NEWSLETTER

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Victory and defeat at the CMG Sixth Computer Olympiad

Squangles: Intuitive inferences and promising conclusions

News from the Belgium-Netherlands Association for Artificial Intelligence

AI FIGHTING TERRORISM

Editor-in-chief

The acts of terrorism against the US continue to dominate the news. There is a great deal of discussion on how to prevent terrorist attacks in the future. Security measures are tightened in all Western countries. In such circumstances the prevailing question is: Can AI make a contribution to the common fight against terrorism?

Below I discuss two applications where AI is potentially helpful: (1) detecting terrorist plots and (2) identifying terrorists. This may sound far-fetched, so let us see how realistic these ideas are.

On April 19, 1995, Timothy McVeigh destroyed a federal building in Oklahoma City with a truck bomb, killing hundreds of people. Later it turned out that several of McVeigh's orders were stored in databases, for instance, the buying of fertilizer, the rental of the truck, and the booking of his hotel room near the building. If all such databases had been accessible, a variety of facts – among them the three mentioned above – could have been combined and would have set off an alarm bell. Applied Systems Intelligence Inc. claims that their Knowledge Aided Retrieval in Activity Context system (KARNAC) is capable of detecting terrorist plots this way. However, in my opinion it is questionable whether such a system would work in practice. First of all it is currently both technically and legally impossible to access 'all such databases' (whatever that means). Moreover it is mostly forbidden to extract meaningful information from them, and then, how does one train such a system? For machine-learning techniques, positive examples must be supplied. Given the many ways a terrorist act may be devised, supplying sufficient examples to attain only a few false positives and false negatives seems unfeasible. For the same reason, hardwiring the rules in the system is out of question too. If there is any value in this approach, it is to be found in a very restricted, well-defined domain with well-described questions.

As to identifying terrorists, we observe that the first applications of biometrics on airports are now installed. Since October, Schiphol Airport uses the iris-scan technique for identification. Passengers can register once and from then on use their iris scan to pass the customs faster. Even more sophisticated is the use of face-recognition techniques at Iceland Airport. Passengers are checked against a database containing images of wanted terrorists. Another application of biometrics is lie detection. The polygraph (i.e., the conventional lie detector) measures heart rate, blood pressure, skin conductance, and respiratory dynamics. Research has shown that liars may also be identified by their facial expressions, pupillary response, and voice pitch. Remarkably, recognition of a familiar visual stimulus is reflected in the EEG pattern. Hence, terrorists may be identified by obtaining an EEG while being exposed to pictures of, for instance, terrorist training camps. Unfortunately, none of these techniques yield sufficiently reliable results; only in combination the appropriate level of reliability can be obtained. So, AI can be used to make the combination by applying dedicated hardware and advanced software.

The futuristic approaches described above have one impediment in common: the danger of false positives. Take for example the terrorist-recognition task on airports. Assume that a system issues a false alarm in 0.1% of the cases. For an airport such as Schiphol, this would mean 100 false alarms per day!

Since its early days AI has made promises of which some have come true, and others not. Today, AI researchers should be cautious in making bold claims especially with such an important and sensitive subject as terrorism. I therefore encourage all readers to continue their research and advise them to refrain from making bold claims that are not supported by evidence.

KARNAC: http://www.newscientist.com/news/news.jsp?id=ns99991368
Schiphol iris scanning: http://news.airwise.com/stories/2001/10/1004008821.html
Airport Face recognition: http://www.cnn.com/2001/US/09/28/rec.airport.facial.screening/
http://www.cnn.com/2001/US/09/28/rec.face.recognition.cnna/
Lie detection: http://homestead.juno.com/crdillingham/files/media.htm

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BNVKI-Board News

Joost Kok

The very successful thirteenth BNAIC has just finished. Time did not permit to report on the conference in this Newsletter, therefore the reports on all BNAIC'01 sessions will appear in the coming issue. The exception is the opening address of mrs. Dr. A.P. Meijler, director of the Science Area of the Netherland Organisation for Scientific Research (NWO) that is included on page 109 of this issue.

On the general meeting of the BNVKI Newsletter on October 25 several important changes were made in the BNVKI board. We have taken leave of three board members: Yao-Hua Tan, Luc DeHaspe, and Walter Daelemans. The BNVKI thanks them kindly for their work in the Board during the past years. Four new members were appointed at this meeting. We introduce them below. The renewed board looks forward to further AI in the Low Countries with renewed vigour!

DR. A. VAN DEN BOSCH

Antal van den Bosch (MA, KU Brabant; Ph.D., Universiteit Maastricht), assistant professor at KU Brabant (dept. of Computational Linguistics and AI) and currently on leave at WhizBang! Labs Inc., Pittsburgh, PA, USA, has a background both in machine learning and in computational linguistics. Having been a close witness of the amazing fruitfulness of the interaction that has sprouted between both fields during the past decade, Van den Bosch' mission as a board member of BNVKI will be twofold: (1) to continue, broaden, and intensify the integration of researchers in natural language and text processing, information retrieval, and web mining into the Belgian and Dutch AI community, and (2) to promote these areas as interesting application areas of AI methods by means of organising invited lectures, tutorials, and special sessions at AI meetings.

MRS. DR. C. JONKER

Mrs. Dr. Catholijn Jonker is assistant professor at the Department of Artificial Intelligence of the Vrije Universiteit Amsterdam. She has over seven years of experience as a designer of intelligent systems, using advanced artificial intelligence techniques.

Her background includes working on tele-communications projects and research projects on intelligent agents. She is an experienced teacher of courses on the design of intelligent multi-agent systems both for graduate students and for companies. Dr. Jonker organises workshops on agent research and is a member of the programme committees of several agent workshops. Dr. Jonker has also been Intelligent Systems expert for the consultant company American Management Systems Inc. For AMS she helped to develop an intelligent system to support automated personalised recharging of mobile phones with enhanced capabilities and furthered the research into eBusiness and automated negotiation.

As a board member of BNVKI, Catholijn Jonker's special aim will be to promote interaction between AI researchers in Belgium and the Netherlands, to promote the use of AI techniques in companies and to promote and improve the integration of women researchers in AI.

PROF. M. DENECKER

Marc Denecker studied mathematics and informatics at the KU Leuven and obtained his Ph.D in informatics at the same university. He is

leading the Knowledge Representation and Reasoning subgroup (KRR) of the research group Declarative Languages and Artificial Intelligence (DTAI) at the KU Leuven. The basic goal of the KRR subgroup is the development of logic-based knowledge representation (KR) and reasoning systems. Research themes range over epistemological and semantical foundations of nonmonotonic knowledge representation languages, KR methodology, abduction and implementation of abductive reasoning systems, application of these systems for temporal reasoning, scheduling, natural language analysis, etc. The DTAI has also strong expertise in Inductive Logic Programming and Machine Learning, implementation, abstract interpretation and analysis of logic programming systems.

As a board member of BNVKI, Marc Denecker's special aim will be to promote and improve the integration of Flemish and Walloon researchers and the larger Dutch AI-community, in order to create more opportunities for exchange of ideas, collaboration and education between researchers and Ph.D. students of the two communities.

PROF. DR. IR. J.A. LA POUTRÉ

Han La Poutré is research group leader at CWI in Amsterdam, heading the theme group "Evolutionary Systems and Applied Algorithmics". He also is professor of "e-Business and Computer Science" at the Capacity Group Information and Technology (Faculty of Management Science) of Eindhoven University of Technology. He holds a M.Sc. degree in Mathematics from the TU Eindhoven (cum laude), and a Ph.D. degree in Computer Science from Utrecht University; he has been researcher at Princeton University (USA). His research interests include evolutionary systems, neural networks, on-line algorithms, e-commerce, agent systems, and agent-based computational economics.

Han La Poutré received the STOC award for the best Ph.D. Paper (STOC: ACM Symposium on Theory of Computing, USA), a NATO Science Fellowship, and a KNAW Fellowship (KNAW: Royal Netherlands Academy of Sciences and Arts). He has been conference co-chair and organiser of the Dutch NAIC conference on AI (1998) and is member of the editorial board of the Journal Netnomics, concerning Internet economics and e-commerce, and of the new, upcoming journal Computational Management Science.

He is and has been project leader of several projects, including scientific projects funded by third parties (e.g. NWO, TI), application projects (e.g. companies, also yielding the SKBS award at BNAIC99), and educational projects. In 1999, his research group was rated excellent in the evaluation/visitation of the CWI by NWO (the Netherlands Organisation for Scientific Research).

