NEWSLETTER

BNVKI
AIABN

December 2003
Vol. 20, No. 6
ISSN 1566-8266

BNAIC 2003

Online dispute resolution

Agents in the harbour

News from the Belgium-Netherlands Association for Artificial Intelligence

Quintessential Quiz Questions

Editor-in-chief

Mastermind, *Weekend Millionairs*, *Een tegen Honderd*: they are successful quizzes that captivate television audiences in many countries. The idea is well known: contestants are to answer a number of short questions that have short, straightforward answers. The contestant who answers the most questions correctly wins a large cash prize – or eternal fame. Answering quiz-type questions – also called *factoid* questions – is the current goal of the AI branch called *question answering*.

Previous questions-answering research relied on explicit domain knowledge, which resulted in systems that only worked for specialized domains. With the advent of large document repositories, and especially the Web, a new approach has become possible: exploiting the redundancy that is present in all the documents, using shallow lexical techniques such as stemming and pattern matching. The result is *open-domain* question answering.

Quite a few groups are tackling question answering for the English language, as the 34 participants of the question-answering track at the Text Retrieval conference 2003 showed. For other languages, including Dutch, there is less research activity. Last summer there was only one participant of the pilot question-answering track at CLEF, the European information-retrieval conference. This participant was the Quartz system, built by ILLC at the Universiteit van Amsterdam. Quartz comes in two flavours: Quartz-d for Dutch and Quartz-e for English question answering. Below some typical questions and answers are shown for Quartz-e. Quartz provides a list of possible answers, ranked by confidence or no answer if the confidence is too low.

What is the capital of Limburg?
```
Possible Answers:
Maastricht
```
An easy question to start with, answered correctly.

What does AI stand for?
```
Possible Answers:
Amnesty International
Air India
Amensty International
Indian Airlines
Aircraft Industry
Artificially Intelligent
```
It is no surprise that our preferred answer end up so low at the list; more striking is that it is a adjective instead of the more common noun.

When was the battle of Waterloo?
```
Possible Answers:
Dec. 7, 1815
June 18, 1815
```
The year is correct, but the date is not! The answer should be June 18. Here the principle that redundancy will eliminate wrong answers fails.

The ILLC team found that the main obstacle for Dutch question answering is the lack of data (Dutch Web pages, newspapers) and of a comprehensive Dutch thesaurus. We encourage BNVKI members to participate in Dutch question answering in CLEF 2004 and expect that an increasing interest will lead to more data and a higher level of Dutch question answering.

Quartz was presented at this year's BNAIC in Nijmegen. A short report on the talk can be found on page 142 of this Newsletter. In addition, the present issue contains reports on the BNAIC's general assembly, invited lectures, prizes, and other sessions. Finally, the BNVKI Newsletter Editorial Board would like to congratulate especially the winner of the best paper award: our esteemed Newsletter editor Edwin de Jong. He won both a cash prize and eternal fame!

CLEF: http://clef-qa.itc.it/
Quartz: http://lit.science.uva.nl/~qa/

TABLE OF CONTENTS

BNVKI-Board News

Han La Poutré

In October, we have experienced the fifteenth BNAIC conference. This BNAIC was organised by SNN (Stichting Neurale Netwerken) and held at the KU Nijmegen. Looking back, it can be described as very successful: the organisation was very good, as well as the scientific program with paper presentations and posters. In addition, the invited speakers did some excellent jobs and the number of participants was good. So, thank you, SNN, for the organisation!

At this BNAIC, we held the annual general assembly meeting of the BNVKI. Of course, financial issues were very important here. The current financial situation of the BNVKI asks for substantial measures in order not to run out of capital after a couple of years. It is currently the trend that companies and organisations hardly support newsletters or associations (like BNVKI) any more. Instead, they may be willing to fund specific activities and events, or want a concrete service in return. Therefore, the BNVKI Board has looked more into this direction and developed a number of measures. At the general assembly meeting, the BNVKI Board therefore proposed a package of 4 measures to be pursued in the next years, which as such was accepted by the meeting. If everything works out as planned, we might even have a small profit next year, but otherwise, the budget should at least be controllable. For the details and further backgrounds, I like to refer to the minutes of the General Assembly, elsewhere in this issue of the Newsletter.

Finally, at the general assembly, it was decided that the next BNAIC will be held in Groningen. So, there is already something to look forward to. Maybe we should already think about what we want to submit, since some people say that nothing goes higher than Groningen ("er gaat niets boven Groningen")….

PHOTOS BNVKI NEWSLETTER 20.6

Photos by Bas Obladen (cover and pages 146, 147, and 151) and Floris Wiesman (pages 136, 140, 143, and 150).

Minutes of the BNVKI-AIABN General Assembly

Nijmegen, October 24, 2003

Joke Hellemons
IKAT, Universiteit Maastricht

Agenda General Assembly 2003

1. Opening
2. Minutes of the Previous General Assembly (see Newsletter BNVKI Dec. 2002)
3. Annual Report by Han La Poutré
4. Changes in the Board
5. Financial Report and Establishment of Accounts Committee
6. Financial Future for the BNVKI
7. Plans for Next Year
8. Location of BNAIC 2004
9. Any Other Business
10. Closing

1. Opening

Han La Poutré welcomes the BNVKI members attending the assembly. No changes in the agenda are made.

2. Minutes of the previous general assembly

There were no questions or comments related to the minutes.

3. Annual Report by Han La Poutré

This year showed the usual activities, like the regular appearance of the BNVKI/AIABN Newsletter. The BNAIS in Amsterdam at CWI was very successful. The number of participants (more than 200) was higher than could be admitted and the organization had to disappoint interested students. Lambert Schomaker (RUG) remarks that there were only a few senior researchers attending in Amsterdam. In the spring of 2004 the BNAIS will take place in Maastricht and the board hopes to welcome more senior researchers. Walter Daelemans and Jaap van den Herik are congratulated with their ECCAI fellowship. Furthermore, the BNVKI sponsored the Workshop on AI and Law in Maastricht.

The Board had regular meetings: one in Utrecht in person and several phone meetings.

4. Board Changes

Rineke Verbrugge steps down as secretary of the BNVKI after 5 years. We thank her and will show

our gratitude with a little present. Antal van den Bosch will take over the position of secretary.

5. Financial Report and establishment of accounts committee

Han La Poutré and Cees Witteveen give information on the financial situation of the BNVKI. The final financial overview of 2002 shows a deficit of € 7,000. The main reason for this number is the absence of sponsors in 2002. The accounts committee gave its approval.

For the year 2003 the board hopes to lower the deficit to about € 5,500. The profit of the BNAIC03 might be € 1,000 and NWO supported with an amount of € 4,500.

6. Financial Future for the BNVKI

Agenda points 6 and 7 are combined in the presentation, discussion, and decision. See agenda point 7.

7. Plans for next year

Previous intentions and preliminary agreements for financial funding of the BNVKI by others did not work out. The Board explains the situation and describes the activities of this and the last year.

Printing and sending the BNVKI Newsletter via SIKS did not get a final agreement. The board also contacted other research schools and platforms for funding sections in the Newsletter, but this appeared to be difficult too. However, NWO sponsored the Newsletter in 2003 for € 4,500.

Lambert Schomaker states that sponsoring is one of the most important ways of raising money for the BNVKI. The Board agrees, but thinks that this can mainly be done via activities with a high status and impact, like the BNAIC, or for actually delivering services. The latter is only possible in a limited way, since the BNVKI is not a professional organisation.

The BNVKI is actually (and formally) a *Vereniging* (private association) of private persons, however it is one with high-quality professional activities, like the supervision and organization of the BNAIC and the production of the highly appreciated BNVKI Newsletter. The expenses now related to the Newsletter are only paid by the income of membership fee, (limited) direct funding or via the BNAIC. The BNVKI does not get funding as a professional organisation (like e.g. research schools or universities do).

In general, the trend is that institutions, companies, and organisations do not support newsletters or associations (like BNVKI) any more. Instead they are willing to fund activities and events, or want a concrete service in return. Therefore, the BNVKI Board looks more into this direction. To this end, the board has developed two different scenarios, a 3-package and a 4-package of measures (including or excluding the fourth measure below).

1. SIKS already has a section in the Newsletter. The Board (director) of SIKS is willing to pay € 1,000 in the year 2004.
2. IPN/NWO plans to publish a new magazine, the IPN magazine (IPN: Informatica Platform Nederland). For cooperation between BNVKI Newsletter and IPN magazine, a funding will be given for 2004 and possibly 2005: € 4,500 (tentative agreement). This cooperation is in the form of e.g. using articles and information from the Newsletters.
   The IPN magazine plans to have several sections filled by research schools (like SIKS, IPA), Bsik projects, associations (like BNVKI), and thus to serve as a communication platform for computer science. It is the intention that later on (after 1 or 2 years) the BNVKI Newsletter can be integrated in this IPN magazine together with periodicals of other institutions and associations. This will depend on the status of this new magazine then (like how many others are also participating). Decisions about integration of the BNVKI Newsletter into the IPN magazine will be taken after 1 or 2 years of the above cooperation. Until that time, the BNVKI Newsletter will stay separate. A simultanuously appearing electronic version via the email list (only focusing on specialists like AI researchers) will be investigated then as well.
3. Reduction of the costs of the Newsletter (e.g. printing and postage costs), for about € 500.
4. A service fee per particticipant has to be transferred from the BNAIC to the BNVKI, as the organisation governing the BNAIC and related activities. This is € 30 to € 50, apart from the membership fee per participant. The idea is comparable to what professional organisations like ACM, IEEE, AAAI do with their ‘own’ conferences. This thus does not increase the membership

fee (for private members), but may only increase the BNAIC participation costs or may be compensated by additional sponsoring or funding of the BNAIC (see above). The participation cost is normally paid by the employer (university) and not by the member him/herself. In case of € 30, this contribution could amout to about € 4,500 in total. The idea is to start from the € 30 amount, and maybe use the € 50 amount in case the other measures above do not sufficiently work out.

The capital of the BNVKI was at the end of 2002 € 17,900, is expected to be € 12,400 at the end of 2003 and approximately € 9,000 at the end of 2004 with only the first three measures. Without meausure 4, in three, four years the capital could be vanished. With measure 4 included, the capital of the BNVKI could even slightly increase to appoximately € 13,500 in 2004.

Jaap van den Herik suggests that as an alternative for the fourth measure the organisations pays a lump sum to be able to organize the BNAIC instead of an amount per participant. Enthousiasm in the community should be enlarged and the own responsibility of the organisers is very important. Lambert Schomaker agrees to get more sponsorship from outside and to develop additional efforts to fill the gap. Schomaker is not against adding a fixed fee, however. Han La Poutré says that both alternatives for measure 4 could be used, and both have their own advantages and disadvantages. The Boards weighs the advantages of an amount per participant as somewhat heavier, since a lump sum may scare potential organisors of the BNAIC. However, the suggested lump sum alternative will be considered in the upcoming year while considering and dealing with new organisors for BNAIC 2005 (for BNAIC 2004 in Groningen, there already is an agreement), and this will be evaluated before the next General Assembly in 2004.

The meeting agrees with the 4-package of all 4 measures, with the consideration/evaluation of the lump sum alternative for future BNAIC organisors.

The next account committee will consist of Louis Vuurpijl and Pierre-Yves Schobbens.

8. Location of BNAIC 2003

The next BNAIC will be organized by the Universiteit of Groningen, specifically by Rineke Verbrugge, Lambert Schokmaker and Niels Taatgen. No date is set yet.

9. Any other business

No remarks.

10. Closing

The General Assembly is closed by Han La Poutré, with thanks to all the present BNVKI members.

BNAIC 2003

A Word from the Organization

Tom Heskes and Wim Wiegerinck
SNN, KU Nijmegen

The fifteenth Belgium-Netherlands Conference on Artificial Intelligence (BNAIC 2003) was held on October 23-24, 2003 in Nijmegen. It was organized by SNN and the KU Nijmegen.

In our own biased perception the conference was a big success and we hope the participants feel the same. The number of participants (147) was about the same as last year, despite the fact that there were slightly less submitted and accepted papers. Of the 51 submitted original (A) papers, 8 had been nominated for best paper. The paper *Combining exploration and reliability in coevolution* by Edwin de Jong got the most positive score from the jury, consisting mainly of members of program committee present at the conference, and received the best paper award sponsored by Elsevier. Elsewhere in this Newsletter you can find reports on the different sessions and invited talks as well as on the demos.

Congratulations Edwin de Jong!

Compared to previous years we introduced a few changes. By abolishing the poster spotlights, we could give the oral presentations 25 instead of 20 minutes. Furthermore, in collaboration with the "Learning Solutions" symposium and with support from SIKS and NICI we organized a tutorial on Wednesday morning, a day before the main program. This excellent tutorial on computational game theory by Michael Kearns attracted more than 80 attendants, many of which also stayed for the symposium in the afternoon.

The excellent food arrangements in Leuven last year were obviously impossible to match, but we can say we tried with an interesting dinner at the Waal river bank on Thursday evening.

Last but not least we would like to express our thanks to our sponsors NWO, KNAW, SPSS, KUN, Elsevier, NICI, SIKS, and SKBS, student volunteers, program co-chairs and committee members, session chairs, invited speakers, the BNVKI board, the organizers from previous BNAICs, and all others that helped us out. We wish the organizers of the BNAIC 2004 in Groningen the privilege of receiving similar support and the best of luck.

INVITED TALKS

Computational Learning Theory: A Retrospective

Invited talk by Michael Kearns

Report by Edwin de Jong
CS, Universiteit Utrecht

In addition to the game theory tutorial, Micheal Kearns delivered an invited lecture on the history of computational learning theory. Having been involved in this field since its inception, Kearns was a very appropriate person to give such an overview. The speaker began by reminiscing his visits to the first COmputation Learning Theory (COLT) workshop in Boston in 1988 and the International Workshop on Machine Learning in 1987, which later became the International Conference on Machine Learning now known as ICML.

On an amusing note, Michael Kearns recalled the reviewer comments for his paper at one of these early gatherings: the reviewers suggested replacing abstract variable names such as *x* and *y* by more concrete examples. The speaker readily met this request by using features such as *lives_in_circus* that might apply to a lion, but was relieved that such rather involved notation is no longer required at current machine learning conferences.

