with an evaluation of any implementation. Related demonstrations are also welcome.

The International Association of AI and Law will offer a mentoring program for papers being submitted to the ICAIL conference. The program is intended primarily for younger authors who have not published at ICAIL previously. For more details see: http://iaail.org.

ICAIL WORKSHOPS AND TUTORIALS

ICAIL 2007 will include tutorials and workshops on the first and last days. Proposals for tutorials and workshops are invited, and should be sent to the Program Chair. Proposals should contain enough information to permit evaluation on the basis of importance, quality, and community interest. Each workshop should have one or more designated organizers and a program or organizing committee. Proposals should be about 2 to 4 pages. For more information, see the website http://iaail.org.

IMPORTANT DATES

* Mentoring program notice: November 6, 2006
* Mentoring Program deadline: November 13, 2006
* Workshop and tutorial proposals: December 17, 2006
* Submission (optional) of abstracts: December 17, 2006
* Submission of papers: January 14, 2007
* Notification of acceptance: March 12, 2007
* Camera-ready copies: April 18, 2007
* Conference: June 4-8, 2007

SUBMISSION DETAILS

For submission details, see http://iaail.org.

CONFERENCES, SYMPOSIA WORKSHOPS

Below, the reader finds a list of conferences, symposia and workshops, and websites or addresses for further information.

NOVEMBER 7-10, 2006
5th International Symposium on Formal Methods for Objects and Components FMCO 2006. CWI, Amsterdam, The Netherlands.
http://fmco.liacs.nl/fmco06.html

NOVEMBER 29 - DECEMBER 1, 2006
GAME-ON 2006, Technical University of Braunschweig, Braunschweig, Germany.
http://www.ibr.cs.tu-bs.de/news/ibr/game-on-2006/index.html

NOVEMBER 30 - DECEMBER 1, 2006
6th International Conference on Practical Aspects of Knowledge Management, University of Vienna, Austria.
www.dke.univie.ac.at/pakm2006

DECEMBER 4-6, 2006
Second IEEE International Conference on e-Science. Amsterdam, The Netherlands.
http://www.escience-meeting.org/eScience2006

MARCH 28-29, 2007
7th Dutch-Belgian Information Retrieval Workshop (DIR 2007), Katholieke Universiteit Leuven, Leuven, Belgium.
http://law.kuleuven.be/icri/liir/dir2007/

APRIL 17-18, 2007
NIOC 2007 Conference: Het perspectief op lange termijn, Amsterdam, The Netherlands.
http://www.nioc.nl

JUNE 12-16, 2007
9th International Conference on Enterprise Information Systems (ICEIS 2007), Funchal, Madeira, Portugal.
http://www.iceis.org

ADRESSES
BOARD MEMBERS BNVKI

Dr. A. van den Bosch
Universiteit van Tilburg, Faculteit der Letteren
Taal en Informatica
P.O. Box 90153, 5000 LE Tilburg
Tel.: + 31 13 4663117. E-mail: Antal.vdnBosch@uvt.nl

Prof.dr. C. Witteveen (treasurer)
TU Delft, ITS
P.O. Box 5031, 2600 GA Delft
Tel.: + 31 15 2782521. Email: c.witteveen@tudelft.nl

Dr. J.W.H.M. Uiterwijk
Universiteit Maastricht, MICC-IKAT
P.O. Box 616, 6200 MD Maastricht
Tel: + 31 43 3883490. E-mail: uiterwijk@micc.unimaas.nl

Dr. E.D. de Jong
Universiteit Utrecht, Inst. for Information & Computing Science
Decision Support Systems Group
P.O. Box 80089, 3508 TB Utrecht
Tel.: + 31 30 2539049. E-mail: dejong@cs.uu.nl

Dr. M.F. Moens
KU Leuven, Interdisciplinair Centrum voor Recht & Informatica
Tiensestraat 41, 3000 Leuven, Belgium
Tel.: + 32 16 325383.
E-mail: marie-france.moens@law.kuleuven.ac.be

Prof.dr. A. Nowé
Vrije Universiteit Brussel, Computational Modeling Lab
Department of Computer Science
Pleinlaan 2, B-1050 Brussels, Belgium
Tel.: + 32 2 6293861
E-mail: asnowe@info.vub.ac.be

Dr. M.V. Dignum
Universiteit Utrecht, Inst. for Information & Computing Science
Cognition and Communication Group
P.O. Box 80089, 3508 TB Utrecht
Tel.: + 31 30 2539429. E-mail: virginia@cs.uu.nl

EDITORS BNVKI NEWSLETTER

Dr. J.W.H.M. Uiterwijk (editor-in-chief)
Address details: see above.