Han La Poutré is interested to contribute to the management of the BNVKI. Amongst others, he is interested in stimulating the development of new application and cooperation possibilities for AI with respect to societal sciences and institutions. This includes fields like economics, sociology, management sciences, and the growing areas of intelligent systems for the e-society.

Opening Address, Belgian-Dutch Artificial Intelligence Conference 2001

October 25, 2001 Amsterdam

Mrs. Dr. A.P. Meijler,
Director Physical Sciences, NWO

It is a great pleasure to be here on behalf of the Netherlands Organisation for Scientific Research (NWO) to open this, already 13th, BNAIC. I am glad to see so many enthusiastic visitors. We have gladly sponsored the keynote speech by Sebastian Thrun, because in our opinion, international speakers enhance the quality of the discussion at a conference like this. I would like to congratulate the organising committee on the interesting programme it has put together.

Twenty years after the foundation of the Dutch Artificial Intelligence Association, more than twenty groups in the Netherlands and Belgium are active in artificial intelligence. Hundreds of students and numerous researchers are involved in the subject. This is a sign of the continuing interest among talented young people. In our own National Research Agenda for Computer Science, we designated Intelligent Systems as one of seven areas that deserve our special attention. In this document, Nationale Onderzoeksagenda Informatica (NOAG-i), published in August 2001 by the Informatica

Platform Nederland (IPN) and the Adviescommissie Informatica (ACI) of NWO's Physical Sciences department, the following 7 research themes are selected: Parallel and Distributed Computing (PDC), Embedded Systems (ES), Software Engineering (SE), Multimedia (MM), Modelling, Simulation and Visualization (MSV), Intelligent Systems (IS), and Algorithms and Formal Methods (AFM).
More information can be found on our website: www.nwo.nl/nwohome.nsf/pages/ACPP_4X6R3M.

Artificial Intelligence is very interesting from the fundamental point of view of understanding thinking-processes. At the same time, we think that the research in this area will make significant contributions to society.

For example, intelligent systems may find practical use in search and retrieval techniques, user profiling, multi-agent systems, and ambient intelligence. It is not surprising that some of the presentations during this conference touch upon these subjects. In the coming four years, progress in these areas is to be expected.

Mrs. Dr. A.P. Meijler

It is clear that more support from the Dutch government will be needed to meet these challenges. Just shuffling around some of our research funds will not be sufficient. We are striving for the release of additional funds. In the coming years, the investments in computer science should double, if we are to fulfil the needs of society. The government is aware of the importance of information and communication technology, and the formation of a new cabinet in eight months' time looks like an opportunity to turn political attention to the issue. We want to focus the investments on three objectives: the development of talent, the improvement of the interaction with other fields of science, and the transfer of knowledge to potential users and industry.

The development of talent is a matter of providing the right climate. Talented researchers should have the intellectual room and financial means to develop into top researchers, who can achieve real breakthroughs. They also need a high-quality environment, where they are trained and scouted. We would like the Dutch computer science research community to grow from 850 people now to 1500 in 2005. This should pay off, among other things, in the form of an improved overall score in the NEC citation index.

One straightforward way to reap the benefits of computer science is the interaction with other fields of science. Disciplines like physics, medical sciences, and linguistics can make good use of the fruits of computer science. Conversely, the social and juristic sciences have researched the proliferation of information systems into various quarters of society. In five years' time, the number of inter-disciplinary research projects should be substantially higher.

The transfer of knowledge to potential users is essential for every branch of science. Computer scientists are definitely doing their part, but surveys have suggested that it needs improvement. Business, government, and research institutes outside ICT are often in need of knowledge that exists only within the computer science research community. The ambition is to foster knowledge-transfer and public-private cooperation. In 2005, we hope that a significant improvement will show up in the ICT scan from TNO.

The planned increase to 1500 researchers in the Netherlands should enable many research groups to reach the critical mass of about 25 people. It will also lead to a much better career perspective in the academic world. Many young talents will find a career in research more attractive than they do now. As long as the research groups are still smaller, close cooperation throughout the Benelux is an adequate way to reach critical mass. This conference is a good example of that.

Thirteen years ago, this conference was first organised, in the same city where it is today. Most

of you were still in high school, playing with your Commodore 64. Impressive developments have taken place since then. Chess computers have learned how to beat the world champion. At the same time, some other aspirations of Artificial Intelligence have proven more difficult to achieve. In a recent issue of the Newsletter of the BNVKI, Joost Kok wrote: "At present we do not see even the beginning of thinking machines." You have come a long way, but there is still a lot to do. I hope this conference will inspire you.

Beyond Ph.D. Theses

Jaap van den Herik
IKAT, Universiteit Maastricht

Ph.D. Theses are produced in clusters. Looking at the various faculties in which AI research takes place, we see that the continuous stream of Ph.D.s as seen over a period of ten years, has peaks. In the last year I have seen peaks for the supervisors John-Jules Meyer and Hans van Vliet. Apparently, at this moment there is no peak, but a non-zero dip. With respect to the previous list we may publish two new announcements of Ph.D. defenses that will take place in the year 2002. They are Nikos Massios (January 25) and Klaas Schilstra (March). We wish both Ph.D. students a good New Years Eve.

Marcel van Lohuizen and Tom van Engers are congratulated with the completion of their theses and we wish them a good performance during the official defence.

Although we have not so many Ph.D. announcements – at least we have four – the number of Ph.D. reviews is even less, namely zero. Our reviewers informed us that they were too busy and did not make the deadline. The Editorial Board of the Newsletter regrets the omission of Ph.D. reviews since we are informed that the announcement and review section is well appreciated by our community. The best I can do is to encourage our readers and especially the (daily) supervisors to provide us with as much information as possible.

This topic brings me to a new one, recently discussed at a SIKS meeting, during a pleasant dinner where usually the best ideas emerge. The simple question is: why do we restrict providing information to our readers to the Ph.D. announcements, reviews, and SIKS courses. We do not inform them on new professorial appointments, on inaugural addresses, and on farewell speeches. I must admit I have never seriously thought about making a section on this information. I find it rather useful, but as an Editor I also know that it is quite a job, since you have to hunt for this information. Nobody is bringing the information to the BNVKI Newsletter.

To show my willingness, and to encourage all readers to send analogous information to newsletter@cs.unimaas.nl I provide you with a few facts.

Prof.dr. Arno Siebes will inaugurate on November 7, 2001 at the Universiteit Utrecht (16.15 hours).

The Rijksuniversiteit Groningen has appointed **Dr. Lambert Schomaker** as ordinary professor in Artificial Intelligence per January 1, 2001 (so he is already 10 months in action).

Prof.dr. Peter Apers has changed his chair on Databases for a place in the Board of the University Authorities.

The BNVKI Newsletter Board congratulates all three persons with the new challenges they have found in life.

M.P. van Lohuizen (November 6, 2001) *Parallel Natural Language Parsing: From Analysis to Speedup*. TU Delft. Promotores: Prof.dr. H.J. Sips and Prof.dr. A. Nijholt. Assistant promotor: Dr. R. Sommerhalder.

T.M. van Engers (December 11, 2001) *Knowledge Management: The Role of Mental Models in Business Systems Design.* Vrije Universiteit Amsterdam. Promotor: Prof.dr. J.M. Akkermans. Co-promotor: Dr. G.C. van der Veer.

N. Massios (January 25, 2002) *Decision-theoretic Robotic Surveillance*. Universiteit van Amsterdam. Promotores: Prof.dr.ir. F.C.A. Groen and prof.dr. M. van Lambalgen. Co-promotores: Dr.ir. L. Dorst and dr. F.P.J.M. Voorbraak

K.O. Schilstra (March 2002) *Towards Continuous Knowledge Engineering*. TU Delft. Promotor: Prof.dr. H. Koppelaar.

Arno Siebes (left) and Lambert Schomaker (right)

Squangles

Henk Visser
IKAT, Universiteit Maastricht

COMP. Good morning Math, what can I do for you?

MATH. Nothing at all, but I want to show you something.

COMP. Go ahead, my computer can wait.

MATH. Do you remember my Transpositional Tricks?

COMP. Of course, I liked your geometrical pictures, do you have more of those nice things?