The main topics presented in the overview were boosting, learning curves, and COLT in Reinforcement Learning. Most detail was given to the colorful history of boosting, in which the speaker has played an active role. Below, we summarize this overview in a nutshell.

The history of boosting started with an early question in computational learning theory regarding two forms of learning. *Weak learning* refers to methods whose accuracy in predicting to which of two classes an example belongs is only slightly above 50 percent; that is, a weak learner predicts only slightly better than random guessing. In contrast, *strong learners* achieve a high accuracy. The question, posed first by Kearns and Valiant, was whether weak and strong learning might in fact be the same.

Robert Schapire described the first recursive construction for combining many weak learners into a single strong learner. After the first weak learner has learned a hypothesis that is slightly better than guessing, the problem can be adapted such that the first hypothesis does no better than random guessing; this leads to a second hypothesis. The question then is how multiple hypotheses may be combined, so that subsequent weak learners continue to provide additional information. In Schapire's construction, this was done by filtering the training examples so as to focus on examples for which the current hypotheses differ.

While these early developments were of great theoretical interest, they did not immediately suggest practical learning algorithms. However, according to Kearns, Yoav Freund was determined to further the development of such algorithms, and indeed his determination was eventually rewarded. Instead of filtering the distribution of examples, Freund introduced a more practical scheme that reweights the data. After finishing his Ph.D. thesis, Freund moved to AT&T Bell labs, where Schapire was working as well at that time. With joined forces, Schapire and Freund developed the adaptive boosting algorithm called AdaBoost, for which they eventually received the prestigious Gödel Prize in 2003.

Further information about computational learning theory may be found in the following book by Michael Kearns and Umesh Vazirani: *An Introduction to Computational Learning Theory.*

URL:http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=7334

Computational Learning Theory webpage: http://www.learningtheory.org/

Homepage of Michael Kearns: http://www.cis.upenn.edu/~mkearns/

Feature Extraction and Search for Robust Audio Fingerprinting

Invited talk by John Platt

Report by Nico Jacobs
CS, KU Leuven

John Platt, a senior researcher at Microsoft, showed in this last invited talk at BNAIC03 how research and applications can go hand in hand. It all starts with a practical application: despite meta-information such as ID3 tags in mp3 files, many audio files still do not contain the right meta-information. The goal of the application is to identify a song in a database so that meta-information such as the performer and the title of the song can be retrieved. Simple techniques such as exact substring search are not feasible since audio might be re-encoded or distorted in many ways, especially if we are monitoring streaming audio transmitted by Internet radio.

Dr. Platt tackles this problem by identifying two subproblems. The first is to find a robust feature extraction technique resulting for each song in a compact 'fingerprint' which does not change much if you distort the sound signal, but which is still quite different for two different songs. The second is to find an efficient technique to retrieve the best approximation from the database for a given fingerprint. For the first task a technique called distortion discriminant analysis was developed. With this technique a sequence of 300 milliseconds of music is converted into 64 feature values which is robust under distortions such as pitch changes, based on oriented principal component analysis. The constraining problem of this technique is the calculation of eigenvalues, which is the most important reason to apply this on only a relative small sample. But some distortions can make a large portion of this 300 millisecond sample useless. In order to be able to handle this kind of distortions a layered approach was used: the first layer transform a large sequence of sound samples into a sequence of feature values, and then this technique is applied a second time on this sequence of feature values. In this way a 64 value fingerprint is obtained from about 6 seconds of music, in a way that is robust to most distortions.

The approximate fingerprint retrieval problem is solved by redundant bit vectors. It starts from the observation that partitioning techniques such as R-trees are too slow when dealing with retrieving the best approximation in a high dimensional space: they are slower than a simple linear scan.

John Platt.

But performing the latter through a database of more than 250,000 entries is still too slow to run on-line. This is solved with a combination of techniques. The first is approximating the hypersphere with a hypercube that not completely overlaps the hypersphere. This reduces the search space without introducing many false positives. Then the query space is discretised. For each discretised value and each dimension a bit-vector is created. Each fingerprint is represented by an index in such a bit-vector. Then one can find candidate solutions for a query by taking all bit-vectors that overlap with the query and apply a bitwise AND, an operation that can be performed in parallel. This list of candidate solutions, which is much smaller than the original fingerprint database, is then searched with a linear scan using the hyperspheres

in stead of the hypercubes to avoid possible false positives.

More information on the fingerprinting approach can be found at http://research.microsoft.com/~jplatt/abstracts/dda.html. The redundant bit vector approach appears in the Microsoft technical report MSR-TR-2003-38, also available from the homepage of dr. Platt.

The Challenge of Computer Mathematics

Invited talk by Henk Barendregt

Report by Floris Wiesman
IKAT, Universiteit Maastricht

Spinoza-prize winner Henk Barendregt earned world-wide acclaim by computer scientists and mathematicians for his ground-breaking work on lambda calculus. For artificial-intelligence researchers his most interesting work concerns logic and automated theorem proving. In his invited lecture at BNAIC 2003, Barendregt gave an overview of six millennia of mathematics, stressing the evolution to intelligent software that helps the human mathematician.

HUMAN MATHEMATICS

Barendregt stated that three activities are at the heart of mathematics: defining, computing, and proving. In early civilisations (Egypt, Babylon, China) emphasis was put on computing, whereas the Greek emphasized proving. Aristotle (384-322 BC) introduced the axiomatic method: start from primitive notions, which do not need definitions, and then derive their properties. This method turned out to be very successful. Many centuries passed before Hilbert (1862-1943) stated that the essence of the primitive notions did not matter since they were *defined* by the axioms. Mathematics before 1800 only required a dozen basic domains (e.g., various number systems and the Euclidean space). Later a plethora of new spaces was created (e.g., groups and non-Euclidean space). Fortunately all these spaces could be described with Cantor's (1845-1918) powerful set theory. Actually, set theory in some cases is *too* powerful, as it may create mathematical *monsters*. Instead of set theory, the less weaker *type theory* can be used. This theory comes in various flavours with various degrees of permissiveness.

The roots of logic are in the syllogisms (reasoning steps based on syntactical forms) of Aristotle. Only 2300 years later, with the first-order predicate logic of Frege (1848-1925) logic would come to its mature form. First, second, and third-order logics would follow. But then came Brouwer (1881-1966) with his *intuitionism* view: the law of excluded middle ($A \vee \neg A$) causes severe problems. Proof by contradiction is therefore not allowed in intuitionistic mathematics; all proofs must be constructive.

COMPUTER MATHEMATICS

The goal of computer mathematics (CM) is to assist mathematicians with the formulation and construction of proofs. CM is not yet established, but it holds the promise of a tool to develop new mathematics, to reach the highest degree of reliability, and to realize a library of reusable theories. Most of the existing systems (e.g., Coq, Mizar, HOL) have a two-part architecture. The first part is for interactive proof development. It may be big and - as all big programs - may contain bugs. The second part is a proof checker; it checks proofs constructed by the second part. Since this part is small, its correctness can be established by hand. This is called the *de Bruijn criterion*. Starting from a small proofchecker a kind of bootstrapping becomes possible. For instance, a simple version of Coq (satisfying the de Bruijn criterion) has proven the correctness of an overdrive version of Coq (not directly satisfying the de Bruijn criterion).

Henk Barendregt.

At the end of his lecture, Barendregt drew a parallel between the histories of biology and mathematics. Biology first had a romantic phase, where everything that was studied could be seen by the naked eye. With the advent of the microscope – which provided help to see the hardly visible –

biology became *cool*. Now, the electro-microscope even visualizes the invisible: *supercool biology*. Mathematics sees a similar development: the mathematics that is fully comprehensible for humans is *romantic mathematics*, CM tools such as Coq bring *cool mathematics*, and tools such as overdrive Coq bring *supercool mathematics*.

SESSION REPORTS

SESSION GAMES

Report by Walter Koster
LIACS, Universiteit Leiden

The Games session consisted of three lectures, dealing with role playing games, chess and Sokoban, respectively.

Online adaptation of computer game opponent AI

Pieter Spronck, Ida Sprinkhuizen-Kuyper, and Eric Postma

Pieter Spronck introduced a dynamic scripting technique that can be used by computer opponents in role playing games. In a presentation at BNAIC 2002 the same authors discussed offline learning, before a game is released to the public. They are now concerned with online learning, during actual gameplay.

The new technique modifies the scripts that steer computer opponents during the game to adapt to the tactics of the human player. The scripts should be fast, effective, robust and efficient.

The learning technique uses a rulebase that contains manually designed rules based on domain-specific knowledge. The weights of the rules are adapted after encounters between parties in the game, using reinforcement learning.

Based on experiments with different tactics for the player parties, the conclusion is that dynamic scripting is capable of adapting rapidly to static and changing tactics. It is a promising technique which, with some adaptations, might be used in commercial games. Clearly, the subject is at the heart of AI: learning how to play intelligently in a complex (game) environment.

Using negative emotions to impair game play

Doug DeGroot and Joost Broekens

Doug DeGroot discussed ways to model emotions in game playing, both appraisal-driven and communication-driven. He illustrated his insights with several newspaper reports on the 1997 Kasparov - Deep Blue chess match, where Kasparov admitted to suffering significant emotional distress, even paranoia, as a result of Deep Blue's unexpected behavior.

The authors have therefore developed a general purpose framework that incorporates a computational model of emotions into a self-aware reasoning engine, with a chess-playing agent as prototype. The intent was to explore the use of negative emotional behaviors, such as intimidation, that might impair the game playing skills of the human opponent.

At the basis of the framework is Mehrabian's PAD (pleasure, arousal, dominance) Temperament Model, that embeds emotions as points in a 3-dimensional cube. Using several modules the framework, and in particular its emotional-state manager, allows for the dynamic control of feelings: the agent's behavior is determined based on this emotional state. Purposeful intimidation of the human opponent is included.

Shortest solutions for Sokoban

Wieger Wesselink and Hans Zantema

Wieger Wesselink described a way to automatically solve instances of the well-known Sokoban game. In this single-player computer game a man has to push stones to certain goal spots, where exactly one stone can be pushed to an empty adjacent horizontal or vertical square at a time. Instead of using heuristics, a straightforward exhaustive breadth first search through the state space is employed. Since this space is usually gigantic, first a clever data structure is used, and second so-called dead spots are detected.

The search is implemented by means of binary decision diagrams (BDDs), an efficient way to represent sets containing many states. As the Sokoban game is being modeled as a reachability problem, states are easily represented using boolean variables that keep track of the positions of man and stones. Dead spots are squares from which a stone can never reach a goal square; their detection may substantially reduce the size of the search space; this is done with the same program.

Several push-optimal and move-optimal benchmark problems can be solved in this way. An interesting phenomenon is that though the number of states increases during iterations, the sizes of the BDDs first increase but then decrease.

SESSION VERIFICATION AND VALIDATION

Report by Ton Weijters
TM, TU Eindhoven

In the verification and validation session, three speakers have presented their research: Leendert van der Torre, Tibor Bosse, and Nguyen Tran Sy. In the first presentation, temporal deontic logic is used in a design language for component-based systems. In the second presentation, time logic is used for modeling agent-environment interaction. The subject of the third presentation was the testing of computer programs.

Design by contract; deontic design language for component-based systems

Christophe Garion and Leendert van der Torre

The topic of the first presentation of the session was a new deontic design language. This new design language is useful in the context of the software develop methodology denoted as designing by contract. Design by contract views software construction as based on contracts between clients (callers) and suppliers (routines). However, there is a gap between this theory and software engineering concepts and tools. For example, dealing with contract violations is realized by exception handlers, whereas violations and exceptions are distinct concepts. To bridge this gap, a new software design language based on temporal deontic logic was proposed. It was a nice and clear presentation.

Representational content and the reciprocal interplay of agent and environment

Tibor Bosse, Catholijn Jonker, and Jan Treur

The content of the second presentation was based on a paper presented during a workshop on ‘cognitive modeling of agents and multi-agents interaction’ during the IJCAI’03. The start of the talk resembled an old philosophical debate about the relation between the objects in reality (the ideas of Plato) and our perception of the reality. The solution for the representation debate appears to relate an internal state property to (multiple) states at different points in time in combination with the interactivist approach. This way of representation forms the bases for a formal semantics for agents that operate in an environment. An illustrative example of an agent who tries to learn to open a door was used to explain the approach.

Consistency techniques for interprocedural test data generation

Nguyen Tran Sy and Yves Deville

Efficient and effective testing of the behavior of computer programs is still an important and non-trivial research question. Classical testing approaches can be classified into (i) random test data generation, (ii) symbolic evaluation, and (iii) dynamic approaches. Dynamic approaches start by executing the program with arbitrary test input. This input is then interactively refined. However, dynamic approaches may require much computing time. The main contribution of the third paper in this section is a novel approach (based on consistency techniques) to generate test data for numeric programs (programs with integers, Boolean and float variables) with procedure calls and arrays. Experiments show the feasibility of the presented approach. The presentation was a real stimulus to read the original publication in the ASE01 proceedings.

SESSION EVOLUTIONARY COMPUTATION

Report by Alexander Ypma
SNN, KU Nijmegen

The session comprised three interesting papers on evolutionary computation, two of them addressing two trade-offs encountered in multi-objective evolutionary computation (exploration vs. exploitation, proximity vs. diversity) and one addressing a genetic algorithm for multidimensional quantization. In particular, de Jong demonstrated that practical algorithms for coevolution (which do not need an explicit fitness function to be specified) may be obtained by making use of several interacting subpopulations with different temperature. The 'hot' subpopulations ensure a high degree of exploration, whereas the 'cold' subpopulations act as archives of good solutions, allowing for rediscovery of the high-quality individuals. This novel and significant result was awarded with the BNAIC2003 Best Paper award.