Prof.dr. E.O. Postma
Universiteit Maastricht, MICC-IKAT
P.O. Box 616, 6200 MD Maastricht
Tel: + 31 43 3883493. E-mail: postma@micc.unimaas.nl

Prof.dr. H.J. van den Herik
Universiteit Maastricht, MICC-IKAT
P.O. Box 616, 6200 MD Maastricht
Tel.: + 31 43 3883485. E-mail: herik@micc.unimaas.nl

M. van Otterlo, M.Sc.
University of Twente, Dept. of Computer Science
P.O. Box 217, 7500 AE Enschede
Tel.: + 31 53 4894111. E-mail: otterlo@cs.utwente.nl

Dr. L. Mommers (section editor)
Universiteit Leiden, Dept. of Meta-Juridica
P.O. Box 9520, 2300 RA Leiden
Tel.: +31 71 5277849. E-mail: l.mommers@law.leidenuniv.nl

Dr. K. Verbeeck (editor Belgium)
Vrije Universiteit Brussel, Computational Modeling Lab
Pleinlaan 2, 1050 Brussel, Belgium
Tel.: + 32 26293724. E-mail: kaverbee@vub.ac.be

Dr. R.J.C.M. Starmans (section editor)
Manager Research school SIKS,
P.O. Box 80089. 3508 TB Utrecht
Tel.: + 31 30 2534083/1454. E-mail: office@siks.nl

Ir. E.M. van de Vrie (section editor)
Open Universiteit Nederland, Opleiding Informatica
P.O. Box 2960, 6401 DL Heerlen
Tel: + 31 45 5762366. Email: Evert.vandeVrie@ou.nl

HOW TO SUBSCRIBE

The BNVKI/AIABN Newsletter is a direct benefit of membership of the BNVKI/AIABN. Membership dues are € 40,-- for regular members; € 25,-- for doctoral students (AIO's); and € 20,-- for students. In addition members will receive access to the electronic version of the European journal *AI Communications*. The Newsletter appears bimonthly and contains information about conferences, research projects, job opportunities, funding opportunities, etc., provided enough information is supplied. Therefore, all members are encouraged to send news and items they consider worthwhile to the editorial office of the BNVKI/AIABN Newsletter. Subscription is done by payment of the membership due to RABO-Bank no. 11.66.34.200 or Postbank no. 3102697 for the Netherlands, or KBC Bank Veldwezelt No. 457-6423559-31, 2e Carabinierslaan 104, Veldwezelt, Belgium. In both cases, specify *BNVKI/AIABN in Maastricht* as the recipient, and please do not forget to mention your name and address. Sending of the BNVKI/AIABN Newsletter will only commence after your payment has been received. If you wish to conclude your membership, please send a written notification to the editorial office before December 1, 2006.

COPY

The editorial board welcomes product announcements, book reviews, product reviews, overviews of AI education, AI research in business, and interviews. Contributions stating controversial opinions or otherwise stimulating discussions are highly encouraged. Please send your submission by E-mail (MS Word or text) to newsletter@micc.unimaas.nl.

ADVERTISING

It is possible to have your advertisement included in the BNVKI/AIABN Newsletter. For further information about pricing etc., see elsewhere in the Newsletter or contact the editorial office.

CHANGE OF ADDRESS

The BNVKI/AIABN Newsletter is sent from Maastricht. The BNVKI/AIABN board has decided that the BNVKI/AIABN membership administration takes place at the editorial office of the Newsletter. Therefore, please send address changes to:

Editorial Office BNVKI/AIABN Newsletter
Universiteit Maastricht, Tons van den Bosch,
Dept. Computer Science, P.O. Box 616, 6200 MD
Maastricht, The Netherlands
E-mail: newsletter@micc.unimaas.nl
http://www.cs.unimaas.nl/~bnvki