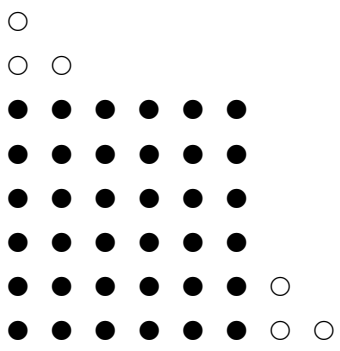
MATH. In a way, yes, but let me first of all state the problem. You know that I found a beautiful representation of the equation 666 = 441 + 225, which I analyzed as an equation between the triangular number of a square – 36 – and the squares of two successive triangular numbers – 15 and 21. Well, when I looked at the tables of the squares and the triangular numbers, I noticed that 36 occurs in both of them and so I wondered whether there are more squares that are also triangles. By the way, I call such numbers squangles.

COMP. Was this your problem? Wait a moment and my computer will give you the answer!

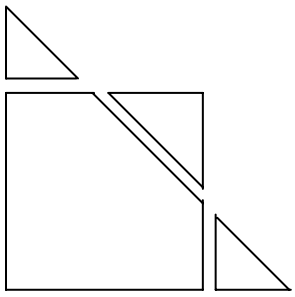
MATH. Stop, this is not a computational problem. I wanted to have insight into the mathematics behind the equation s(m) = t(n), I am not interested in the solutions as such.

COMP. I see, tell me what you've found.

MATH. (*walks to the blackboard*) First of all I drew the following picture of the equation s(6) = t(8):



I noticed that two triangles of 2 are added to the square of 6 in order to get the triangle of 8 whereas one triangle of 3 is removed. My intuitive inference was that in general each squangle can be transformed in this way, that is, by replacing a triangle number by two congruent triangles. The following figure or scheme pictures this result:



My promising conclusion was that a table with triangular numbers and their doubles would lead me faster to more examples of squangles.

COMP. So you used a computer for the construction of such a table?

MATH. Not at all. I only calculated as much values of t(n) and 2t(n) as was necessary to find the next squangle after 36. Here I will do it again and mark the equal outcomes:

n	t(n)	2t(n)
0	0	0
1	1	2
2	3	6
3	6	12
4	10	20
5	15	30
6	21	42
7	28	56
8	36	72
9	45	90
10	55	110
11	66	132
12	78	156
13	91	182
14	105	210
15	120	240
16	136	272
17	153	306
18	171	342
19	190	380
20	210	420

You see, twice the triangle of 14 gives the triangle of 20. This means that the square of 14 + 1 + 20, that is 35, is also the triangle of 35 + 14, that is 49.

COMP. My computer would have told you the same thing much faster, so what is your point?

MATH. My purpose was to demonstrate how mathematical intuition can, so to say, unfold itself along with perspicuous representations. It seems that this is what Poincaré meant when he attributed the intuitions of Sophus Lie to his ability to think in pictures. Perhaps you know the fragment in which he compared Lie with Sonja Kowalewski, whom he considered a "logicienne", as if mathematicians who do not think in pictures have no intuitions.

COMP. You know that I always had difficulties with the notion of intuition. I understand now that you regard intuition as a process with at least two aspects, an intuitive inference and a promising conclusion. I accept the notion of promising conclusion, but am still in doubt about those magnificent intuitive inferences. I agree that mathematicians sometimes make good guesses, but I hesitate to use the term intuition for them. Moreover good guesses can occur on any occasion, and certainly not only in connection with pictures, as Poincaré seems to have thought.

MATH. This is just what I wanted to discuss, because I used the two examples of squangles myself in order to see if they could bring me further. However, I made use of a perspicuous representation, albeit not a pictorial one. Look:

$$6^2 = ½ \cdot 8 \cdot 9$$
$$35^2 = ½ \cdot 49 \cdot 50$$

When I wrote this down some days ago, it occurred to me that both squares have come about through two other numbers with a difference of 1, a square and the double of a square, 9 and 8, the double of 4, 49 and 50, the double of 25. That I still speak of an intuitive inference is because it came suddenly and because it was accompanied by a conviction of correctness or Helmholtz's *Überzeugung der Gewissheit*. I was certain that it was more than a good guess: I had found the characteristic property of the equations. This discovery was followed by the promising conclusion that a table with squares and their doubles would lead me even faster to more squangles than the earlier table.

COMP. So you began to make the new table in order to find the next squangle. What a primitive procedure in this age of the computer!

MATH. Be quiet, I am not yet finished. But let me first write down the relevant values of s(n) and 2s(n) and mark the outcomes with a difference 1:

n	s(n)	2s(n)
0	0	<u>0</u>
1	<u>1</u>	<u>2</u>
2	4	<u>8</u>
3	<u>9</u>	18
4	16	32
5	25	<u>50</u>
6	36	72
7	<u>49</u>	98
8	64	128
9	81	162
10	100	200
11	121	242
12	144	<u>288</u>
13	169	338
14	196	392
15	225	450
16	256	512
17	<u>289</u>	578

COMP. So you finally found that the square of $12 \cdot 17$ is equal to the triangle of 289. It took a lot of time, but I agree that it would have cost you more time to find that both 204^2 and $½ \cdot 288 \cdot 289$ have the same outcome, let me see, 41616, if you had calculated all squares and triangular numbers up to this number. But I understand that this is not all there is.

MATH. Indeed. For I got the idea of making a list of the pairs of those numbers that successively produced 2 and 1, 8 and 9, 50 and 49, and 288 and 289:

(0, 1)
(1, 1)
(2, 3)
(5, 7)
(12, 17)

COMP. I see, the next pair is (29, 41) and this means that the square of $29 \cdot 41$ is also a triangular number. Interesting, but did you prove the Fibonacci-like rule that supports my uh... intuitive inference?

MATH. Of course I did, in spite of my conviction of correctness. I even found the rule that lies behind the pairs that gave the desired values of t(n) and 2t(n), but only after I had enlarged the list with the help of the pairs (12, 17) and (29, 41) from the other list:

(0, 0)
(2, 3)
(14, 20)
(84, 119)
(492, 696)

I saw immediately that each second component is 1 more than the sum of the three preceding numbers: 3 = 0 + 0 + 2 + 1, 20 = 2 + 3 + 14 + 1, 119 = 14 + 20 + 84 + 1, and 696 = 84 + 119 + 492 + 1, but it took somewhat longer before I found the rule for the first components: 14 = 4·3 + 0 + 2, 84 = 4·20 + 2 + 2 and 492 = 4·119 + 14 + 2. The proof that these rules are correct was not very simple, so I will not bother you with it.

COMP. Why did you rack your brains about a proof when you had no doubt of the correctness of the conclusion?

MATH. Well, that is just what makes mathematics challenging. Finding a proof is like a treasure hunt. But I am still not finished, for after I had found the rules for the lists, I wondered whether it would not be possible to derive a rule for the sequence of squangles themselves from them. However, the algebraic approach did not give much hope, because of the complexity of the Fibonacci-like rule. But when I looked again at the last list but one, I discovered that there is already a connection between the *x*-coordinates alone: from the third *x*-coordinate each is a simple linear combination of the two preceding ones: $x_{n+2} = 2x_{n+1} + x_n$ and the same holds for the *y*-coordinates. But then I turned to the squangles:

0, 1, 6, 35, 204, 1189, ...

I imagined that here, from the third term on, each term might also be a simple combination of the two preceding ones. I was right! Do you see it too?

COMP. I am sorry but I already left my computer too long alone. Thank you for your lecture, and see you later. (*Leaves the classroom while Math begins to scrawl on a piece of paper, trying for a generalization*. *Ten minutes later Comp returns*)

MATH. Hallo Comp, did you set your computer to work?

COMP. Yes, and how! I wrote a program that calculated the first twelve squangles. It also found the rule that governs it. I shall write it down in your notation:

$$t_{n+2} = 6t_{n+1} - t_n$$

MATH. And now you are certainly going to argue that my work was superfluous? But who invented not only the problem, but also the kinds of sequences and rules that brought the problem to a solution? I begin almost to think that you could not find the last rule yourself!

