NEWSLETTER

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BNAIC 2003 programme

UvA world champion RoboCup simulation

Modal action logics in action

News from the Belgium-Netherlands Association for Artificial Intelligence

AI on and off the Road

Editor-in-chief

Seven years ago, in Korea, the first robot soccer World Cup was organized. Since then, robot soccer has evolved strongly and the robot soccer events have grown proportionally. On page 82 of this Newsletter there is a report on the Dutch success in the simulation league of the RoboCup 2003 World Championship. For those of our readers who are ready for a new contest that involves AI and robots, there is now the *DARPA Grand Challenge* (or *DARPA Challenge*). It encompasses a race of fully autonomous vehicles over a distance of more than 250 miles. The first and only prize is one million dollars. The DARPA challenge is to be held at March 13, 2004. DARPA (the Defense Advanced Research Projects Agency of the U.S. Department of Defense) organizes the race to advance research in autonomous vehicle technology; of course DARPA has military purposes with this type of research. BNVKI members who do not mind military applications and who would like to participate should note that they cannot start their own team but must join an American team, since team leaders must be U.S. citizens.

These are the most salient rules:

- The route will include paved and unpaved roads, trails, and off-road parts. Moreover, there will be man-made and natural obstacles. See the pictures below for examples. There will be no non-Challenge traffic on the route.
- Only vehicles that finish within the time limit of ten hours are eligible for the prize.
- The route will be unknown to the contestants until two hours before the start of the race. The route description consists of coordinates of waypoints, which define the corridor through which the vehicle is allowed to drive. The corridor may be as narrow as ten feet. When a vehicle leaves the corridor, it will be disqualified.
- GPS (Global Positioning System) may be used, but reception will not be fully reliable.
- It is not allowed to damage intentionally the environment or competing vehicles.

This is a grand challenge indeed! The constraints require an average speed of more than 40 km/h. That is quite daunting given the types of terrain that must be crossed. Your editor-in-chief would not be surprised if no vehicles will finish in time. The rules state that the DARPA Challenge will be repeated annually until there is a winner or the authorization of Congress to award the prize expires – currently in 2007. I wonder what is more probable: the DARPA challenge finished by 2007 or robots that win against the human world champion soccer team by 2050?

Grand Challenge: http://www.darpa.mil/grandchallenge/

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BNVKI-Board News

Han La Poutré

I am writing this in the first week of August, at the start of my holiday. While several people are already returning to work, this is different for me. However, I already enjoyed several free days, enjoying the warm weather in the Netherlands, and attended several festivities in Amsterdam and surroundings. Thus, like for most people, this is the period to relax, get new energy, and get new ideas.

This last aspect is something very valuable in science, and particular in sciences like artificial intelligence and computer science in general. Creativity is an essential ingredient of our discipline. Without innovative ideas, it is hard to get breakthroughs and even just substantial progression. Creativity deals with making something new, either from scratch or by putting something in a new context. It relates to staying curious and young at heart, when looking at the world: always try to improve the current state of the art, always try new ways to solve problems, and always try to challenge existing solutions and approaches.

In August/September, the new academic year starts again. Most people will then again perform their research with new energy and youthful enthusiasm. At the BNVKI, we will make an energetic start with the BNAIS on October 9th and the BNAIC on October 23rd and 24th. Both events are full of energy, showing the young energy of our AI students, as well as the experienced skills of our AI researchers in the Netherlands and Belgium. Also, in August, Walter Daelemans and Jaap van den Herik will have been presented their ECCAI Fellows Certificates, with which the BNVKI board likes to congratulate them (see the article below). An energetic start indeed…

I like to wish everyone a good new year in research, with lots of creativity, youthful enthusiasm, and innovative results!

New Dutch and Belgian ECCAI Fellows

Board of the BNVKI

The Board of the BNVKI is very pleased to announce that the ECCAI has elected one foremost Belgian AI researcher, Walter Daelemans, and one foremost Dutch AI researcher, Jaap van den Herik as ECCAI Fellows.