Combining exploration and reliability in coevolution

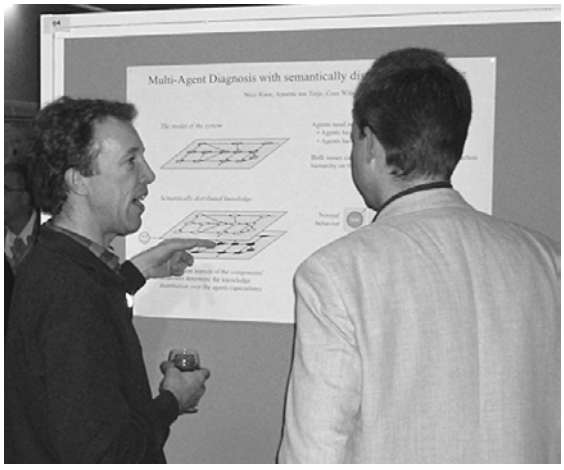
Edwin de Jong

Coevolution can in principle circumvent the difficult problem of designing a fitness function; this may remove harmful biases, and thereby improve search performance. Recently, based on Evolutionary Multi-Objective Optimization, the feasibility of accurate evaluation in coevolution has been demonstrated theoretically. The current

challenge is to translate this theoretical promise into practical algorithms, since an implication of the former feasibility guarantee is that a practical algorithm is likely to reduce the potential for exploration. The author investigates a setup consisting of multiple subpopulations, each with a varying degree of exploration. It is shown that by allowing these subpopulations to interact, the desirable aims of exploration and reliability can be combined.

Evolutionary concept learning with constraints for numerical attributes
Federico Divina, Maarten Keijzer, and Elena Marchiori

This paper proposes two alternative methods for dealing with numerical attributes in inductive concept learning systems based on genetic algorithms. The methods use constraints for restricting the range of values of the attributes and novel stochastic operators for modifying the constraints. These operators exploit information on a subset of thresholds on numerical attributes. The methods are embedded into a GA-based system for inductive logic programming. Results of experiments on various data sets indicate that the methods provide effective local discretization tools for GA based inductive concept learners, though its computational complexity is somewhat larger than competing quantization methods like decision trees and LVQ.



The balance between proximity and diversity in multi-objective evolutionary algorithms
Peter Bosman and Dirk Thierens

Multi-Objective Optimization differs from single-objective optimization in that a multiple of objectives should be optimized simultaneously without an expression of preference for any of the objectives. This gives rise to an inherent trade-off between proximity (closeness to the Pareto optimal front) and diversity (spread of the Pareto optimal front). The authors point out the most important aspects for designing competent Multi-Objective evolutionary algorithms (MOEAs) and present a general framework for this design, where they show how current state-of-the-art MOEAs can be obtained by making choices within this framework. Specifically, they run a current MOEA on several MO optimization problems, where a single parameter is varied that determines the ratio between selection pressure based on proximity and diversity. The expected trade-off between diverse and close solutions is indeed observed in these experiments.

SESSION KNOWLEGE BASED SYSTEMS

Report by Henk Koppelaar
ITC, TU Delft

Situation recognition as a step to an intelligent situation-aware crew assistant system
Quint Mouthaan, Patrick Ehlert, and Leon Rothkrantz

First speaker Patrick Ehlert encountered a false start. The beamer equipment did not operate properly. Due to the congress organization of the BNAIC the beamer operated smoothly shortly thereafter.

Patrick explained his set-up of Quint Mouthaan's flight simulator to enable tracking the cognitive overload of a pilot-at-work. Of course the aim – in the end – is to support a fighter pilot (F16 for instance) in enhancing his awareness of the flight parameters. First things first: measurements on pilots behavior will subsequently follow from Patrick Ehlert's simulator use (next year).

A quantitative analysis of the robustness of knowledge-based systems through degradation studies
Perry Groot, Frank van Harmelen, and Annette ten Teije

Perry Groot continued the session with a talk on quantifying robustness of Knowledge-Based Systems through degradation studies. The use of degradation to such end is the central and novel contribution to such quantification. Degradation requests criteria for quality. In this talk (and paper, which is also to appear in the *Knowledge and Information Systems Journal*) the measure of quality is on recall and precision of output (common measures in information retrieval).

Recall is the fraction of correct answers that the Knowledge-Based system actually computes, whereas precision is the fraction of produced answers that actually are correct. This works. It is exemplified in experiments conducted by Perry Groot.

He concluded that upon delivery every Knowledge-Based system should be endowed with a set of degradation statistics such as explained: it would contribute to the important aspects of systems quality.

Intelligent maintenance scheduling using an expert-driven fuzzy-rule based object quality system

Richard van Duijn, Jan van den Berg, and Mark Vreijling

Jan van den Berg from the Erasmus Universiteit also talked about quality. His measure of quality purported to quality of coating conditon of pylon equipment for high voltage transportation.

He had an extensive application from Rijkswaterstaat: optimally shifting from corrective to preventive maintenance of coating. Departing from a hypothesized quality degradation curve he enthousiastically outlined his model for maintenance planning by fuzzy rule-based quality curves.

SESSION AGENTS I

Report by Mehdi Dastani
CS, Universiteit Utrecht

Game specification in the Trias Politica

Guido Boella and Leendert van der Torre

In the first talk of this session Leon van der Torre presented the paper *Game Specification in the Trias Politica*. This paper is joint work with Guido Boella. The basic idea is that the distribution of powers makes social systems efficient. Based on this idea a multiagent model is proposed in which power is distributed among three types of agents: legistrators, judges, and policemen. The multiagent system includes a fourth type of agents called citizens. The autonomous powers observe the citizens behaviours and deliberate to decide which behaviour should be counted as violation and which violations should be sanctioned. This setting can be considered as a game among agents. The authors use the BDICTL formalism to specify such games and obligations, and to characterize autonomous powers.

Organisational change: deliberation and modification

Catholijn Jonker, Martijn Schut, and Jan Treur

Martijn Schut presented the second talk, which is joint work with Catholijn Jonker and Jan Treur. The title of the presentation was *Organizational Change: Deliberation and Modification*. In this talk, a methodology is explained that aims at modelling organizational changes in terms of deliberations involved in organizations. Organizational changes are processes that allow an organization to adapt its behaviour to changing environmental conditions. Two aspects of organizational changes are discussed. The first aspect is the dynamics within organizations such as interaction between agents and the information exchanged between them. The second aspect is the dynamics of an organization determined by incoming and outgoing agents. This methodology can be used to design and analyze virtual organizations.

Problem solving in a computational society

Nico Roos and Cees Witteveen

The last talk of the session was the presentation of the paper *Problem solving in a computational society* by Cees Witteveen. This paper is joint work with Nico Roos and proposes a new paradigm to analyze the computational complexity of problems in multiagent setting. In contrast to traditional approaches, where the computational complexity of a problem depends only on time and space, this new paradigm considers also the information obtained from other computational entities in the environment that have solved various instances of the same problem. The obtained information, also called computational history, consists of various instances of some problem and its solution. Computational history forms the basis of a new computational complexity class of problems, called h-computable problems.

SESSION PROBABILISTIC MODELS

Report by Uzay Kaymak
FEW, Erasmus Universiteit

Although probabilistic approaches are used in many intelligent systems, this was the session devoted to probabilistic models in BNAIC 2003. It was a well-attended session that included three presentations, two of which were short contributions that had also been published elsewhere. The topics covered included probabilistic models for specific problem types (time series analysis and information fusion) as

well as general issues regarding the updating of probabilities in such models.

Multi-scale switching linear dynamical systems
Onno Zoeter and Tom Heskes

In many real-world problems that generate time series, the underlying system can be considered to operate in various conditions or regimes. In each of these regimes, the system behaves according to different transition models. Onno Zoeter presented a multi-scale switching linear dynamical system approach for analyzing time series in which regimes at different level of detail can be identified. This is particularly useful when the nature of the problem admits a hierarchical organization of different regimes at different levels of detail, such as in monitoring systems with changing focus of attention. Switching linear dynamical systems are notorious for their memory and computational requirements for exact inference. The authors circumvent this problem by proposing an inference algorithm which computes the posterior probabilities approximately.

Gaussian mixture model for multi-sensor tracking
Wojciech Zajdel and Ben Kröse

Tracking a target in time and space is an important problem that appears in various fields. In the next presentation, Wojciech Zajdel described a Gaussian mixture model for tracking an object with the help of distributed and non-overlapping sensors. This problem is characterized by the fusion of information from multiple sensors and the uncertainty that arises when the target is not observed by any sensor at all, (e.g. following a person inside a building from security cameras on different floors). The authors represent the target as a granule in some intrinsic feature space, but the updating of the model parameters also uses dynamic information from the sensors such as time and location data. A propagation algorithm followed by the well-known EM algorithm learns the model parameters. The authors conclude that their approach could outperform the existing Monte-Carlo approaches to tracking.

Updating probabilities
Peter Grünwald and Joseph Halpern

Peter Grünwald gave the final presentation in this session. He discussed the general problem of updating probabilities in a probabilistic model, as new information arrives. Conditioning is often used if the information arrives in the form of an event, but simple conditioning can lead to problems as explained by the presenter. It is argued that naïve conditioning takes place in a too restricted space, which is the source of the problems. In that case, the value of the new information depends on the protocol according to which new information is released. Therefore, one should perform conditioning in a larger and more sophisticated space, where the process according to which new information arrives is taken into account. Dr. Grünwald gave some examples where naïve conditioning works and cases where it does not, also indicating under which conditions that is the case. The lively discussion that followed after the presentation was indicative of the importance that the artificial intelligence community in Benelux attaches to this topic.

SESSION INFORMATION RETRIEVAL

Report by Cilia Witteman
DDM, KU Nijmegen

Event-coreference across multiple multi-lingual sources in the MUMIS project
Jan Kuper, Horacio Saggion, Dennis Reidsma, Hamish Cunningham, Thierry Declerck, Eduard Hoenkamp, Marco Puts, Franciska de Jong, Yorik Wilks, and Peter Wittenberg

The first talk in this session, *Event-coreference across multiple multi-lingual sources in the MUMIS project*, was presented by a very enthusiastic Jan Kuper (UT). The domain of this project is soccer, and the aim is to allow questions of the type: 'Show me the goals by so-and-so in match such-and-such' and then retrieving answers from video material. The texts that are used to extract information about the matches from are from different sources, and Jan showed the audience how they aligned the differences between these texts. Ambiguities and unknowns in one or more texts were resolved by applying plausible rules, such as that a player cannot be both the sender and the receiver of a pass. The talk was clear, and the demonstration went well.

Preprocessing documents to answer Dutch questions
Valentin Jijkoun, Gilad Mishne, and Maarten de Rijke

In the second talk, Gilad Mishne presented work from the ILLC in Amsterdam, about *Preprocessing documents to answer Dutch questions*. He showed the audience what type of questions their QUARTZ system can answer. Examples are Who built the Berlin wall, and What is the real name of Barbie. He then explained how there were five different subsystems or strategies, and elucidated the

differences. The results were promising in this year's Dutch question answering evaluation exercise, although the answer that the Berlin was built by frogs was somewhat strange. (The explanation is that last year a wall was built in Berlin to protect frogs while they cross the road, and that this was frequently mentioned in different sources.)

Integrity and change in modular ontologies
Heiner Stuckenschmidt and Michel Klein

The final talk was not about information retrieval, but it was interesting nevertheless. Michel Klein (VU) talked about *Integrity and change in modular ontologies*. One important reason for modularization is efficiency, which is quite plausible. Michel showed the audience quite clearly how to detect changes and their impact. This line of research seems important when ontologies are not in the same physical location for example. The opposite would be equally important: merging smaller ontologies into one, but that was not Michel's topic.

SESSION AGENTS II

Report by Cees Witteveen
ITS, TU Delft

In this agent session we had three presentations.

Automated negotiation and bundling of information goods
Koye Somefun, Enrico Gerding, Sander Bohte, and Han La Poutré

The first paper, authored by Koye Somefun, Enrico Gerding, Sander Bohte, and Han La Poutré from CWI and the TU Eindhoven, was titled *Automated negotiation and bundling of information goods.*

In a typical bargaining process a customer bargains with the seller by exchanging (counter) offers. Often, customers are allowed to initiate concurrent negotation rounds for the same bundle of goods with different quality. The paper discusses some properties of bargaining strategies in a negotiation process that satisfies a certain fairness property. In particular, fairness is ensured by allowing all customers to have the same opportunities within a certain time frame.

Finally, a decomposition of negotiation strategies into *concession* and *Pareto search* strategies is discussed. Here, the Pareto search strategies aim at reaching agreement as soon as the concession strategy have determined the desired utility level of an offer. By means of computer experiments it can be shown that certain combinations of pareto search strategies for seller and customer are able to produce pareto efficient solutions given a wide range of concession strategies.

Agents, markets, and control: outline of a general formal theory
Hans Akkermans, Jos Schreinemakers, and Koen Kok

The second paper, authored by Hans Akkermans, Jos Schreinemakers, and Koen Kok, titled *Agents, markets, and control: Outline of a general formal theory* was presented by Jos Schreinemaker. The central topic of this paper is a general "market" theorem for agent-based control that integrates results from micro-economic market theory and control theory. Basically, market-based control deals with the problem how to distribute a set of scarce resources over agents that act as local independent controllers and what the local (agent) and global (society) control strategies are.

The central result proven in this paper shows that market-based control is able to deal with scarce resources in a control situation in such a way that the distribution is both locally optimal as well as globally optimal. Moreover, the authors show that for a class of local controllers called PID-control, their results based on a distributed market-based approach can actually also be viewed upon as a recipe for a conventional centralized controller.

Finally, their market-based control approach seems to be a strict generalization of the conventional control engineering approach since, in the absence of resource constraints, market-based control reduces to a collection of independent controllers that behave according the ce-approach.

Intermediaries in an electronic trade network
Floortje Alkemade, Han La Poutré, and Hans Amman

The last paper, *Intermediaries in an electronic trade network* by Floortje Alkemade, Han La Poutré, and Hans Amman, deals with the problem how intermediaries (agents that mediate between customers and producers) can make profit in an information economy.

The approach they follow to solve this problem is by evolutionary agent-based simulations where a trade network game is modelled and consumers have to decide which links they will form to producers or intermediaries.

The first main conclusion from their simulations is that, intermediaries that are experts in finding best price quotes can make profit in economies where consumers can also link directly to producers. Secondly, if the market situation is relatively stable and direct rade is more profitable, intermediaries will be bypassed by most consumers. Finally, if market dynamics are sufficiently complex, many consumers tend to trade through an intermediary.

SESSION MACHINE LEARNING II

Report by Jaap van den Herik
IKAT, Universiteit Maastricht

The session Machine Learning II contained three lectures. They were presented in the Auditorium on Friday, October 24, 2003.