COMP. Goodbye Math! (*leaves the classroom with a shrug of the shoulders*)

Notes

1. The above dialogue is by no means meant as a criticism of the work of creative computer scientists. Their approaches can be very original as I learned from Marjan Dragt (GUTS), who wrote the program alluded to in the text.
2. The notion of "perspicuous representation" played an important role in Wittgenstein's later work. Hubert Dreyfus (1967: 40) used it in his criticism of Artificial Intelligence research.
3. The notion of "scheme" originally comes from Kant (1781: A 140), who distinguished "schemes" from "pictures". An example of the latter is the following representation of the number five by five points: ·····, whereas a scheme would enable us to think of a number "in general". It would be rather a "method for representing a number by a picture" than the picture itself. It is conceivable that Kant's difficulties with this notion would have been less great, if he had made use of the notion of "variable" or if he had acknowledged that mathematicians often "draw figures" of all kinds. For the role of figures in the solution of problems, I refer to Polya's (1945) little book on invention and discovery.
4. "Intuition" is, of course, a delicate subject. Scientists such as Helmholtz (1903), Poincaré (1905), and Mach (1905) acknowledged it as an important source of discoveries, and they already tried to get a grip of the relevant phenomena. Bertrand Russell (1948: 421-422) once gave the example of the sum of the first two, three and four cubic numbers, but he admitted that he did not know "how to make explicit what guides mathematical intuition in such cases".
5. The idea of presenting arguments in the form of a dialogue is nothing new. My first serious contact with this approach was through Heyting's (1958) book on intuitionism.

REFERENCES

Dreyfus, Hubert (1967). *What Computers can't do. A Critique of Artificial Reason*. New York: Harper and Row.

Helmholtz, Hermann von (1903). *Vorträge und Reden*. Fünfte Auflage. Braunschweig: Friedrich Vieweg und Sohn.

Heyting, Arend (1958). *Intuitionism. An Introduction*. Amsterdam: North-Holland.

Kant, Immanuel (1781). *Kritik der reinen Vernunft*. Riga: Johann Friedrich Hartknoch.

Mach, Ernst (1905). *Erkenntnis und Irrtum. Skizzen zur Psychologie der Forschung*. Leipzig: Johann Ambrosius Barth.

Poincaré, Henri (1905). *La Valeur de la Science*. Paris: Ernest Flammarion.

Polya, George (1945). *How to solve it. A new Aspect of Mathematical Method*. Princeton, N.J.: Princeton University Press.

Russell, Bertrand (1948). *Human Knowledge. Its Scope and Limits*. London: George Allen and Unwin.

Visser, Henk (2001). Transpositional Tricks. *BNVKI Newsletter*. Vol. 18.2, pp. 30-34. *ALP Newsletter.*

More information:
htttp://www.cwi.nl/projects/alp/newsletter.

The CMG 6th Computer Olympiad and the Computer-Games Workshop

Mark Winands
IKAT, Universiteit Maastricht

From August 18 to 23 the Institute for Knowledge and Agent Technology (IKAT) organised the CMG 6th Computer Olympiad at the Universiteit Maastricht (UM). Together with the Olympiad a Computer-Games workshop was organised. This event took place from August 20 to 22. Both events are described in this report.

THE COMPUTER OLYMPIAD

The Computer Olympiad is a multi-games event in which all of the participants are computer programs. The Olympiad is a brainchild of David Levy, who organised this tournament in 1989 (London) for the first time. The next four editions were held in 1990 (London), 1991 (Maastricht), 1992 (London) and 2000 (London). This year was the second time that the event was held in Maastricht. IKAT, under the leadership of Jaap van den Herik, was responsible for the organisation. Similar to last year, Van den Herik was the tournament director. The purpose of the Olympiad is to find the strongest program for each game. The Olympiad has also grown to a social event, as the authors of the programs are not bound to silence during the play as in human tournaments. The event is a reunion as programmers meet to discuss ideas and renew acquaintances. Some teams arrive with clear goals of winning, some just to participate, some to test their new ideas under tournament conditions. The Olympiad is a truly international event. This year, participants were coming from all over the world: USA, Canada, The Caribbean, Japan, Taiwan, Israel and the European Union. The event was held under the auspices of the ICCA (International Computer Chess Association), which gave it an official status. This year, there were competitions in six games: Chess, Chinese Chess, Shogi, Amazons, Lines of Action (LOA) and Gipf. Below we will give a short description of each of the tournaments.

Computer chess was the main tournament of the Olympiad. The computer chess competition had the highest number of participants, 18, an increase of 4 compared to last year. The computer chess tournament had a special status since it was the official 18th World Microcomputer Chess Championship (WMCC 2001). Unlike other competitions, there were several titles to gain in the computer-chess tournament. This year the organisation allowed programs running on multi-processor machines. Because this gave a clear disadvantage for the programs still running on single-processor machines, the organisation decided that there were two world-champion titles. The leading program executing on a single processor was declared the *World Microcomputer Chess Champion - single processor*. The leading program executing on multiple processors was declared the *World Microcomputer Chess Champion - multiple processor*. Among the participants there were 6 commercial programs. The authors of these programs are professionals, who have the resources to fine-tune and optimise their program. Therefore, the professionals have a great advantage over the amateurs. Because the amateurs have hardly any chance of winning the tournament in practice, the title *World Microcomputer Chess Champion – amateur* exists for them. Due to the high number of participants a Swiss tournament was played consisting of nine rounds. The games were played during the morning and the afternoon. Each day there was a press briefing given by the well-known chess master Hans Böhm. These sessions were very interesting and amusing. Although the top programs play at a higher level than Böhm does, he was still able to uncover some weaknesses in those programs. After five days of tough battle JUNIOR (Ban, Israel) was the best multi-processor program and the winner of the chess tournament, SHREDDER (Meyer-Kahlen, Germany) the best single-processor program and GROMITCHESS (Skibbe, Germany), the best amateur program.

A popular new game in the AI community is Amazons. It is a simple board game of occupying and enlarging territory. The game is quite similar to Go. Because of the large branching factor, a brute-force approach, like in chess, is unfeasible in Amazons. Paradoxically, the chess programmer Johan de Koning claimed that he still could use a lot of his chess-programming experience in his program 8QP. For the second time his program won the Amazon competition with a perfect score!

Diederik Wentink: GIPFTED

After the absence of last year Chinese Chess returned as a part of the Olympiad. The Asian programs dominated the tournament. The battle for the first place was between ELP (Chen, Taiwan) and SG 8.2 (Hsu, Taiwan). Those two programs playing against each other was a derby, since both belong to the same research group. In the end the program ELP won this exciting competition.

Shogi is the Japanese version of chess. The complexity of this game is higher than of Western Chess. At the moment computer Shogi tournaments are very popular in Japan. In this country Shogi is also a popular domain for AI research. Because of the travelling distance between Japan and Maastricht, there were only three programs participating. But the authors of the programs still had a lot of fun in competing at the Olympiad. The tournament was won with a perfect score by SHOTEST 5.6 (Rolasson, UK). A European program as winner of the tournament shows that this game is not exclusively a domain for Japanese researchers.

The LOA tournament was for the second time present at the Olympiad. LOA is a chess-like connection game, which is getting steadily more attention in the game-playing community. The LOA tournament was the only tournament that needed a play-off. The LOA programs YL (Björnsson, Canada) and MIA II (Winands, The Netherlands) shared the same number of points after the regular tournament. The play-off was won after some nice tactical play by YL.

Gipf, a fairly new domain in the game-playing community, was a newcomer at the Computer Olympiad this year. The game, mostly common in Belgium, is played on a hexagonal board with the pieces being pushed from the sides. Despite Gipf's newness two quite strong Gipf programs were present at the Olympiad: GIPFTED (Wentink, The Netherlands) and GF1 (Van den Branden, Belgium). After some interesting matches it was GF1 that won the competition.

At the last day of the Olympiad a social dinner was organized for the authors of the participating programs. This was a good moment for the programmers to discuss the performance of their machines at the Olympiad with each other. During the meals the medals and prizes were presented to the winners of each tournament. At this occasion several authors thanked the organisation for the success of the Olympiad.

THE COMPUTER-GAMES WORKSHOP

As a successor of last year's Computer-Games Workshop at the Fifth Computer Olympiad in London, Jos Uiterwijk (IKAT) again organised a three-day workshop during the evenings, from August 20 to 22. The workshop focused on the latest developments in games programming. Each evening, the workshop attracted an audience of some 25 to 30 people, from all over the world. The event consisted of three invited lectures, thanks to a grant from NWO, and ten regular presentations. Each day started with an invited lecture (45 minutes) followed by three or four presentations (25 minutes each). Summaries below were adapted from Jos Uiterwijk's more extensive report in the ICGA Journal (Vol. 24, No. 3).

The first invited lecture of the workshop was given by Ernst Heinz (MIT, USA) and was entitled *Selected Goodies of DARKTHOUGHT*. In this lecture he revealed many so far unpublished details about his chess program DARKTHOUGHT, mainly concerning search extensions, transposition tables and material signatures. This lecture was inspiring for those building competitive game programs. Next, Jeroen Donkers (UM, The Netherlands) presented a talk entitled *Learning Opponent-type Probabilities for PrOM Search*. He explained the

PrOM (for Probabilistic OM)-search algorithm, which is an extension of plain OM (Opponent-Model) search. Subsequently, Don Beal (University of London, UK) talked about *Learning to Play Well from Observing Bad Play*. He illustrated how TD(λ), the most best-known algorithm for self-learning in games, deteriorates when a program tries to learn from games of a lower quality than the program itself, but that an enhanced algorithm does much better. Then, Levente Kocsis (UM, The Netherlands) gave the presentation named *Learning Move Ordering in Chess*. He showed how neural networks can be applied to order the moves in the alpha-beta search. Finally, this day saw an inserted (light) talk by Henk van Haeringen (The Netherlands). He explained the rules of a chess variant invented by him, called *SuperChess*. The main difference with standard chess is the addition of extra types of pieces.

At the second day, Hiroyuki Iida (Shizuoka University, Japan), discussing the *Advances of AND/OR-Tree Search Algorithms in Shogi Mating Search*, presented the second invited lecture of the workshop. He gave characteristics of a family of AND/OR tree-search algorithms, mainly proof-number (PN) variants (PN^*, PDS and DF-PN). Most of them are depth-first algorithms, some of which only make use of proof numbers, whereas others use both proof and disproof numbers. Although the exact details of all these algorithms are not yet clear their prospects are very promising in Shogi. Next, Diederik Wentink (UM, The Netherlands) went into some details of his MSc. research *Analysis and Implementation of the Game of Gipf*. He explained the rules and the game properties of Gipf. Then Bruno Bouzy (Université Paris 5, France) explained *Go Patterns Generated by Retrograde Analysis*. He calculated all pattern game values for small boards up to 3×3, and for open boards (i.e., without edge constraints) up to 4×4. The last talk of the day was by Erik van der Werf (UM, The Netherlands), presenting his experiments on *Visual Learning in Go*. He presented his neural-network architecture, called ERNA, which learned firstly to determine connectedness from raw board representations and secondly to count the number of liberties of stones.

The invited lecture of the final day was given by Christian Posthoff (The University of The West Indies, Trinidad and Tobago), who entrusted to the audience his thoughts on *Computer Chess and Artificial Intelligence from an Academic Perspective*. He covered a period of some thirty years, in which he was personally involved in the field. Particularly, his revelations on the work done in the early sixties in the former GDR were interesting. Then Mark Winands (UM, The Netherlands) showed results of his experiments

Christian Posthoff

with *PN, PN^2 and PN* in Lines of Action*. All these three proof-number-search variants turned out to be quite useful in the endgame of LOA in finding deep forced wins. Next, Michael Buro (NEC Research Institute, USA) gave *An Overview of NECI's Generic Game Server* and its accompanying client software. The system is more flexible and has a larger set of rich features than the traditional game servers. At the moment the system offers services for the following games: Amazons, Checkers, Chess, Hex, Go, Othello and Phutball. Due to the absence of Guy Haworth (UK), Ernst Heinz presented the lecture *Four Notes on Chess Endgames*. In these notes Haworth gave some recent reflections on notions such as the "discarding-like-pieces" guideline and the "depth-by-the-rule" metric.

FINAL REMARKS

The participants who I spoke were all very positive about this Olympiad. Most of them promised to come back next year. A few of them even promised to participate in other games too. The future of the event is prosperous. The major sponsor, CMG, promised to support the event for at least three more years. Next year the Olympiad will be probably held in Maastricht again. Moreover, the workshop was well received by the participants. It was an interesting workshop, where many refreshing ideas were exposed.

The detailed results and game scores of the several competitions can be found at the website. Regarding the workshop, there are proceedings consisting of 7 full papers and 5 abstracts. The workshop proceedings can be obtained from Joke

Hellemons via hellemon@cs.unimaas.nl. All the workshop presentations available in PowerPoint format can be seen or downloaded from the website.

I look forward to the next Computer Olympiad and Computer-Games Workshop!

Olympiad website:
http://www.cs.unimaas.nl/olympiad/

Fifth International Conference on Computing Anticipatory Systems

Daniel M. Dubois
Institute of Mathematics, Université de Liège

Like the 4 preceding CASYS conferences, CASYS'01 (August 13-18, 2001) was organized by the Centre for Hyperincursion and Anticipation in Ordered Systems (CHAOS asbl), which belongs to the Institute of Mathematics of the University of Liège. The scope of the conference was the study, research and development of concepts, methodologies, theories and mathematical models for designing, modeling, simulating, optimizing and controlling computing anticipatory systems.

ANTICIPATION

"Computing system" refers to any rule-based and learning-based evolving natural and artificial system. Computation deals with manipulation of symbols in a large sense, including calculation. In 1985, Robert Rosen published his book *Anticipatory Systems* (Pergamon Press, New York) where he defined an anticipatory system as a system containing a model of itself and/or its environment, which adapts its current state to the prediction of its model. Just like a past event (a memory) is represented by a variable that gives at the current time its value taken in the past, a future event (an *anticipation*) is represented by a variable that gives at the current time its potential future value. Let us point out that the concept of anticipatory system deals not only with the prediction of events (a projection of the present to the future) but also with the construction, by the anticipatory system, of the future events (not a projection of the present to the future, but a constructed future which conditions the present).

In 1992, Daniel Dubois and Germano Resconi published the book *Hyperincursivity: a new mathematical theory* (Presses Universitaires de Liège, Belgium), where the notions of incursion (INclusive reCURSION) and hyperincursion (an incursion with multiple solutions) were proposed. An incursive systems is an inclusive or implicit recursive system, for example, $x(t+1) := F(x(t), x^*(t+1))$, where each iteration $x(t+1)$ is computed at each time step $t = 1,2,3,...$ from a function F of $x(t)$ and $x^*(t+1)$, where $x^*(t+1)$ is the anticipation of $x(t)$ at the next time step, computed from the system itself or from a model. A hyperincursive system is an incursive system which generates multiple iterations at each computing step. With incursive systems, the systems depend not only on past and present states (as in recursive systems), but also on future states.

During the last 5 years, significant developments of anticipatory systems were made and presented at the CASYS conferences. This year's edition of the conference can be considered as a turning point in this field, because of the development of a more precise mathematical foundation of anticipatory systems. Important elements are the extension of differential delay difference equations to differential advance (anticipatory) difference equations; the anticipatory synchronization of a slave system to a master system and the mathematical generalization of strong and weak incursive (anticipatory) systems.

INVITED SPEAKERS

The conference was proud to welcome the invited speakers, two world-renowned personalities, Prof. Dr. George Klir (Binghamton University, USA), who received the CASYS Award for his outstanding work on anticipatory and intelligent systems, and Prof. Dr. Ian Stewart (University of Warwick, UK), who received the CHAOS Award for his outstanding work on chaos and mathematical systems.

Prof. Klir presented a talk on *The Role of Anticipation in Intelligent Systems*, in which the role of anticipation in intelligent systems was discussed. He argued that the area of intelligent systems can greatly benefit by importing the various results developed within the area of anticipatory systems. He also argued that the area of anticipatory systems could enlarge its scope by importing knowledge regarding soft systems and soft computing from the area of intelligent systems.

Prof. Stewart presented an invited talk on *Systems with Emergent Dynamics*. According to prof. Stewart, evolutionary biologists often reject deterministic models of evolutionary processes because they equate 'deterministic' with 'goal-seeking', and have learned the hard way not to trust goal-seeking explanations of evolutionary adaptations. On the other hand, he argues that the general theory of dynamical systems potentially has much to offer for evolutionary biology, for example, as a resolution of the conflict between

gradualism and punctuated equilibrium. The concept of a system with emergent dynamics retains the deterministic nature of dynamical systems, while eliminating any goal-seeking interpretation. Then systems with emergent dynamics are deterministic but not goal-seeking. As such, they offer a sensible way to use dynamical systems as models for evolutionary processes in biology, and in other areas.

In all, 166 papers were proposed by 282 scientific authors/co-authors from 45 different countries, presented in 10 symposiums. More information about CASYS can be found on the web:
http://www.ulg.ac.be/mathgen/CHAOS/CASYS.html
and
http://www.ulg.ac.be.mathgen/CHAOS/CHAOS.html

AI IN BUSINESS

Bolesian Part of Cap Gemini Ernst & Young

Bas Zinsmeister, Bolesian

Cap Gemini Ernst & Young decided to integrate the activities of Bolesian into their own organisation. This means that all employees of the former 'Bossche company' will work for CGE&Y as of now. The activities and domain of special attention stay the same; also our services remain unchanged. The only real change is our location; from now on we reside in Utrecht instead of Den Bosch.