A variational EM algorithm for large-scale mixture modeling
Sjaak Verbeek, Nikos Vlassis, and Jan Nunnink

The first lecture was given by Sjaak Verbeek (Universiteit van Amsterdam). The work was previously published in the Proceedings of the 8th Annual Conference of the Advanced School for Computing and Imaging (ASCI 2003). Verbeek gave a clear exposition of the EM algorithm for Gaussian mixtures (earlier work has been presented at the BNAIC 2001). The current variational EM approach is able to guarantee a speed up by increasing a lower bound on the data-log-likelihood in each step. The framework allows for arbitrary partitioning. A fine and convincing result.

Nonmetric multidimensional scaling: neural networks versus traditional techniques
Michiel van Wezel and Walter Kosters

The second lecture was by Michiel van Wezel (Erasmus Universiteit Rotterdam). He started with an overview of the problem domain and the techniques used. A comparison of their own method (quadiatic programming to estimate the weights) with Krushal's nonmetric phase, Guttman's nonmetric phase, monotone regression by monotone splines, and monotone regression by a monotone network was made. The basic result was that their method performed comparably, but "has the advantage of yielding smooth mappings instead of step functions, which is more plausible and makes interpolation easier".

Supervised locally linear embedding
Dick de Ridder, Olga Kouropteva, Oleg Okun, Matti Pietikäinen, and Robert Duin

The third lecture was presented by Dick de Ridder (TU Delft). He reported on a cooperation with researchers from Finland on work that was previously published in *Artificial Neural Network and Neural Information Processing*, Lecture Notes in Computer Science, Vol. 2714. Their scientific point of departure is the nonlinear dimensionality reduction method LLE (locally linear embedding). They propose a supervised variant of LLE, called SLLE, for an extension of LLE to multiple manifolds. The idea is to retain class separability as well as possible, instead of representing manifolds as well as possible. With experiments they show that simple classifiers trained on SLLE-mapped data can outperform other classifiers on the original data. In the lecture many special cases were dealt with. Moreover, a future research list was given with the purpose to speed up the algorithm.

SESSION COGNITIVE MODELING

Report by Eric Postma
IKAT, Universiteit Maastricht

Production compilation: a simple mechanism to model complex skill acquisition
Niels Taatgen and Frank Lee

Niels Taatgen presented an overview of his work on production compilation within the framework of ACT-R. Production compilation is the generation of task-specific complex procedures from combinations of simple task-independent procedures. In his presentation, Taatgen addressed the complex task of Air Traffic Control. Human subjects acquire their skills on such a task by instruction and practice. During instruction, a supervisor provides instructions to the trainee. Subsequently, the trainee practices with many situations to acquire the required skills. Initially, the trainee is slow and makes many errors. During

training, the task is executed faster and the number of errors is decreased. The ACT-R production compilation models the skill acquisition process as follows. Initially, the instructions are stored into a declarative memory. The interpretation of the instructions interferes with the execution of the task. Hence, the task performance is slowed down. The production-compilation process generates task-specific complex procedures by compiling the instructions and knowledge gained during practicing. The compiled rules enhance the speed and reliability of the task. The results presented by Taatgen showed the power of the ACT-R production compilation to model the pattern of human performance faithfully.

Infant directed speech and evolution of language
Bart de Boer

When addressing infants, adults employ a special kind of speech. Such infant-directed speech differs from normal (adult-directed) speech in that it is slower, more informative and a better articulation. It has been generally assumed that infant-directed speech facilitates the learning of language. Bart de Boer presented the results of two series of experiments performed to investigate the assumption. In the first series of experiments, he presented pre-processed samples of real infant-directed and adult-directed speech to a computer model that learns to recognize vowels appropriately. The experiments showed infant-directed speech to aid the learning of vowels. In the second series of experiments, the role of evolution was addressed. The transfer of complex vowel systems from generation to generation is hampered by their complexity. Infant-directed speech may help to deal with the transfer across generations. The result of the simulations showed this to be the case. The presentation given by Bart de Boer was very inspiring. His simulations complement experiments involving human subjects and offer unique and quantitative insights into the transfer of linguistic knowledge.

Modeling human color categorization: color discrimination and color memory
Egon van den Broek, Maarten Hendriks, Marco Puts, and Louis Vuurpijl

Egon van den Broek presented the results of genuine cognitive-engineering research. In content-based image retrieval, users can perform queries for images containing colours or configurations of colours. Generally, query-by-colour interfaces enable the user to select a specific colour by varying the values of the constituent red, green, and blue components. Van den Broek argued that such an approach is quite unnatural. Humans communicate, remember and identify colours by using colour names. Therefore, a suitable query-by-colour interface should enable the user to use colour names that correspond to psychological colour categories. Van den Broek and his colleagues performed behavioural experiments to compare querying by RGB colours with querying by colour names. Subjects were presented with over 200 colours uniformly distributed over the RGB space. The results of the experiments support the existence of 11 colour categories and that they are used by human subjects to describe RGB colours. In the near future, the insights gained will be translated into effective user interfaces for content-based image retrieval applications.

SESSION AGENTS III

Report by Marc Denecker
CS, KU Leuven

The third session on agents contained three interesting presentations. In fact, the first two of them were candidate papers for the best paper award of BNAIC 2003. Unfortunately for the authors, the winning paper did not come from this session.

A test bed for multi-agent systems and road traffic management
Alexander van den Bosch, Maarten Menken, Martijn van Breukelen, and Ronald van Katwijk

This work was presented by Alexander van den Bosch and Maarten Menken from the Vrije Universiteit Amsterdam, and is based on their graduation project. It was developed as part of the project "Verkeerscentrale van de Toekomst" of TNO, the Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek, which aims at developing a platform for simulating traffic control strategies. In the project, a traffic control system is perceived as a multi-agent system consisting of traffic control units which regulate the inflow of traffic via certain roads. Examples are traffic lights, speed meters, and ramp metering systems. A traffic control strategy is implemented as collaboration amongst these agents.

The presented work consisted of two components. First, a software connection was realised between the Java multi-agent platform Jade and the traffic simulator Paramics used at TNO. Second, as a proof-of-concept, two simulations were implemented in the system. An interesting feature of both simulations is that the traffic control agents are implemented in a rule-based fashion. The agents are executed using the Java rule-based

reasoning engine Jess, which interacts with the Jade system for communication with other agents and with the Paramics system. This makes the system interesting not only as a test bed for traffic control but also as a test bed for integration of different AI-technologies.

Towards data mining in large and fully distributed peer-to-peer overlay networks
Wojtek Kowalczyk, Márk Jelasity, and Gustzi Eiben

Wojtek Kowalczyk, Mark Jelasity and Gustzi Eiben Wojtek Kowalczyk from the Vrije Universiteit Amsterdam proposed techniques for data mining in the context of data values distributed over huge, dynamic peer-to-peer overlay networks. These techniques are based on efficient, robust and scalable distributed algorithms for effectively calculating basic statistics of a distributed data component such as its sum or its mean. The basic idea underlying these distributed algorithms is that all nodes in the network iteratively compute an approximation of the statistic. In each cycle of the algorithm, each node exchanges its approximation with other nodes, using the recently introduced newscast model of computation. This is a scalable and robust epidemic protocol for disseminating information and group membership in peer-to-peer networks. In this protocol, each node at each step communicates information with *n* randomly selected peer nodes. The authors showed that in this way, the approximation computed in each node converges to the real value in an exponentially fast way in the number of cycles of the algorithm. The paper shows also how these basic statistics can be used to gather more complex information such as naive Bayes.

Plan merging: Experimental results
Mathijs de Weerdt, Roman van der Krogt, and Jonne Zutt

The paper was presented by Mathijs de Weerdt from the TU Delft. It presents an algorithm to coordinate the plans of multiple autonomous agents and evaluates it in an experiment for plan merging of taxi companies. In this experiment, each taxi company is seen as an autonomous agent which generates plans to satisfy incoming requests of potential customers. The plan merging algorithm is then used to merge the plans of different taxi companies. This could be useful in a system in which taxi companies can trade customer requests with other companies in order to maximise their own profit. For example, they might sell a request from a customer located far away from any of its taxis to another company with a better located car. The experiment showed that by using the plan merging algorithm, the taxi companies could obtain more than 5 percent reduction of the taxi driving distance, and even 30 percent if customers accept a delay of 15 minutes.

SESSION MUSIC

Report by Nikos Vlassis
II, Universiteit van Amsterdam

The BNAIC'03 session on Music was held on Friday October 24 at the Radboud Auditorium, amidst a snow-covered Nijmegen. The session attracted a lot of attention from the conference participants. It included two very interesting talks, by Nico Jacobs from the KU Leuven, and Taylan Cemgil from the Universiteit van Amsterdam, on the problems of music recognition and transcription. The audience responded actively to the presentations, with interesting questions and discussion afterwards.

A symbolic approach to music recognition
Nico Jacobs, Filip Van den Borre, Lennert Smeets, Evarest Schoofs, and Hendrik Blockeel

Music piece retrieval is an active area of research in information retrieval. When you try to retrieve a symbolicly represented piece of music from a database using a whistled query you face a number of problems. In his talk, Nico Jacobs discussed two of them: normalize both the query and the database items in such a way that their frequency and duration range become comparable, and define a good approximating distance between these normalized sequences. For each of these problems different solutions were proposed and tested on a small real world data set. The primary conclusions were that discretization of the data should be postponed as far as possible in the processing (distances that operated on undiscretized data outperform variants that use classic discretization techniques), the tone of a note is much more informative than its duration (in the experiments there was no further gain in accuracy by providing

additional duration information over providing only frequency information), and the ideal length of a query is about 15 notes.

A dynamic Bayesian network for polyphonic music transcription
Ali Taylan Cemgil, Bert Kappen, and David Barber

When humans listen to sound, they are able to associate acoustical signals generated by different mechanisms with individual symbolic events. The study and computational modeling of this human ability forms the focus of computational auditory scene analysis (CASA) and machine listening. One of the hard problems in musical scene analysis is automatic music transcription: to infer automatically a musical notation that lists the pitch levels of notes and corresponding timestamps in a given performance.

In his talk, Ali Taylan Cemgil presented a model for polyphonic pitch tracking. Their model, described as a form of Dynamical Bayesian Network, embodies a transparent and computationally tractable approach to the acoustic analysis problem. The proposed approach *h* places emphasis on modeling the sound generation procedure. It provides a framework in which both high level (cognitive) prior information on music structure can be coupled with low level (acoustic physical) information in a principled manner to perform the analysis. The model is readily extensible to more complex sound generation processes

SESSION IMAGE PROCESSING

Report by Ben Kröse
CS, Universiteit van Amsterdam

The session consisted of two presentations: one about using AI techniques for image processing, the other on computer vision.

Multi-agent segmentation of IVUS images
Ernst Bovenkamp, Jouke Dijkstra, Hans Bosch, and Johan Reiber

The first paper presented by Ernst Bovenkamp from Leiden University Medical Center, describes a collaborative multi-agent system for finding optimal image segmentation for medical images. Agents have for example to find the vessel, some shadow or some other typical image region. The agents establish interrelations through communication and exchanges interests and capabilities (but not all agents talk to all other agents). A typical agent is built on rules for image processing, communication and conflict resolution. The results of the system are compared with the performance of human experts. In the discussion the issue of uncertainty was raised: how is uncertainty propagated through the system?

Contex-enhanced object detection in natural images
Niek Bergboer, Eric Postma, and Jaap van den Herik

The second paper was presented by Niek Bergboer from the Universiteit Maastricht. The idea presented in the paper is that current object (e.g., face) detection algorithms have to search in the entire image, which is computationally expensive. Niek developed a method in which first appropriate context regions are found after which the object detection can restrict itself to a search in those regions. In the discussion it was asked whether the search for appropriate context regions is not expensive itself, but apparently it is cheaper than searching for the faces.

SESSION MACHINE LEARNING III

Report by Kurt Driessens
CS, KU Leuven

On heuristics for learning model trees
Celine Vens and Hendrick Blockeel

The *Machine Learning III* session was the final, and probably fastest session that was held in the Radboud Auditorium. The session started with a talk given by Celine Vens about the paper *On heuristics for learning model trees* which she wrote together with Hendrik Blockeel. This paper was nominated for the best paper award, and while it didn't win the reward Celine gave a clear and concise presentation of their new node splitting heuristic for regression trees that use linear models

in the leaves. She showed experimental results form both synthetic and real world data sets.

Genetic programming for data classification: refining the search space
Jeroen Eggermont, Joost Kok, and Walter Kosters

The second talk was given by Jeroen Eggermont who presented work by himself, Joost Kok and Walter Kosters titled *Genetic programming for data classification: Refining the search space*. In this work the authors try to reduce the search space that has to be explored by a genetic algorithm that is trying to build decision trees. Although nice results have already been reached, the discussion following the talk generated a large number of possibilities that can still be explored.

Generating artificial data for monotone classification and regression problems
Rob Potharst

With his talk on *Generating artificial data for monotone classification and regression problems* Rob Potharst closed the final session on machine learning. Rob told us that part of the presented algorithms are actually older work he did in context of his Ph.D. thesis, but that since he recently revisited this topic in related work, he decided to publish it now at BNAIC. The two presented algorithms can be used to generate monotone data, with and without an underlying model.

SESSION ROBOTICS

Report by Lambert Schomaker
AI, RU Groningen

Lino, the user-interface robot
Ben Kröse, Josep Porta, Albert van Breemen, Ko Crucq, Marnix Nuttin, and Eric Demeester

The session wisely started in "het Kasteeltje" in the absence of yours truly, who was still submersed in the BNVKI meeting in the main hall. Running through the slippery October snow, I reached the venue where Ben Krose presented his slides on the Lino user-interface robot, which has been developed in the European "Ambience" project in a cooperation between the Universiteit van Amsterdam, Philips Research and KU Leuven. This robust domestic robot is equipped with a number of input channels, perceptual/cognitive modules and output modalities. Using a convenient framework for software development in remote teams, a notable component is the "human awareness module" (not to be misinterpreted as a module emulating human awareness): a set of audiovisual tools to detect the presence of humans. Speech output is accompanied by friendly mechanical viseme patterns for robotic facial expression. An existing psychological model (Ortony, Clore & Collins, *The Cognitive Structure of Emotions*. Cambridge University Press, 1988) was used to translate the current robot state to an expression. Of course, one of the modules concerned localization and navigation. Interestingly, the implementation of the reasoning module was planned on the basis of the modern Belief, Desires and Intentions architecture, but in the end, for understandable practical reasons, CLIPS was chosen: A caveat to those who think that we have progressed further in the field than is actually the case. It was funny to see Ben deal with the relevant but also playful aspects of Lino, in comparison to the usually highly serious facets of robotic research.

Emerging shared action categories in robotic agents through imitation
Bart Jansen, Bart De Vylder, Bart de Boer, and Tony Belpaeme

Bart Jansen, from the Vrije Universiteit Brussel, presented the results for action category learning in embodied agents. A robot arm and a camera were used to explore the dispersion of visually perceived and imitated gestures through a simulated population. The challenging aspect of this concept is the autonomous learning that takes place in the population as a whole. Results show that over generations, the used initiator/imitator approach allows for an increase in the number of gesture categories within the population, while the accuracy of gesture recognition improves. A strong aspect of this model of self organisation is the fact that real-world problems of 3D perception and inverse kinematics for arm control are at the core of the learning task, enabling the emergence of shared action categories in a population. A fruitful paradigm for future research.

Reactive agents and perceptual ambiguity
Michel van Dartel, Ida Sprinkhuizen-Kuyper, Eric Postma, and Jaap van den Herik

Michel van Dartel (Universiteit Maastricht) explores the limits of the perceptual abilities of "internal-stateless" agents which observe a simple time-varying world. While I think that stateless systems are not feasible in the physical world (there is an abundance of physical and physiological inertia) it is true that many problems in an ecological environment can be dealt with in a purely reactive manner, with a minimum of "cognition". The author shows that if there is a sufficient amount of structure in the time-varying environment, a proper perception/action

mechanism will pick it up. Although brute force in the form of MLPs and an evolutionary algorithm is used, the findings are very interesting. After all, even the evolution of simple biological animals takes millions of years. Here, again, many promises for future research.

It was a great pleasure to chair this session which definitely had the athmosphere of a Magritte painting: people talking robotics in a semi-classically painted room while thick snow flakes were falling outside.

SESSION AGENTS IV

Report by Han La Poutré
CWI

In this session, three papers about agent-related topics were presented.

Programming agent deliberation; an approach illustrated using the 3APL language
Mehdi Dastani, Frank de Boer, Frank Dignum, and John-Jules Meyer

The first paper had the title *Programming agent deliberation; an approach illustrated using the 3APL language* (Mehdi Dastani, Frank de Boer, Frank Dignum, and John-Jules Meyer). The paper presented extensions of the 3APL programming language with an additional set of programming constructs to implement the deliberation cycle of cognitive agents. This allowed for separation of concerns with respect to the object-level concerns, related to the mental attitudes of agents, and the meta-level concerns, related to the deliberation processes of agents.

A dialogue game for inconsistent and biased information
Henk-Jan Lebbink, Cilia Witteman, and John-Jules Meyer

The second presentation was on the paper *A dialogue game for inconsistent and biased information* (Henk-Jan Lebbink, Cilia Witteman, John-Jules Meyer). In this presentation, a dialogue game was presented that describes coherent conversational sequences at the speech act level between agents with inconsistent and biased information. To this end, truth-values from a bilattice structure were defined to represent an agent's epistemic attitudes towards the world and the constituents of the dialogue game were presented.

Non-standard reasoning services for the debugging of description logic terminologies
Stefan Schlobach and Ronald Corne

The last presentation was on the paper *Non-standard reasoning services for the debugging of description logic terminologies* (Stefan Schlobach and Ronald Cornet). The focus of the presentation was on the identification of modelling errors when detecting logical contradictions in a knowledge base. In particular, a number of new non-standard reasoning services were presented to explain incoherences through so-called pinpointing. The DICE terminology, developed in AMC Amsterdam, for classification of patients in intensive care medicine, served as a central application instance.

The 2003 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 presentations shown at the industrial exhibition of the BNAIC 2003. The assessment committee consisted of professor Jaap van den Herik (chair), dr. Bert Kappen, drs. Bas Obladen, and drs. Bas Zinsmeister.

The referee committee had a tough time to decide among the six demonstrations. Although the quality was not uniform, originality was a real contender. Are not ideas essential for further industrial breakthroughs? Sure, but following that idea we arrive again in the world of Science and in the core business of the BNAIC. Hence, the number of candidates decreased for various reasons to three.

Wim Wiegerinck.

As a consequence of this selection of three, Bert Kappen withdrew from the committee in order not to decide on an own candidate.

After a full session of deliberation the committee decided in favour of the demonstration called *Promedas: A diagnostic decision support system* by Bert Kappen, Wim Wiegerinck, Ender Akay, Marcel Nijman, Jan Neijt, and André van Beek. A fine characteristic of the system is that it emphasizes on the last 20 percent of difficult cases. In fact, this constitutes a turning point in the expert-system approach, where users previously were satisfied when 80 percent of the cases could be solved by a machine. The remaining 20 percent were then given as a challenging task to the expert human beings. Nowadays, intelligent systems have started to find their way also in this difficult area.

We will see how far they will come in the near future (95% or even more?). Jaap van den Herik handed Wim Wiegerinck the SKBS prize of € 450, the equivalent of the former Dfl. 1.000.

Below 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 for *Neural Vision 2.0 - Exploratory Data Analysis with Neural Networks*
2000 Kaatsheuvel (shared prize) E. Zopfi for *HKT* and G. Schram for *LubeSelect*
2001 Amsterdam (shared prize) Alexander Ypma, Rob Kleiman, Jan Valk, and Bob Duin for *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 for *Promedas: A diagnostic decision rapport system*

It is expected that SKBS will continue its policy of stimulating the development of demonstrations in the future BNAICs.

The Learning Solutions Workshop

A Tutorial on Game Theory by Michael Kearns

Report by Edwin de Jong
CS, Universiteit Utrecht

The program of this year's BNAIC conference started off with an educational element. On Wednesday October 22, 2003: a tutorial on game theory by Michael Kearns, a well-known name in machine learning research. While some tutorials are visited mostly by beginning Ph.D. students, the present topic drew the attention of researchers at all levels, attesting to the prevalence of this topic in current research.

In a classically decorated room at Heyendael Castle, the well-attended tutorial began with a review of different notions of equilibria, distinguished by their various assumptions about communication, coordination, and collusion. When none of these factors are present, the relevant equilibrium concept is the familiar Nash equilibrium, in which no player can profitably deviate from its current strategy given the strategies of the other players. Nash equilibria are not just a descriptive tool, but can also be computed. The computational complexity of algorithms for this depends on the type of the game. For *zero-sum* games, where an increase in payoff for one player implies a decrease for another player, efficient algorithms exist.

Cooperative Equilibria and Evolutionary Stable Strategies were also discussed, but the second part of the tutorial focused on *Correlated Equilibria*. These arise in models for strategic and economic reasoning, which form a special interest of the speaker. Correlations in the choices of players can already result from minimal forms of communication, such as the use by players of shared random information; traffic lights are an everyday example. When modeling the strategic choices of many different parties, a simple table representation quickly becomes infeasibly large. An important question therefore is how structure in networks of interacting parties may be exploited. The rapidly developing field of probabilistic modeling provides powerful methods that can be applied to this question. By exploiting the fact that parties seldom influence all other parties, compact representations of the joint strategy distribution may be obtained. When the networks has a tree-like structure, the NashProp algorithm provides an efficient tool for identifying equilibria.

While this report can only touch on a few of the topics that were addressed, the tutorial itself provided a welcome overview of topics in game theory. The clear presentation and the informedness of the speaker certainly added to this, and we wish to thank the organization for providing this very informative and rewarding tutorial to visitors of the BNAIC.

A Top Performance

Jaap van den Herik
IKAT, Maastricht

The year 2003 outperformed the results of the year 2002 by four Ph.D. theses. In the December 2002 issue of the BNVKI Newsletter we were delighted on the booming series of Ph.D. theses in 2002, namely of 33. Only in 1997 we had reached an equivalent number viz. that of 30. Now, one year later, we surpassed our own record by quite a margin. The improvement is significant. For an adequate overview I would like you to compare the numbers over the years with each other. They are presented in the table below.

After ten years of publication of Ph.D. defence announcements we reached a grand total of 259 announcements on AI-related theses. The announcement section is open to all AI theses and AI-related theses, such as theses from the research school SIKS (including, among others, theses on information systems and on (multimedia) databases). There are also theses from related domains, such as AI and Medicine, AI and Law, and AI and Civil Engineering.

We do not distinguish the Ph.D. defences by domain, but two general remarks are in order. (1) The current results mean that the average is raised from 24.5 per year (over nine years) to 25.9 (over ten years). (2) Our close cooperation with the research school SIKS shows the following increase. In 2001 we had 11 SIKS Ph.D. theses (out of 25), in 2002 it was 17 out of 33. This year (2003) it reads 18 out of 37.

Year	# of Theses
1994	22
1995	23
1996	21
1997	30
1998	21
199	28
2000	19
2001	85
2002	33
2003	39
Grand Total	259

As a courtesy to the Ph.D. students who completed their thesis in 2003 we list them below together with their promotion date.

H. Stuckenschmidt (23-1), J. Broersen (25-2), M. Petkovic (28-2), J. Lehmann (11-3), M. Abolhassani (11-3), B. van Schooten (17-4), D. Klinkenberg (24-4), J.L. Campos dos Santos (4-6), M. Jansen (5-6), D. Tanase (5-6), L.C. Breebaart (6-6), H.W. Nienhuys (18-6), Y. Ran (18-6), C. Bunea (20-6), R.H. Klompé (23-6), M. Wegdam (26-6), R. Kosala (2-7), A. Serebrenik (2-7), L.J. Kortmann (4-7), S. Keizer (3-9), B.P. Kooi (5-9), A. Lincke (17-9), R.J.F. Ordelman (10-10), S.F. Portegies Zwart (15-10), D.N. Jansen (29-10), M. Windhouwer (6-11), J.C. Wojdel (11-11), R. Bunschoten (14-11), A.C. Roth (26-11), C.A.F.M. Grütters (2-12), I.T. Kuz (4-12), J. Heguiabehere (4-12), H.H.L.M. Donkers (5-12), S. Hoppenbrouwers (10-12), C. Monz (11-12), L. Kocsis (11-12), and M. de Weerdt (15-12).

EXPECTATIONS

What are our expectations? First, we should remark that the introduction of the AiO system as performed in the beginning of the 1980s has resulted in a quite substantial increase of Ph.D. defences. This means that the general knowledge part has increased. Second, there are, of course, weak and strong theses, but on the average it is OK. Moreover, among the strong theses there are now and then very strong theses, which have the potential to lead to continued research in the international research environment. The number of such theses and such students is increasing. (For a reason, see below). Third, the stimulating role of the SIKS research school turned out to be very essential in the cooperation of the various

researchers in The Netherlands. Fourth, the BNAIC is an annual success for the young researchers to find their place and to understand what colleagues are doing at other institutions. Based on the current trend and taking into account the four considerations given above, I believe that within five years: (1) the number of the Ph.D. defences per year will be above 50 (i.e., from 37 (2003) to 51 (2008)) and consequently (2) the average number over 15 years will be above 30. A top-performance in itself.

SIKS

As stated above the cooperation between the BNVKI and SIKS has been arrived now at a mutual basis of feeling well. Let us be careful, since the challenge is to keep it there. Still, we expect that in 2004 the relation will grow especially since SIKS will start to support the BVNKI financially with the production of the Newsletter. To encourage the SIKS promovendi (since September 1, 2003 all AiOs are called promovendi) we list the 18 SIKS promovendi below together with their promotores, and the promotion dates.

SIKS Promovendi 2003

2003-01 Heiner Stuckenschmidt (VU). *Ontology-Based Information Sharing in Weakly Structured Environments.* Promoter: Prof.dr. F.A.H. van Harmelen (VU). Co-Promotor: Prof.dr. O. Herzog, (Universität Bremen). Promotion: 23 January 2003

2003-02 Jan Broersen (VU). *Modal Action Logics for Reasoning About Reactive Systems.* Promotores: Prof.dr. J.-J. Ch. Meyer (UU), Prof.dr. R.J. Wieringa (UT), Prof.dr. R.P. van de Riet (VU). Promotie: 25 February 2003

2003-03 Martijn Schuemie (TUD). *Human-Computer Interaction and Presence in Virtual Reality Exposure Therapy* Promotor: Prof.dr.ir.F.W.Jansen. Co-promotor: Dr.ir. C.A.P.G.van der Mast (TUD). Promotion: 3 March, 2003

2003-04 Milan Petkovic (UT). *Content-Based Video Retrieval Supported by Database Technology.* Promotor: Prof.dr. W. Jonker (UT). Promotion: 28 February 2003

2003-05 Jos Lehmann (UvA). *Causation in Artificial Intelligence and Law - A modelling approach.* Promotores: Prof. dr. J.A.P.G. Breuker (UvA), Prof.mr. P.W. Brouwer (UvA). Promotion: 11 March 2003

2003-06 Boris van Schooten (UT). *Development and specification of virtual environments.* Promotores: Prof.dr.ir. A. Nijholt. Co-promotor: Dr. E.M.A.G. van Dijk. Promotion: 17 April 2003

2003-07 Machiel Jansen (UvA). *Formal Explorations of Knowledge Intensive Tasks.* Promotores: Prof.dr. B.J. Wielinga (UvA). Co-promotor: Dr. A. Th. Schreiber (UvA). Promotion: 5 June 2003

2003-08 Yongping Ran (UM). *Repair Based Scheduling.* Promotor: Prof.dr. H.J. van den Herik (UM). Co-promotor: Dr.ir. N. Roos (UM). Promotion: 18 June 2003

2003-09 Rens Kortmann (UM). *The resolution of visually guided behaviour.* Promotores: Prof.dr. H.J. van den Herik (UM), Prof.dr. E.O. Postma (UM). Promotion: 4 July 2003

2003-10 Andreas Lincke (UvT). *Electronic Business Negotiation: Some experimental studies on the interaction between medium, innovation context and culture.* Promotores: Prof.dr. P. Ribbers (UvT), Prof.dr. J. Ulijn (TUE) Co-promotor: Dr. H. Weigand (UvT). Promotion: 17 September 2003

2003-11 Simon Keizer (UT). *Reasoning under Uncertainty in Natural Language Dialogue using Bayesian Networks.* Promotor: Prof.dr.ir. A. Nijholt (UT). Promotion: 3 September 2003