In the words of Henk Broeders (CEO of Cap Gemini Ernst & Young in the Benelux) the added value of the integration into Cap Gemini Ernst & Young is that: "By integrating Bolesian's activities, we are able to gain even more advantages of synergy. We will realise those advantages by linking Bolesian's knowledge and skills to our management and IT consultancy. For our customers, this will definitely result in added value, and that's exactly what we want. "

For many companies, knowledge is an essential part of critical business processes. Knowledge plays an important role, especially in decision-making processes. Bolesian uses knowledge technology to make this knowledge explicit and to represent it in the most suitable form. Bolesian's knowledge-analysts are specialists in interviewing experts and elicitating, structuring and modelling their knowledge. This explicit knowledge is the foundation for the system development path that follows.

Bolesian maintains connections in scientific circles. Consequently, we are able to translate the newest technologies into practical solutions for both business and authorities alike. One of the advantages of the analysis and modelling techniques that Bolesian employees apply, is that specific knowledge is being disconnected from persons and processes. Therefore the particular knowledge is better and more broadly accessible in the organisation. A positive consequence of separating explicit knowledge from their processes is knowledge that is easier to maintain. The knowledge systems of Bolesian are often integrated with already existing operational systems, either as a separate component, or as a completely integrated package.

From within Cap Gemini Ernst & Young, Bolesian remains focussed on several types of problems in various market sectors. We operate in the recruitment and employment branche (matching on job-sites), trade and industry (product-configuration, monitoring, planning and scheduling and diagnosis), the world of social security, financial and insurance companies (assessment) and more.

When you are interested in our service-offerings for your company or institution you can contact us at the address stated below.

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Section Editor
Richard Starmans

Social Event for SIKS Ph.D. students

November 9, 2001, Utrecht

Quite some time has already passed since the last SIKS students social event, when we went carting with several Ph.D. students. The SIKS-promovendiraad (students council) considered it a good initiative to have similar events on a regular basis.

The next social event is planned for Friday November 9. We will meet around 14.30 in the station Utrecht Centraal, near the exit Jaarbeurszijde. From there, we will visit the Muntmuseum (coin museum) - a current topic - have a tour through the grachten (channels) and dine together. SIKS supports this activity with a financial contribution; part of the diner and the trip will be at your own expense.

This is a prime occasion to meet the SIKS Ph.D. students outside work. In addition, it is simply fun and interesting. If you would like to participate, please register before October 26 with me (David Jansen, dnjansen@cs.utwente.nl). If you only can participate in a part of the program, please mention this clearly in your message.

Advanced Course Multi-Agent Systems

November 12 and 13, 2001, Apeldoorn

On November 12 and 13 2001 the School for Information and Knowledge Systems (SIKS) will organize an Advanced Course on *Multi-Agent Systems*. The course takes two days, will be given in English and is part of the so called Advanced Components Stage of the Educational Program for SIKS Ph.D. students. Although these courses are 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 students taking the course. The course is given by experienced lecturers actively involved in the research areas related to the topics of the course.

Location
Hotel Apeldoorn, Soerenseweg 73 in Apeldoorn.

Scientific directors
dr. C. Witteveen (TUD)
prof. dr. J.-J. Ch. Meyer (UU)
dr. W. van der Hoek (UU)

Provisionary program:

Monday, November 12

10.15 - 10.30	Opening by prof. dr. J.-J.Ch. Meyer (UU)
10.30 - 11.30	dr. W. van der Hoek (UU): Modal and Epistemical Logic
11.30 - 11.45	Break
11.45 - 12.45	prof. dr. J.-J. Ch. Meyer: Logic for Intelligent Agents
12.45 - 14.00	Lunch
14.00 - 15.00	dr. W. van der Hoek: the Agent Language GOAL (UU)
15.00 - 16.00	dr. T. Grant (Origin): Single Agent Planning Techniques
16.00 - 16.15	Break
16.15 - 17.15	dr. T. Grant: Single Agent Planning Techniques (part 2)

Tuesday, November 13

10.00 - 11.00	prof. dr. J.-J. Ch. Meyer: Multi-Agent Epistemic Logic
11.00 - 11.15	Break
11.15 - 12.45	dr. R. Verbrugge (RUG): Logic for Multi-Agent Systems
12.45 - 14.00	Lunch
14.00 - 16.00	dr. C. Witteveen (TUD): Problems and Techniques in Multi-Agent Planning
16.00 - 16.15	Break

16.15 - 17.15 dr. H. Tonino (TUD): Plan Coordination

17.15 - 17.30 Conclusions and Evaluation

Registration
In the conference center is a limited number of places is available, while there is interest from other groups in the topic as well. Therefore, an early registration is required. Deadline for registration for SIKS Ph.D. students: October 26, 2001. After that date, applications to participate will be honored in a first-come first-serve manner. Of course, applications to participate from other interested groups are welcome already. They will receive a notification whether they can participate as soon as possible.

Information for non-SIKS Ph.D. students: SIKS needs a confirmation from your supervisor/office that they agree with the arrangement and paying conditions.

Anyone who is interested in the courses, is kindly requested to fill out the registration form on our site.

Costs
Arrangement 1: one stay in a standard room, breakfast, two lunches, dinner, course material included:
Fully registrated SIKS Ph.D. students: no charge
SIKS research fellow/associated member: *f* 400,=
Ph.D. students from IPA, ASCI, OZSL, TRAIL, BETHA or JF Schouten Institute: *f* 400,=
Other academic participants: *f* 800,=
Non-academic participants: *f* 1.500,=

Arrangement 2: same arrangement, but with the exclusion of one stay in a standard room and breakfast:
Fully registrated SIKS Ph.D. students: no charge
SIKS research fellow/associated member: *f* 250,=
Ph.D. students from IPA, ASCI, OZSL, TRAIL, BETHA or JF Schouten Institute: *f* 300,=
Other academic participants: *f* 600,=
Non-academic participants: *f* 1.250,=

Cancellation regulation
If registration is cancelled before November 3, 2001 the course fee may be refunded. After that date, no reimbursement is possible. For all questions regarding the content of the course and the educational program, please contact the SIKS office.

SIKS/SOBU symposium Contracts and Coordination

November 23, 2001, Tilburg

Communication and coordination between systems becomes more and more a focus of attention besides the internal design of systems. One of the ways in which coordination can be specified is by means of "contracts". Contracts are used in real-life, for example, in commerce, but also in system design to structure agent societies or connect workflows from different organizations. This symposium brings together different perspectives on contracts and reports about on-going research on how contracts can be used in developing information and communication systems.

Location
Katholieke Universiteit Brabant (Room to be announced).

Host
dr. H. Weigand (KUB)

Preliminary program (titles mentioned are working titles only)

10.00-10.15 Coffee/tea

10.15-10.30 Opening

10.30-11.15 Henry Prakken (UU) Contracts from an AI & Law perspective

11.15-12.00 Yao-Hua Tan (VU) Logical analysis of e-commerce contracts

12.00-13.00 Lunch

13.00-13.30 Thijs Ott de Vries (Ordina/KUB) Contracts for interorganizational systems

13.30-14.00 Virginia Dignum (Achmea/UU) Designing agents for Knowledge Management

14.00-15.00 Jose Fiadeiro (University of Lisbon) Contracts and software evolution

15.00-15.15 Coffee/tea break

15.15-16.00 Roel Wieringa (UT) A software engineering perspective on contracts

16.00 Closing

Organization
The symposium is sponsored by the SOBU L&I group and the research school SIKS. Admission is free; lunch is free for SIKS Ph.D. students, research fellows of SIKS and for members of SOBU L&I.

For other participants the costs for lunch are *f* 25,=. However, the number of participants is limited, hence it is necessary to register in advance. Applications to participate will be honored in a first-come first-serve manner. The local organizer is Hans Weigand (h.weigand@kub.nl, tel. 013-4662806).

Registration
Please, register with mrs. Alice Kloosterhuis, email: a.m.kloosterhuis@kub.nl, phone 013-4663020. Please indicate whether you are a SIKS Ph.D. student, a research fellow of SIKS or a member of SOBU L&I, and whether you want to join the lunch.

Two Basic Courses: System Modeling and Knowledge Modeling

17 -21 December, 2001, Lunteren

From December 17 to December 21, the School for Information and Knowledge Systems (SIKS) organizes two basic courses: System Modeling (B7) and Knowledge Modeling (B8) in Lunteren. The location will probably be conference center "Het Bosgoed". Both courses will be given in English and are part of the obligatory Basic Course Program for SIKS Ph.D. students. Although these courses are 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.

Organization
dr. G. Schreiber (UvA)
prof. dr. R. Wieringa (UT)
prof. dr. A. de Bruin (EUR)

Program
The program will be made available in the next issue of the Newsletter.

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SECTION KNOWLEDGE SYSTEMS IN LAW AND COMPUTER SCIENCE

Section Editor
Radboud Winkels

Second International Workshop on Legal ontologies

13-14 December, 2001
Universiteit van Amsterdam

This workshop is organised in conjunction with JURIX 2001: the Fourteenth Annual International Conference on Legal Knowledge and Information Systems (see http://www.lri.jur.uva.nl/jurix2001 for more details)

In 1997 we held the First International Workshop on Legal Ontologies in conjunction with the Sixth International Conference on Artificial Intelligence and Law at the University of Melbourne, Australia (see http://www.csc.liv.ac.uk/~pepijn/legont.html for more details). It was a successful workshop in which 8 papers were presented on issues ranging from proposals for legal (core) ontologies, through the comparison of different ontologies, to means of building them automatically from legal sources.

Since then, much research has been done, especially in the broader fields of ontological engineering and knowledge management, systems using (legal) ontologies have been built, and both practical and theoretical problems and opportunities have been encountered. It seems like a good time to have a follow-up workshop for the legal domain.

WORKSHOP AIMS

We welcome (short) papers addressing all aspects of legal ontologies, but as a source of inspiration we list some potential issues:

- Tools and languages for *constructing* and *maintaining* large legal ontologies: support for (semi-)automatic ontology construction, support for validating ontologies, the use of (Legal)XML, RDF
- *Use ans reuse* of legal and other ontologies in building legal knowledge and information systems: how to decide which ontologies are useful, setting up libraries of legal ontologies

- *Comparison* of different (legal) ontologies: criteria for comparison, reasons for or benefits from ontology comparison
- Legal ontologies in practice: experiences with systems in legal practice that are based on or use legal ontologies

IMPORTANT DATES

Deadline for submissions: October 30, 2001
Notification of acceptance: November 15, 2001

WORKSHOP ORGANIZERS

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Lezingen JURIX Bijeenkomst

Report by Jacqueline Dake
FdL, KU Brabant

Op 28 september 2001 vond een JURIX bijeenkomst in Leuven plaats. Hieronder worden de vier lezingen besproken die daar gehouden werden.

APPLICATIES VAN ZENO

Tom van Buggenhout (Zeno) sprak over de vele toepassingen op het gebied van de juridische informatica die Zeno ontwikkelt.

Zeno richt zich op alle stappen in het proces dat van data via informatie en kennis naar beslissingen leidt. Dit betreft toepassingen als *datare-engineering*, *information retrieval*, *decision-support- en expert systemen*.

Zeno is ontstaan uit SD Worx, de grootste groep op het gebied van geïntegreerd personeelsbeheer in België. Voor SD Worx heeft Zeno *Juridisk* ontwikkeld. Juridisk is een sociaal-juridische databank voor België waarin ca. 150.000 documenten op het terrein van arbeidsrecht, sociale zekerheid, CAO-wetgeving, loonfiscaliteit, internationaal recht en rechtspraak zijn opgenomen. De juridische database die bij SD al aanwezig was, is door Zeno gestructureerd met behulp van SGML. Het invoerproces moest intact worden gelaten en er moesten meerdere bevragings-interfaces ontwikkeld worden.

Momenteel werkt Zeno aan het project Edulex in opdracht van het Ministerie van Onderwijs. Dit project behelst het beschikbaar maken van de onderwijsreglementering op het WWW. Van Buggenhout besprak nog andere Zeno-cases. Deze zijn te vinden op de website van Zeno.

Kernpunt in de lezing van Van Buggenhout was dat automatisering van kennis de kennis eenvormig, overdraagbaar, onderhoudbaar en sneller beschikbaar maakt.

Op dit onderwerp haakte Jaap Hage, voorzitter van Jurix, in met de vraag of er andersom een druk voelbaar is om procedures te uniformiseren met het oog op de automatiseerbaarheid ervan. Van Buggenhout beaamt dit. Zeno streeft uniformiteit na door kenniscomponenten te ontwikkelen, interface-afspraken te maken en gebruik te maken van XML.

Verder benadrukte Van Buggenhout in zijn lezing het belang van de inbreng van de gebruiker bij de ontwikkeling van een systeem. Zeno vindt zijn inspiratie wat dit betreft in de KISS-methode van Gerald Kristen. In de lezing van Marie-Francine Moens later op de dag, kwam het belang van het betrekken van de gebruiker bij het hele ontwikkelingsproces nogmaals aan de orde.

WETGEVINGSDATABANKEN: PROBLEMEN EN OPLOSSINGEN

Marie-Francine Moens (KU Leuven) besprak twee projecten: het Agora-Lex project en het vervolg ervan, het *E*-Lex project. Het doel van het Agora-Lex project was het electronisch beschikbaar maken en ontsluiten van Belgische wetgeving en regelgeving.

België is een uitstekende proeftuin voor Europa, gezien de speciale problematiek van de tweetaligheid.

Bij het Agora-Lex project bleek dat de handmatige invoer van teksten en referentiegegevens veel problemen veroorzaakte. Het is arbeidsintensief en hierdoor is er vrijwel geen sprake van versiebeheer. Gevolg is ook dat de teksten van geconsolideerde versies niet elektronisch beschikbaar zijn op het moment dat de wijzigende akten worden gepubliceerd. Het laatste is temeer een probleem daar

in februari 2001 de Raad van Europa aan de lidstaten de verplichting oplegde dat wetgeving electronisch beschikbaar moet zijn voor het publiek, correct en up-to-date, en zowel de oorspronkelijke als de geconsolideerde versies.

Een belangrijke conclusie uit het Agora-Lex project was dat er een grotere mate van automatisering moest zijn in de *gehele* levenscyclus van databanken, te beginnen bij het opstellen van wetgeving. Door bijvoorbeeld in deze fase sjablonen aan te bieden, wordt de structuur en het gebruik van standaardformuleringen bevordert.

Bij documentuitwisseling is het bestandsformaat (ASCII) en de mark-up taal van belang (SGML, XML). Officiële electronische publicatie van wetgeving is een streefdoel. Groot aandachtspunt zal uiteraard het garanderen van de authenticiteit zijn. Bij het bewaren voor toekomstige generaties is uiteraard de blijvende toegankelijkheid van belang. Het indexeren van gestructureerde informatie zal eenvoudiger zijn te automatiseren dan het indexeren van ongestructureerde informatie. In beide gevallen is het streven om intelligente tools te ontwikkelen en gebruiken.

Moens sloot haar lezing af met een samenvatting van de positieve effecten van een grotere automatisering in de volledige levenscyclus van wetgeving:
1. volledigheid, ook qua versiebeheer;
2. het vermijden van menselijke fouten met betrekking tot consolidaties en referentiegegevens (metadata);
3. het elektronisch beschikbaar komen van teksten van gewijzigde wetgeving komen elektronisch beschikbaar op het moment van de publicatie van de wijzigende akte.

LEXICAL CHAINS

Roxana Angheluta (KU Leuven) legde in haar lezing uit wat *lexical chains* zijn, hoe ze berekend kunnen worden, en waarvoor ze gebruikt kunnen worden.

Om met het laatste te beginnen, *lexical chains* vinden toepassingen bij het automatisch samenvatten van tekst, bij tekst categorisatie (een tekst toewijzen aan een categorie), het linken van documenten en in het juridische domein bijvoorbeeld bij het desambigueren van juridische termen.

Angheluta legde uit dat *lexical chains* een representatie zijn van de lexicale cohesie van een tekst. Een *lexical chain* wordt gevormd door woorden in een tekst die (semantisch) gerelateerd zijn. Bij het bepalen van *lexical chains* worden veelal alleen zelfstandige naamwoorden in beschouwing genomen, omdat deze het meest bepalend zijn voor de inhoud van een tekst.