2003-12 Roeland Ordelman (UT). *Dutch speech recognition in multimedia information retrieval.* Promotor: Prof.dr. F.M.G. de Jong (UT). Promotion: 10 October 2003

2003-13 Jeroen Donkers (UM). *Nosce Hostem - Searching with Opponent Models.* Promotor: Prof.dr. H.J. van den Herik (UM). Co-promotor: Dr.ir. J.W.H.M. Uiterwijk (UM). Promotion: 5 December 2003

2003-14 Stijn Hoppenbrouwers (KUN). *Freezing Language: Conceptualisation Processes across ICT-Supported Organisations.* Promotores: Prof.dr. H.A. Proper (KUN), Prof.dr. M.P. Papazoglou (UvT). Co-promotor: Dr. H. Weigand (UvT). Promotion: 10 December 2003

2003-15 Mathijs de Weerdt (TUD). *Plan Merging in Multi-Agent Systems.* Promotores: Prof.dr.ir. H.J. Sips (TUD), Prof.dr. J-J.Ch. Meyer, (UU). Co-promotor: Dr. C. Witteveen (TUD). Promotion: 15 December 2003

2003-16 Menzo Windhouwer (CWI). *Feature Grammar Systems - Incremental Maintenance of Indexes to Digital Media Warehouses.* Promotor: Prof.dr. M. Kersten (UVA/CWI). Promotion: 6 November 2003

2003-17 David Jansen (UT). E*xtensions of Statecharts with Probability, Time, and Stochastic Timing.* Promotor: Prof.dr. R.J. Wieringa (UT). Co-promotor: Dr. J-P. Katoen (UT). Promotion: 29 October 2003

2003-18 Levente Kocsis (UM). *Learning Search Decisions.* Promotor: Prof.dr. H.J. van den Herik (UM). Co-promotor: Dr. J.W.H.M. Uiterwijk (UM). Promotion: 11 December 2003

Moreover, it is with much pleasure that I would like to mention that the current issue contains nine new announcements of Ph.D. theses. As usually the list is composed out of Ph.D. defences that will take place after December 1, 2003. Furthermore the list contains one announcement not listed before (congratulations are due to M. Windhouwer). The list covers a wide range of research subdomains. The BNVKI Editorial Board wishes all Ph.D. students a successful defence.

M. Windhouwer (November 6, 2003). *Feature Grammar Systems - Incremental Maintenance of Indexes to Digital Media Warehouses*. CWI Amsterdam. Promotor: Prof.dr. M. Kersten.

C.A.F.M. Grütters (December 2, 2003). *Asieldynamiek - een systeemdynamische analyse van de Nederlandse asielprocedure (1980 - 2002).* KU Nijmegen. Promotores: Prof.mr. A. Oskamp, Prof.mr. J. Berkvens and Prof. J. Vennix.

I.T. Kuz (December 4, 2003). *An Approach to a Scrabble Wide-Area Web Service*. TU Delft. Promotores: Prof.dr.ir. H.J. Sips and Prof.dr. M.R. van Steen.

J. Heguiabehere (December 4, 2003). *Building Logic Toolboxes*. Universiteit van Amsterdam. Promotores: Prof. dr. D.J.N. van Eijck. Co-promotor: Dr. M. de Rijke.

H.H.L.M. Donkers (December 5, 2003). *Nosce Hostem – Searching with Opponent Models*. Universiteit Maastricht. Promotor: Prof.dr. H.J. van den Herik. Co-promotor: Dr.ir. J.W.H.M. Uiterwijk.

S. Hoppenbrouwers (December 10, 2003). *Freezing Language: Conceptualisation Processes across ICT-Supported Organisations*. KU Nijmegen. Promotores: Prof.dr. H.A. Proper, Prof.dr. M.P. Papazoglou. Co-promotor: Dr. H. Weigand.

C. Monz (December 11, 2003). *From Document Retrieval to Question Answering*. Universiteit van Amsterdam. Promotores: Prof.dr.ir. R.J.H. Scha and Prof.dr. F.M.G. de Jong. Co-promotor: Dr. M. de Rijke.

L. Kocsis (December 11, 2003). *Learning Search Decisions*. Universiteit Maastricht. December 18, 2003. Promotor: Prof.dr. H.J. van den Herik. Co-promotor: Dr.ir. J.W.H.M. Uiterwijk.

M. de Weerdt (December 15, 2003). *Plan Merging in Multi-Agent Systems*. TU Delft. Promotores: Prof.dr.ir. H.J. Sips, Prof.dr. J-J.Ch. Meyer. Co-promotor: Dr. C. Witteveen.

L.J. Hommes (January 26, 2004). *The Evaluation of Business Process Modeling Techniques*. TU Delft. Promotor: Prof.dr.ir. J.L.G. Dietz.

INAUGURAL ADDRESSES 2003

In 2003 we were able to include as a standard part of this section an announcement list of Inaugural Addresses. Previously we published only now and then on the festivities of the official acceptance of a professorship, of the farewell speeches, and the appointments in "higher" bodies such as the Board of University Authorities. Last year we ended with the inaugural address by Professor Lambert Schomaker (RUG, December 10, 2002) and next year we start with the inaugural address of the current BNVKI chair Professor Han La Poutré (TUE, March 26, 2004). In the year 2003, we saw ten inaugural addresses in the field of Artificial Intelligence and related domains. In this issue, we mention explicitly the announcement of the inaugural address of Prof.dr. R.C. Jansen who will work in the field of bio-informatics. As a courtesy to their official acceptance of the professorial task, we list the twelve new professors once more below. Clearly, such a number is hard to improve in the next five years. Future will show what happens.

Prof.dr. R.C. Jansen (December 2, 2003). *Levensecht puzzelen*. RU Groningen.

Prof.dr. L.R.B. Schomaker (10-12), Prof.dr. F.A.H. van Harmelen (13-2), Prof.dr. L. Hardman (2-5), Prof.dr. S. Brinkkemper (28-5), Prof.dr. J.L. Top (13-6), Prof.dr. E.O. Postma (13-6), Prof.dr. Y.H. Tan (26-6), Prof.dr. R. Bakker (19-9), Prof.dr. T.W.C. Huibers (2-10), Prof.dr. E. Proper (10-11), Prof.dr. R.C. Jansen (2-12), Prof.dr.ir. H. La Poutré (26-3-2004).

Finally, I return to my expectations of more than 50 promovendi in 2008. I believe that the talented professors listed above will bring this number within 4 years from now (i.e., 2008) up to above 50 and within 10 years from now up to above 60.

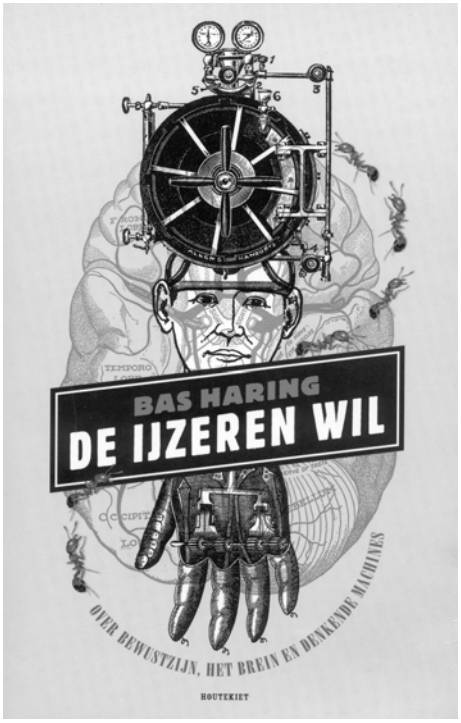
What's in a Name?

Lecture of Bas Haring, DECIS-colloquium

Report by Jeroen de Jong
DECIS

Enriching his talk with easily recognisable everyday-examples, Haring presented his new book, *The Iron Will (De Ijzeren Wil)*. He is an AI-researcher at the Universiteit Leiden, working as coordinator of the new study "Media technology". Still, he finds time to write books for a broad audience. His newest book has the same ambition as his well-received debut *Cheese and evolution theory*, namely bringing academic discussions down to "the man in the street". Given the nature of his public on 6 November (scientists), he appeared to be standing in front of the wrong audience. Or was he?

Haring posed his question "Do machines have a will?", after which he tried to work the audience along 3 lines to his preferred conclusion ('Yes'). Firstly, he said that *words* are only a handy, yet arbitrary, reference to common understandings. A "complex configuration of steel, plastic and filling" was easily recognised by the audience as a 'chair'. But it is only a true reference to that object, because we define it that way.



Secondly, closely following the first point, he asks himself how to define 'will'? The listeners considered different robots brought to their attention (even Furby!) not to have a will. But it's a strange notion: Animals, like parrots rattling their cages for food, were thought to actually have a will. Then how about simple life forms that seem to perform only pre-programmed tasks? Do they have a will? In Haring's opinion, *will* and *pre-programmedness* are not necessarily mutually exclusive things.

Working from the other side, he showed that even pre-programmedness is a broad notion - his third point. John Koza presented a virtual aquarium filled with bloodthirsty sharks hunting for prey. Small fish were put to swim around, and were able to propagate as they lived longer. This evolutionary programming led to smart fish that could stay alive! Their behaviour is untraceable, complex, and it was not pre-programmed by us - it programmed itself. The evolutionary process directed the will of these fish, but is it therefore less a will than ours?

In spite of Haring's popularization ambitions, the discussions during the talk were scientific in nature. But while having drinks afterwards, in every scienctist appeared to live a layman as well. Trying to convince their small groups of listeners with little philosophical experiments-of-mind, they proved Haring's success in this respect, though maybe not from the kind of people he envisioned.

For further DECIS-colloquia (normally each last Thursday of the month, starting at 3 pm), see www.decis.nl/events.

Section Editor
Richard Starmans

ICS / SIKS Symposium on Agent Organizations

January 13, 2004 , Utrecht

Agent organizations are an emergent area of application of MAS that requires interdisciplinary research approaches at different levels of abstraction. Agent organizations demand the integration of organizational and individual

perspectives, the dynamic adaptation of models to organizational and environmental changes, and rely for a great extent on the notion of openness and heterogeneity of MAS. This symposium presents current research on the practical and formal aspects of agent organizations.

PROGRAM

13.00-13.30	Coffee/Tea
13.30-13.45	Welcome by Prof.dr. John-Jules Meyer (UU)
13.45-14.45	Dr. Virginia Dignum (UU): The OperA Model for Organizational Interaction
14.45-15.00	Coffee/Thee
15.00-16.00	Prof. Dr. Carles Sierra (IIIA, Spain): Electronic Institutions and Reputation measures: two complementary ways to build trust
16.00-17.00	Prof. Dr. Liz Sonenberg (University of Melbourne, Australia): Situation awareness: an agent biased perspective
17.00-17.15	Closing by Dr. Frank Dignum (UU)
17.15-18.00	Drinks

REGISTRATION

The symposium is co-organized by the Intelligent Systems Group of ICS, Utrecht University and the SIKS research school. Participation is free of charge, but registration is requested. If you want to participate in the workshop, please send an email before 5 January 2004 to Virginia Dignum, virginia@cs.uu.nl, containing your name and affiliation.

DIRECTIONS

The symposium will be held in de Uithof, Universiteit Utrecht (exact room to be announced). The exact location and directions on how to get to de Uithof can be found in the symposium page: http://www.cs.uu.nl/~virginia/AOSymposium.htm.

SIKS Course Research Methods and Methodology

From February 9 till 11, 2004, the School for Information and Knowledge Systems (SIKS) organizes two basic courses: Formal methods for IKS and Agent Technology. The location will be announced soon. The course will be given in English and is part of the Basic Course Program for SIKS Ph.D. students. Although the course is primarily intended for SIKS Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS Ph.D. students taking the course.

The primary goal of this hands-on course is to enable Ph.D. students to make a good research design for their own research project. To this end, the course contains an introduction to the philosophy of (computer) science and research methodology, but most importantly, it provides interactive training in various elements of research design, such as the conceptual design and the research planning.

The course consists of 5 blocks, spread over three days. A block takes roughly half a day, except block 3 that takes one full (intensive) day.

Students enrolling for this course are asked to submit (a summary of) their research proposal three weeks in advance. This is for three reasons. Firstly, it helps you to prepare yourself for the course, and this will usually increase the value that you will get from it. Secondly, your proposal will be reviewed by one or two senior researchers from SIKS. This review will *not* be a judgment, but consist solely of some questions that perhaps may help you to strengthen your proposal. Thirdly, some of you will be asked to present their research framework during the course (on a voluntary basis of course). Such real-life examples can be very interesting and useful for the whole class, but they will also return value to the presenter.

COURSE COORDINATORS

Dr. Hans Weigand (UvT)
Prof.dr. Roel Wieringa (UT)
Dr. Richard Starmans (UU)

More details on the program and registration will be announced soon. For all questions regarding SIKS-activities, please contact: office@siks.nl

AI EDUCATION

Section Editor
Evert van de Vrie

WIBA: Agents in the Harbour

Eelco Aartsen
Logica CMG

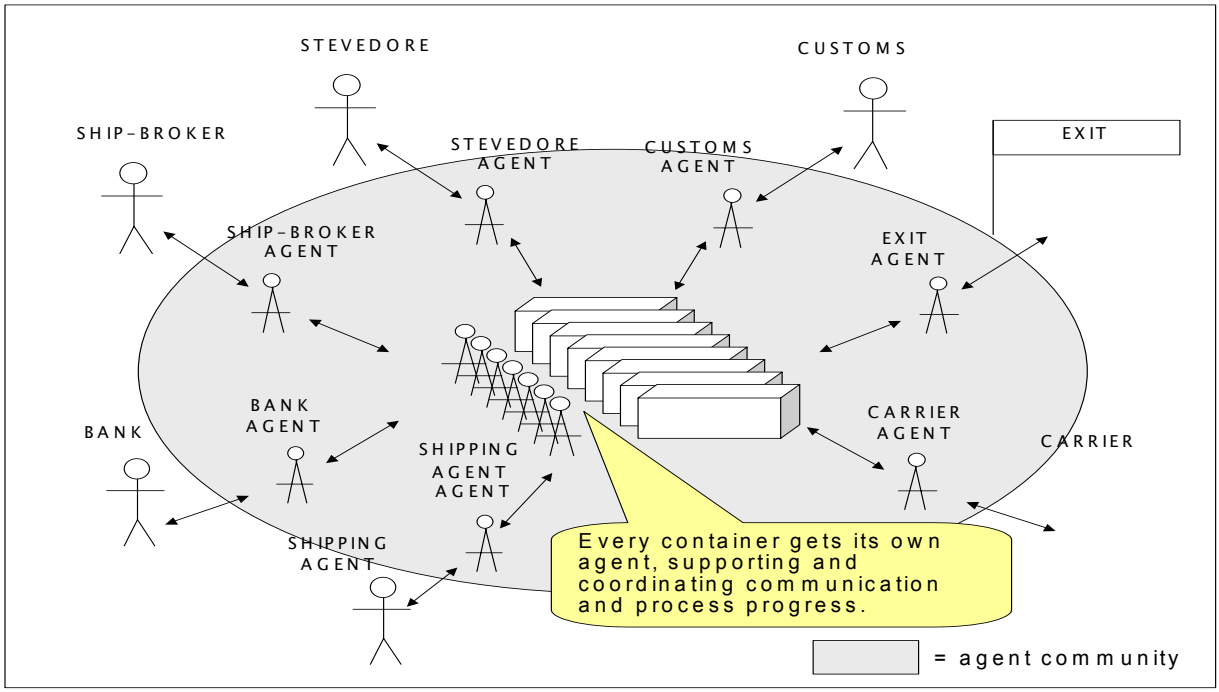
For my M.Sc. in Computer Science at the Open Universiteit I studied Work Item Based Agents (WIBAs). Usually agents are instantiated for roles, machines, individuals or organisational units. Instead, WIBAs are instantiated for every "piece of work", a work item. They are responsible for supporting communication and coordination of the work item. The idea originates from research carried out by LogicaCMG in the Rotterdam container port. There the agents represent the actors in the harbour. Out of that research the idea arose to create an agent for every work item, being a container, shipload or package. The study had to give insight in the (technical) possibilities and constraints of the WIBA.

The process in the harbour is very volatile. Because of laws and regulations it's changing constantly, and almost every container has to be handled differently. Because of this, predefined rules defining how to operate are not possible.

To discover how the WIBA still could support the communication and coordination, a set of Use Cases was written as if the ultimate WIBA already existed. These use cases were analysed and transformed into generic requirements, so that the WIBA could be designed in a generic way. With these requirements a WIBA architecture was designed: every actor in the harbour gets its own agent, and every container gets a WIBA. The micro architecture of the WIBA itself was based on the Belief Desire Intention architecture; the desire of the WIBA is to get the container out of the harbour.

The technical feasibility of the architecture has been investigated by realising a prototype in the Jack agent environment. With this prototype as a basis, the architecture was judged on its capability to meet the requirements. The conclusion was that a WIBA could really support communication in the harbour without knowing the special (and ever changing) rules of the harbour. The WIBA acts as a Virtual File, extended with capabilities like authorization and event handling.

The WIBA as Virtual File also puts minimal demands on the number of participating actors. With two actors the WIBA could already be effective. Because the WIBA decouples the actors, they can maintain their own working procedures. Because of these properties the WIBA-platform can be introduced gradually into the harbour. After



WIBA architecture for the Rotterdam harbour.

implementing the WIBA this way, it can still be extended with more complexity to support the process even better.

The problem of persistency forms the biggest disadvantage of the architecture. If the WIBA collects data it should persist itself somewhere. This calls for hosting machines, and launches security issues. Because of the flexible architecture there are several possibilities to deal with these problems.

The Work Item Based Agent architecture offers a flexible, technically feasible solution for the communication problems of the Rotterdam harbour. It's a solution with a lot of flexibility and generic possibilities. The actors in the harbour can exchange information without the need to adjust their working procedures.

For more information:
Eelco.aartsen@logicaCMG.com

M.Sc. Theses in Section AI Education

Supervisors of remarkable M.Sc. work are invited to ask their student for a short article, to be submitted to the editor of the Section AI Education.

SECTION KNOWLEDGE SYSTEMS IN LAW AND COMPUTER SCIENCE

Section Editor
Marie-Francine Moens

New Forms of Argumentation in Online Dispute Resolution

JURIX lecture by Gerard Vreeswijk, Universiteit Utrecht
October 10, 2003

Report by Floris Bex, Universiteit Utrecht

In some cases it is preferable to settle a civil dispute out of court. For instance, individuals might want to avoid a long and costly legal battle or businesses might want to have a low profile regarding customer complaints. *Alternative Dispute Resolution* (ADR) is commonly oriented towards finding a solution of the dispute that is satisfactory for all parties while trying to preserve a relationship. With the increase of online trading, interest has risen in *Online Dispute Resolution* (ODR) and a number of different applications for the mediation of client to client and business to client disputes have emerged over the years. One of the most successful of these is SquareTrade, a service offered to buyers and sellers who use the well-known eBay online auction site, which has settled around 200,000 cases from February 2000 to February 2002.

There are different types of ODR, namely "direct negotiation" which typically takes place in a virtual room where the parties in the dispute communicate directly when working towards a solution of the dispute, "mediation" where a third party negotiator helps with settling the dispute (usually for a fee), and "arbitration", where the parties agree that the outcome is binding. One can already see some potential problems in these types; for example, the independence of mediators, the enforcement of an outcome in the case of an arbitration, and the language problem. Most of these problems are in fact not specific to ODR, but they are common to all kinds of (online) interaction between people. What remains is what Vreeswijk calls the core of ODR: the art of settling a dispute with a remote adversary.

ARGUMENTATION FOR DISPUTES?

But does this settling of a dispute involve argumentation? If we look at, for example, the ODR application SmartSettle, we see that no argumentation is involved at all. The parties qualify their interests, identify their best and worst possible outcomes to establish a "bargaining range" for each issue and then bargain on the complete package by varying the values of the different dimensions. An algorithm can offer suggestions by sampling the negotiation space that both parties have in common. This makes clear that negotiation is not equal to argumentation; negotiation is about finding a solution that is acceptable for all parties while argumentation is about what is the "truth".

Vreeswijk now asks the question "does ODR actually need argumentation?" According to Vreeswijk, it does, and he illustrates this with an experiment, which was held at the ODR workshop in Edinburgh, UK in June 2003. This experiment involved a role-playing game of a client vs. a sales clerk. The client wants to turn in a discman and a damaged CD. To the client the damaged CD is more important than the discman, although the sales clerk does not know this. The sales clerk, on

the other hand, can give the client a better discman, but he cannot give a non-damaged CD to the client, as the CD is out of stock. The client does not know these facts. These "hidden facts" could not be communicated to the other party, and it turned out that this could be frustrating for the negotiators. The fact that no arguments could be given also significantly increased the time in which the dispute was settled.

Vreeswijk concludes from this experiment that dialogue is needed in negotiation to give reasons for one's choices, motivate proposals and so on. There are, however, some problems with written dialogue. For example, with written dialogue we lose important communication channels like facial expressions and tone of voice. Vreeswijk concentrates on another problem, namely the loss of context and disorientation that occurs when dealing with asynchronous communication (e.g. by mail). According to Vreeswijk, structuring the information that is exchanged between the parties would facilitate the negotiations.

A CASE FOR ODR

Vreeswijk illustrates this with a case study involving Mrs. Janssen, who has bought a microwave. One month later, the microwave is broken. According to Mrs. Janssen, this is due to the fact that the vendor wrongly installed the microwave. The vendor acknowledges this, but argues that Mrs. Janssen misused the stove; she put an unpeeled egg in the microwave and applied the Quick Heat function of the stove for more than 20 minutes, while the manual explicitly states that Quick Heat should not be used for more than 20 minutes. The parties now must negotiate over who should compensate for the damage. According to Mrs. Janssen, the vendor has full responsibility. The vendor says he has limited responsibility, since the customer misused the stove. It is evident that there is no clear solution to this problem, as both parties have made mistakes. Vreeswijk has made a mockup of an ODR client interface which shows all current arguments together with both parties position towards the argument (e.g. "claimed" or "questioned"), whether a consensus has been reached over the argument, the support for the argument and so on. If this mockup were to be developed as a full product and integrated into existing ODR systems, it could be a big help to all parties involved in the dispute, as it provides a clear and precise overview of all the issues involved in the debate.

Vreeswijk concluded his talk with a short summary. Unfortunately there was not much time for an in-depth discussion. Most of the audience acknowledged the importance of structuring arguments like Vreeswijk did. Vreeswijk's original idea was to "exchange ideas with the public on new forms of argumentation that ODR might need", but due to time constraints this was not possible. Nevertheless, the ideas proposed by Vreeswijk about the structuring of arguments are interesting and it would be nice to see a real system that can also compute, for example, the status of arguments automatically.

Automated Red Flag Systems in Support of Claim Fraud Detection

JURIX lecture by Stijn Viaene,
KU Leuven
October 10, 2003

Report by Stijn Viaene
EAE, KU Leuven

Matching the quality label of the trust relationship instilled by traditional face-to-face interaction stands as one of the biggest challenges of global-scale electronic commerce and business, not least because of the overall increased perception of risk. Fraud is such a risk, and a very real one, especially to the concept of insurance and the business of insuring, both of which hypothesize a relationship of utmost mutual good faith between transacting parties. In recent years, the detection of fraudulent claims has blossomed into a high-priority and technology-laden problem for insurers. This was not always the case. Until the early 1980s, the polite way to discuss underwriting and claims settlement fraud was to include them with other potential adverse actions by policyholders and claimants under the rubric of moral hazard. The common thread of all occurrences of moral hazard in insurance is that parties other than the insurer may hold unrevealed information that can materially affect the true size of the risk exposure or accidental loss.

The most effective way to fight fraud is to prevent abuse of the system. This has lead insurers, among other things, to improve their applicant screening facilities, provide special training for front-office and claims handling personnel, invest in specialized investigative skills, intensify communication and cooperation within the industry and between the industry and prosecution and police authorities, and sponsor state or country-level fraud bureaus. Yet, fraudsters always seem to find new ways of exploiting the inertia of complex systems, especially when there is a lot of money

involved. It is then imperative that fraudulent activity is identified at the earliest possible moment, and that cheaters are swiftly tracked down. This way, losses due to fraud are minimized. The use of new technologies (e.g. data warehousing, data mining and high-speed networking) may help to enable this. Moreover, automated types of fraud detection should make it possible to reduce the investigative process lead-time and allow for more optimal allocation of scarce investigative resources.

RED FLAGS

The baseline problem in detecting, and ultimately deterring fraudulent claims is the identification of characteristics that distinguish them from valid claims. Most insurance companies use lists of fraud indicators or flags (most often per insurance business line), representing a summary of the detection expertise, as a standard aid to claims adjusters for assessing (suspicion of) fraud at claim time. These lists form the basis for systematic and consistent identification of fraudulent claims. The increasingly systematic electronic collection and organization of, and company-wide access to, coherent insurance data have made the use of automatic pattern learning techniques for the identification of insurance fraud a valid and worthwhile endeavor. This has stimulated data-driven initiatives aimed at analyzing and modeling the formal relations between fraud indicator combinations and transaction suspiciousness, resulting in the implementation of automated indicator-based fraud screening models.

Early claim screening systems help decide upon the nature of incoming claims as either suspicious or not. This is the basis for routing claims through different claims handling workflows. Claims that pass the initial (automated) screening phase are settled swiftly and routinely, involving a minimum of transaction processing costs. Claims that are flagged as suspicious pass a costly state verification process, involving (human) resource intensive investigation. The screening process, ideally, is designed to take into account these cost asymmetries. Also, as indicative information on the level of fraud suspicion only gradually becomes available during the life of a claim, the diagnostic system ought to follow claims throughout their lives. Cases that raise enough questions during routine processing are referred to specialized investigators, whose task is to try to uncover the true nature of the situation and reach informed judgment through in-depth inquiry. With a strong enough case for fraud the insurer may then decide to dismiss or reduce compensation or even decide to press charges. The final decision on what action to undertake will typically not be made without explicit consultation with senior or qualified personnel (e.g. for balancing prudential against commercial arguments).

FRAUD DISCOVERY THROUGH KNOWLEDGE DISCOVERY

Building an automated claim fraud screen involves a process called knowledge discovery in databases (KDD), which roughly consists of the following phases: (1) business understanding, (2) data understanding, (3) data selection, (4) data preparation, (5) data mining, (6) evaluation and interpretation, en (7) knowledge consolidation. This process typically proceeds in iterations and not in a waterfall-like manner. The data mining phase pertains to the very heart of the effort, i.e. algorithmically learning a fraud detection model from the available data. Ideally, both structured and unstructured data sources are used to construct the model. The ultimate detection model is supposed to be easy and efficient to apply (and re-train), effective at identifying fraud, and capable of providing useful insight into its decisions. In practice, this latter requirement often entails trading off the predictive performance of a powerful black-box model (e.g. a complex neural network) for the simplicity of an understandable and actionable, but less powerful, white-box model. The success of data mining in no small part depends on high-quality pre-processing (phases (1)-(4)), as well as intelligent post-processing (phases (6)-(7)) activities in order to mold the data mining results into effectively useful knowledge for the purpose of day-to-day fraud control. One of the main challenges of KDD remains bringing about a synergistic fusion of knowledge extracted from data and prior domain or expert knowledge in order to produce incrementally significant results.

Case-Based Reasoning in the Law

JURIX lecture by Bram Roth
Universiteit Maastricht, October 10, 2003

Report by Luuk Matthijssen
Knowledge Management and IT Consultant

On 26 November 2003 Bram Roth defended his PhD thesis *Case-based reasoning in the law* at the Universiteit Maastricht. Preceding his defence, he gave a presentation of his research at the Jurix meeting on October 10th 2003 at the Universiteit Utrecht.

REASONING BY ANALOGY

Case-based reasoning is a field of study in AI that analyses human reasoning by analogy. In reasoning by analogy, problems are solved by using knowledge of similar cases that have already been settled. It is believed that this method of reasoning corresponds to the way humans actually learn to solve problems through their own experience. Even more, as explicit knowledge is often represented as case reports, it is also possible to reason by analogy using the experience of others.

In the law this type of reasoning is not undisputed. On the one hand we have the common law tradition in which the principle of *stare decisis* dictates that all legal decisions must be consistent with previous decisions to provide legal security. Previously decided similar cases can be put forward to argue that a current case must be decided accordingly. On the other hand, our continental legal tradition says that legal decisions, especially in penal law cases, must be based on explicit legal rules that are written down in laws. This principle of legality offers legal protection by assuring that the rules can be known to the people that must observe them. Previously decided cases, although they are recognized as a legal source, do not qualify to this demand.