Om de relaties tussen woorden te bepalen, maakt Angheluta bij haar promotieonderzoek gebruik van WordNet. WordNet is ontwikkeld op de Princeton University. Het is een database met woorden en de relaties tussen die woorden. Woorden worden in *synsets* (verzamelingen van synoniemen) ondergebracht, en ook tussen de *synsets* zijn weer relaties aangebracht. Naast synonymie zijn in WordNet onder andere relaties tussen woorden opgenomen, waaronder: hyponymie (bank, stoel, tafel zijn hyponiemen van meubel) en hypernymie (meubel is een hyperniem van bank).

Met dergelijke relaties uit WordNet is het mogelijk om de *similarity* tussen woorden te bepalen. Vervolgens kunnen *chains* worden gevormd van woorden met een hoge onderlinge *similarity*.

Het eerste algoritme dat Angheluta besprak, desambigueert de woorden met behulp van een *similarity* matrix. In zo'n matrix staan horizontaal en verticaal alle zelfstandige naamwoorden van de tekst. Een cel bevindt zich dus altijd op de kruising van twee woorden. De cel bevat een lijst met voor elke combinatie van betekenissen van de twee woorden een *similarity*-score (deze wordt bepaald aan de hand van de mate van relatie tussen deze twee betekenissen in WordNet). Uit deze matrix wordt voor elk woord de 'beste' betekenis gekozen, dat is de betekenis waarvan de som van de *similarity*-scores het hoogst is.

Het tweede algoritme dat Angheluta besprak is geïnspireerd door Barzilay en Elhadad. Dit algoritme is een min of meer uitputtende zoekmethode naar alle mogelijke *chains* uitgaande van alle betekenissen van de woorden. Hoe meer verbindingen tussen woorden in een bepaalde interpretatie, hoe plausibeler die interpretatie is. Zwakke interpretaties worden tussentijds verwijderd, en uiteindelijk wordt gekozen voor de sterkste interpretatie.

Tot nu toe zijn de resultaten van het tweede algoritme beter dan die van het eerste, maar Angheluta verwacht dat een verfijning van de *similarity*-maat tussen *synsets* de resultaten van het eerste algoritme zullen verbeteren.

LINGUÏSTIEK

Rik De Busser (KU Leuven) begon zijn lezing met het beantwoorden van de vraag waarom tot nu toe de resultaten van linguïstisch onderzoek vrijwel

genegeeerd zijn bij de ontwikkeling van informatie-extractie (IE) systemen. In de eerste plaats hebben de ontwikkelaars van IE-systemen veelal een technische benadering, waardoor zij vaak ad hoc oplossingen kiezen. Ten tweede zijn theorieën uit de formele taalkunde veelal zeer complex en lastig implementeerbaar. Ook zijn het vaak partiële theorieën, die wel de basiseigenschappen verklaren en enkele uitzonderingen, maar lang niet alle taalverschijnselen dekken. Het succes van statistische technieken bij IE-onderzoek heeft mogelijk ook een rol gespeeld. Het lijkt er echter op dat deze technieken een plateau bereikt hebben.

De Busser wil in zijn promotie-onderzoek taalkundige theorie integreren in de statistische methodieken. Hij besprak twee theorieën die hiervoor geschikt zouden kunnen zijn.

Rhetorical Structure Theory (RST) is eind jaren '80, begin jaren '90 geformaliseerd. Met RST kan een tekst worden geanalyseerd. De bouwstenen van de tekst worden geïdentificeerd en de relaties tussen die bouwstenen worden benoemd. Relaties zijn bijvoorbeeld: *elaboration*, *contrast*, *justification*, *concession* en *exemplification*. Twee bouwstenen met hun onderlinge relatie kunnen weer een bouwsteen vormen op een hoger niveau. RST levert als analyse van een tekst dus uiteindelijk een boomstructuur op.

RST is een gereedschap waarmee belangrijke delen van een tekst onderscheiden kunnen worden van de minder belangrijke delen, hetgeen bijvoorbeeld van belang is voor het maken van automatische samenvattingen. De Busser noemde nog enkele onvolkomenheden van RST: retorische relaties zijn niet altijd expliciet aanwezig; de *cues* die een relatie signaleren in een tekst, zijn soms ambigu en de relaties zelf zijn soms ook ambigu.

De tweede theorie die De Busser besprak was de Functionele Grammatica (FG). Deze relateert syntactische frasen aan functionele rollen, zoals: *actor* (= degene die de handeling verricht), *process* (= de gebeurtenis), *goal* (= wat de actor wil bereiken; syntactisch veelal het lijdend voorwerp).

De Busser noemde als groot voordeel van de FG boven klassieke IE-technieken, dat eerstgenoemde domeinonafhankelijk is, terwijl de klassieke IE-technieken zwaar leunen op input van domeinkennis.

De Busser besloot met het toelichten van de functie van de FG in het juridisch domein: het kan de kwaliteit van automatische samenvattingen van vonnissen bevorderen, waar de bijdrage van de FG met name ligt bij de identificatie van semantische rollen.

Links met betrekking tot bovenstaande lezingen:
Zeno:
http://www/zeno.be/
Raad van Europa verplichtingen:
http://cm.coe.int/ta/rec/2001/2001r3.htm
Wordnet:
http://www.cogsci.princeton.edu/~wn/index.shtml

CONFERENCES, SYMPOSIA WORKSHOPS

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

November 5-7, 2001
The 8th International Conference on Multimedia Modeling (MMM2001). CWI, Amsterdam, The Netherlands.
Information:
http://www.cwi.nl/conferences/MMM01/

November 18-21, 2001
The 7th Australian and New Zealand Intelligent Information Systems conference (ANZIIS). Perth, Australia.
Information: http://www.arcme.uwa.edu.au/~anziis/

November 23, 2001
1ste Grote Terminologiedag: Terminologie en Taaltachnologie. Antwerpen, België.
Information: http://www.taalunieversum.org/tst/

November 29-December 2, 2001
The 2001 IEEE International Conference on Data Mining (ICDM '01). Silicon Valley, California.
Information:
http://www.cs.uvm.edu/~xwu/icdm-01.html

December 10-12, 2001
The twenty-first Annual International Conference of the British Computer Society's Specialist Group on Knowledge Based Systems and Applied Artificial Intelligence (ES2001). Cambridge, England.
Information: http://www.bcs-sges.org/es2001/

December 13-14, 2001
Fourteenth Annual International Conference on Legal Knowledge and Information Systems. University of Amsterdam, The Netherlands.
Information: http://www.lri.jur.uva.nl/jurix2001/

March 1-8, 2002
Interdisziplinäres Kolleg 2002. Focus Theme: Autonomie and Emotion. Günne am Möhnesee, Germany.
Information: http://www.tzi.de/ik2002/

March 20-22, 2002
Fifth IFIP International Conference on Formal Methods for Open Object-based Distributed Systems. Universiteit Twente, The Netherlands.
Information:http://trese.cs.utwente.nl/fmoods2002/

March 19-22, 2002
The IFIP 14th International Conference on Testing of Communicating Systems (IFIP TC 6 / WG 6.1). Berlin, Germany.
Information: http://www.fokus.gmd.de/events/

April 2-5, 2002
Sixteenth European Meeting on Cybernetics and Systems Research. Vienna, Austria.
Information: http://www.oefai.at/emcsr/

April 8-11, 2002
Fifth International Conference on Coordination Models and Languages. York, UK
Information: http://www-users.cs.york.ac.uk/~wood/Coord02/Coordination2002.html

April 19-21, 2002
NMR'2002 session on Argument, Dialogue and Decision. Toulouse, France.
Information:
http://www.cs.uu.nl/people/henry/add02/add02.html

June 26-28, 2002
4th International Conference on Advanced A/D and D/A. Prague, Chech Republiqic.
Information: http://measure.feld.cvut.cz/

July 15-19, 2002
Autonomous Agents & Multiagent Systems (AAMAS2002).
Information: http://lia.deis.unibo/it/aamas2002

July 21-26, 2002
15th European Conference on Artificial Intelligence (ECAI). Lyon, France.
Information: http://ecai2002.univ-lyon1.fr/

July 25-27, 2002
3rd International Conference on Computers and Games. Edmonton, Canada.
Information: http://www.cs.ualberta.ca.cg2002

October 21-22, 2002
14th Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2002). Leuven, Belgium.
Information: Hendrik.Blockeel@cs.kuleuven.ac.be

November 26-29, 2002
The 2002 IEEE International Conference om Data Mining (ICDM'02). Maebashi City, Japan.
Information: http://kis.maebashi-it.ac.jp/icdm02

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