CASE COMPARISON

Bram Roth has developed a formal theory of reasoning by case comparison in the law. He argues that reasoning by analogy is not necessarily an invalid reasoning strategy if the conclusions are qualified as relative to a 'contingent choice' of case factors that are relevant to the comparison with previous cases. To develop his theory Roth divides the process of case-based reasoning into (1) selecting relevant case facts, (2) establishing an analogy between cases, and (3) deciding the case at hand by following or deviating from the decided cases.

The selection of factors that are relevant for case comparison are in Roth's theory 'a contingent choice'. This means that the selection of case factors can be subject of argumentation but the choice must be made consciously and explicitly as to be able to properly motivate and qualify the resulting conclusions. To facilitate reasoning about the analogy of cases he has developed a model of case comparison for which he introduces the notion of 'dialectical support'. Both the case at hand and the decided cases are represented as tree-like structures of conclusions and reasoning steps supporting or attacking these conclusions. Case comparison is formalized as generalized form of reasoning a fortiori. Reasoning patterns can be analyzed by the choice of factors that are taken into account when comparing cases. Both pro and con arguments add up to a measure of dialectical support that can be projected on a scale to establish the level of similarity between cases.

A property of the model that gave rise to an interesting debate at the Jurix meeting was that intermediate conclusions in decided cases do not influence the level of dialectical support. Arno Lodder, author of the DiaLaw theory (1998), argued that these intermediate conclusions express a valuation of arguments that must be taken into account in the comparison of cases. Roth consented that intermediate conclusions are relevant to individual cases at the stage when they are decided but he kept to his claim that they can be left out at the stage when cases are compared.

RELATED WORK

To conclude his presentation Roth discussed his theory in relation to some other models of legal case-based reasoning, especially the HYPO model (Ashley, 1990), the CATO model (Aleven, 1997) and the dialogue game of Prakken and Sartor (1998). In relation to these theories Roth focuses less on reasoning patterns. He also leaves out the sophisticated valuation methods and heuristics for the selection of case factors from the HYPO and CATO models. Instead Roth finds, unlike the other authors, that case factors should not be built fixedly into the reasoning model. This is because the outcome of the reasoning process depends heavily on the choice of factors that are used for case comparison and in reality these factors are often subject of dispute. With his new formal theory of case-based reasoning Roth gives a more realistic treatment of the factors that are used to establish analogy. He hopes his model can be used in the legal practice to study the legal validity of reasoning by analogy.

REFERENCES

Aleven, V. (1997). *Teaching Case-Based Reasoning Through a Model and Examples*. Ph.D. dissertation University of Pittsburgh.

Ashley, K.D. (1990). *Modeling Legal Argument: Reasoning with Cases and Hypotheticals.* Cambridge: MIT Press/Bradford Books.

Lodder, A.R. (1998). *DiaLaw: On legal justification and dialog games.* Ph.D. dissertation Universiteit Maastricht.

Prakken, H. and Sartor, G. (1998). Modelling Reasoning with Precedents in a Formal Dialogue

Game. *Artificial Intelligence and Law*, Volume 6, pp. 231-287.

Roth, A.C. (2003). *Case-Based Reasoning in the Law. A Formal Theory of Reasoning by Case Comparison.* Ph.D. dissertation Universiteit Maastricht.

ANNOUNCEMENTS

Computers and Games 2004 (CG'04)

Fourth International Conference on Computers and Games

July 4-12, 2004
Bar-Ilan University, Ramat-Gan, Israel

The biennial Computers and Games conference series is a major international forum for researchers and developers interested in all aspects of artificial intelligence in computer game playing. After two terms in Japan, one in North America, the fourth conference will be held in Israel. The conference will take place on three days within the period of July 4 - 12. The exact days will be announced later. The Barn-Ilan University will act as host and organize the CG'04 conference together with the 12th World Computer Chess Championship and the 9th Computer Olympiad.

TOPICS OF INTEREST

Relevant topics include, but are not limited to:
- the current state of game-playing programs,
- new theoretical developments in game-related research,
- general scientific contributions produced by the study of games,
- AI techniques applied to games, such as machine learning, heuristic search, knowledge representation, data-mining, and path finding,
- social aspects of computer games,
- cognitive research on how humans play games, and
- issues related to networked games.

PAPER SUBMISSION

The conference proceedings will be published by Springer-Verlag in the *Lecture Notes in Computer Science*-series. The authors of the best papers will also get the opportunity to publish extended versions of their papers in the International Journal of Intelligent Games & Simulation (commercial games), and the International Computer Games Association Journal (classic games). All submitted papers are refereed. Accepted papers will be presented at the conference and printed in the conference proceedings.

IMPORTANT DATES

- February 15, 2004 - Deadline for paper submissions
- March 15, 2004 - Accept/Reject notifications sent to authors
- May 1, 2004 - Camera ready version
- June 1, 2004 - Early registration deadline

PROGRAMME CHAIRS

- Jaap van den Herik
- Yngvi Björnsson
- Nathan Netanyahu

For more information you can contact Martine Tiessen: M.Tiessen@cs.unimaas.nl.

Third International Conference on Entertainment Computing (ICEC 2004)

September 1-3, 2004
Eindhoven, The Netherlands

We invite you to participate at the prestigious 3rd International Conference on Entertainment Computing under the auspices of the International Federation for Information Processing (IFIP). Based on the very successful first international workshop (IWEC 2002) and the second international conference (ICEC 2003), the next ICEC 2004 has been set up as an international forum to exchange experience and knowledge among researchers and developers in the field of entertainment computing. Different submission types are invited that present scientific ideas or improvements to existing techniques in the broad multi-disciplinary field of entertainment and edutainment applications.

Suggested research topics include, but are not limited to:
- Advanced Interaction Design, e.g. Haptic Interfaces
- Aesthetics, Ontology and Social Reflection
- Ambient Intelligence for Entertainment
- Art, Design and Media

- Augmented, Virtual and Mixed Reality
- Avatars and Virtual Action
- Computer Games and Game Based Interfaces
- Education, Training, and Edutainment Technologies
- Evolutionary Platforms / Hardware
- Graphics Techniques
- Human Factors of Games
- Human Sciences, Violence and Entertainment
- In-Car/Flight/Train Entertainment Systems
- Intelligent Board Games
- Interactive Digital Storytelling, and Interactive Tele-Vision
- Mobile Entertainment via Mobile Phones, PDAs etc
- Narrative Environments and Virtual Characters
- Networking (technical and social)
- New Genres, New Standards
- Novel Hardware Devices
- Pervasive Entertainment and Game-Playing
- Robots and Cyber Pets
- Simulation Applications of Games, and Military Training
- Social Computing and Presence
- Sound and Music
- Sport and Entertainment
- Video Games
- Wearable Computers and Sensors for Entertainment

Case studies are invited from any entertainment and edutainment application, including: Authoring, Computer Games, Cultural Heritage, E-Commerce, E-Learning, Event-Marketing, Home Entertainment, Media System Design, Service Robotics, etc.

The proceedings of ICEC 2004 will be published by an International Publisher. All submitted contributions are refereed and selected on their quality. Accepted contributions will be presented at the conference and printed in the proceedings. The authors of the best papers will also get the opportunity to publish extended versions of their papers in a Special Issue of an International Journal.

SUBMISSION TYPES

- Full Paper: max. 8 pages
- Short Paper: max. 4 pages
- Poster: max. 2 pages plus Poster A2
- Demonstration: max. 2 pages plus set-up description

IMPORTANT DATES

- March 20, 2004: Submision of full papers
- April 10, 2004: Submission of short papers, posters and demonstrations
- May 1, 2004: Notification of Acceptance
- June 1, 2004: Submission of Camera Ready Copies
- September 1-3, 2004: ICEC 2004 Conference

GENERAL CONFERENCE CHAIRS

Matthias Rauterberg (chair)
Anton Nijholt (co-chair)
Jaap van den Herik (co-chair)

STEERING COMMMITTEE

Marc Cavazza (UK)
Tak Kamae (Japan)
Don Marinelli (USA)
Ryohei Nakatsu (Japan)
Matthias Rauterberg (The Netherlands)
Andy Sloan (UK)

CONTACT PERSON

Matthias Rauterberg, g.w.m.rauterberg@tue.nl, http://www.ipo.tue.nl/homepages/mrauterb/
http://www.industrialdesign.tue.nl/conference/icec2004/

CONFERENCES, SYMPOSIA WORKSHOPS

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

JANUARY 20 - 23, 2004
2nd International Conference of the Global WordNet Association. Masaryk University, Brno, Czech Republic.
http://www.fi.muni.cz/gwc2004/

FEBRUARY 11-13, 2004
International Conference on Computational Intelligence (ICCI 2004). Çanakkale, Turkey.
http://icci.ijci.org/

FEBRUARY 29- MARCH 3, 2004
Fourth International ICSC Symposium on Engineering of Intelligent Systems (EIS 2004). Island of Madeira, Portugal.
http://www.icsc-naiso.org/conferences/eis2004/eis-cfp.html

MARCH 14-17, 2004
The 19th ACM Symposium on Applied Computing (SAC 2004). Nicosia, Cyprus.
http://www.acm.org/conferences/sac/sac2004

MARCH 17-18, 2004
Action in Language, Organisations and Information Systems. The 2nd International Conference-ALOIS 2004. Linköping, Sweden.
http://www.vits.org/konferenser/alois2004/

APRIL 5-7, 2003
International Conference on Information Technology: Coding and Computing (ITCC 2004). Las Vegas, USA.
http://www.cs.okstate.edu/~aa/itcc04/itcc04.html

APRIL 5-7, 2004
evoMUSART 2004 - 2nd European Workshop on Evolutionary Music and Art. Coimbra, Portugal.
http://evonet.dcs.napier.ac.uk/eurogp2004/

APRIL 13, 2004
First Working-Conference on Information, Modeling, and the Web (WIMW-04). Nijmegen, The Netherlands.
http://www.cs.kun.nl/is/

APRIL 14-16, 2004
IEEE International Conference on Engineering of Complex Computer Systems, IEEE ICECCS. Florence, Italy.
http://www.dsi.unifi.it/iceccs04

APRIL 26-30, 2004
Mexican International Conference on Artificial Intelligence. Mexico City, Mexico.
http://gsidom.iie.org.mx/micai2004.html

MAY 3-4, 2004
International Workshop on Information Systems for Crisis Response and Management (ISCRAM2004). Brussels, Belgium,
http://www.tilburguniversity.nl/ISCRAM2004

May 26-28, 2004
Seventh International Workshop on Deontic Logic in Computer Science (DEON04). Workshop special theme: Deontic Logic and Multi-Agent Systems. Madeira, Portugal.
http://www.dcs.kcl.ac.uk/events/deon04/

JUNE 2 - 5, 2004
Ninth International Conference on the Principles of Knowledge Representation and Reasoning (KR2004). Whistler, Canada.
http://www.kr.org/

JULY 3-2004
Third International Workshop on Social Intelligence Design (SID 2004). Enschede, The Netherlands.
http://parlevink.cs.utwente.nl/sid04.html

JULY 4-8, 2004
Second International Joint Conference on Automated Reasoning (IJCAR 2004). Cork, Ireland
http://4c.ucc.ie/ijcar/

July 19-23, 2004
12th International Conference on Conceptual Structures (ICCS 2004): Conceptual Structures at Work. Huntsville, Alabama.
http://concept.cs.uah.edu/

JULY 25-29, 2004
Nineteenth National Conference on Artificial Intelligence. San Jose, USA.
http://www.aaai.org/Workshops/2004/ws-04.html

JULY 28-30, 2004
Fourth International Conference on Web Engineering ICWE'04. Munich, Germany.
http://www.icwe2004.org/

AUGUST 22-27, 2004
18th IFIP World Computer Congress. The premier international forum on Sciences and Technologies of Information and Communication. Toulouse, France.
http://www.wcc2004.org

AUGUST 23-26, 2004
The 3rd International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems (AH'2004), Eindhoven, The Netherlands.
http://www.ah2004.org/

SEPTEMBER 6-10, 2004
12th IEEE International Requirements Engineering Conference (RE'04). Kyoto, Japan.
http://www.re04.org

SEPTEMBER 20-24, 2004
The 15th European Conference on Machine Learning (ECML) and the 8th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD). Pisa, Italy.
http://ecmlpkdd.isti.cnr.it/

ADDRESSES
BOARD MEMBERS BNVKI

Prof.dr.ir. J.A. La Poutré (chair)
Centrum voor Wiskunde en Informatica
P.O. Box 94079
1090 GB Amsterdam
Tel.: + 31 20 592 9333. E-mail: Han.La.Poutre@cwi.nl

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

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

Prof.dr. M. Denecker
Katholieke Universiteit Leuven
Dept. of Computer Science, Celestijnenlaan 200A
3001 Heverlee, België
Tel.: + 32 16327544. E-mail: marcd@cs.kuleuven.ac.be

Dr. C. Jonker
Vrije Universiteit Amsterdam, Dept. of Artificial Intelligence
De Boelelaan 1081, 1081 HV Amsterdam
Tel.: + 31 20 4447743. E-mail: Jonker@cs.vu.nl

Dr. F. Wiesman
Universiteit Maastricht, IKAT
Postbus 616, 6200 MD Maastricht
Tel.: + 31 43 3883379. E-mail: Wiesman@cs.unimaas.nl

Drs. B. Zinsmeister
Cap Gemini Ernst & Young
Postbus 2575
3500 GN Utrecht
Tel.: + 31 30 6893394. E-mail: Bas.Zinsmeister@cgey.nl

EDITORS BNVKI NEWSLETTER

Dr. F. Wiesman (editor in chief) -See addresses Board Members

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

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

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

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

Dr. J. van Looveren (editor Belgium)
Vrije Universiteit Brussel, AI Lab
Pleinlaan 2, 1050 Brussel, Belgium
Tel.: + 32 6293702. E-mail: joris@arti.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
Postbus 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, 2003.

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@cs.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, Hazel den Hoed,
Dept. Computer Science, P.O. Box 616, 6200 MD
Maastricht, The Netherlands
E-mail: newsletter@cs.unimaas.nl
http://www.cs.unimaas.nl/~bnvk