Prof. Walter Daelemans (Universiteit Antwerpen, Universiteit van Tilburg) has made major contributions to the areas of machine learning and natural language processing. Prof. Jaap van den Herik (Universiteit Maastricht, Universiteit Leiden) has contributed to diverse subfields of AI, especially games & search and AI & law. Both candidates have previously been active as members of the BNVKI Board, as one among many ways in which they have provided service to the European AI community.

The purpose of the ECCAI Fellows program is to recognize individuals who have made significant, sustained contributions to the field of AI in Europe. Leadership in ECCAI or ECCAI member societies, support of forums for the exchange of ideas, and extended service for the international AI community also play a role in the selection process. The ECCAI member societies nominate individuals whom they consider to have achieved unusual distinction in the field. From the nominees the ECCAI Fellows Selection Committee generally selects 5 to 10 new Fellows each year.

Modal Action Logics for Reasoning about Reactive Systems

Ph.D. Thesis by Jan Broersen
CS, Universiteit van Amsterdam

Report by Barteld P. Kooi
AI, RU Groningen

In the movie *Monty Python and the Holy Grail* (1975) there is a scene in which it is explained how the Holy Hand Grenade of Antioch is to be used:

First shalt thou take out the Holy Pin. Then, shalt thou count to three. No more. No less. Three shalt be the number thou shalt count, and the number of the counting shall be three. Four shalt thou not count, nor either count thou two, excepting that thou then proceed to three. Five is right out. Once the number three, being the third number, be reached, then, lobbest thou thy Holy Hand Grenade of Antioch towards thy foe, who, being naughty in My sight, shall snuff it.

I would like to focus your attention to the sentence *Four shalt thou not count, nor either count thou two, excepting that thou then proceed to three.* It seems natural that the action *counting to two* is forbidden, *counting to three* is obligatory, and *counting to four* is forbidden. However it is quite difficult to give a formal account of this kind of phenomenon, where an action is obligatory, but a

subaction of the obligatory action is forbidden, or where an action is forbidden, but a subaction is obligatory. When a formal requirement specification of a computer system is given, there are also statements about actions being obligatory or forbidden. But should we interpret these statements in such a way that when an action is obligatory, all its subactions are forbidden, or are all subactions also obligatory, or are we not commited either way? It is one of the issues Jan Broersen deals with in his dissertation.

WHICH LOGIC?

Broersen's dissertation consists of four main parts. There is a chapter on modal logics of action composition, there is one on temporalizing modal action logics, one on intended modal action logics, and one on deontic modal action logic. In this review I will focus on the latter, deontic modal action logic.

Logic is the science of inferences. The question logic mainly tries to answer is whether an inference, consisting of premises and a conclusion, is valid or not. This is done by abstracting from specific inferences and translating an inference into a logical language. Semantics, proof systems, and decision procedures are developed for such logical languages, and with these one can say whether an inference in a logical language is valid or not. One of the problems of logic is that one can choose the extent of the abstraction from the real inferences. For example, an inference such as *All dogs are vicious and Lassie is a dog, therefore Lassie is vicious*, when translated to the language of *propositional* logic will be something like p, $q \,/\, r$ which is not valid in propositional logic, but when the inference is translated to the language of *predicate* logic it will be something like $\forall x\ (D(x) \rightarrow V(x))$, $D(l \,/\, V(l)$, which is valid in predicate logic. This example shows that it is very significant to choose an appropriate logical language, for the inferences one wants to study.

MODAL LOGIC FOR SOFTWARE ENGENEERING

Broersen studies reactive systems with modal action logics. Reactive systems continuously interact with their environment. As an example one can think of operating systems, which continuously receive and provide information. Reactive systems can be very complex due to their continuous interaction, especially if concurrency (more actions happen simultaneously) also plays a role. Hence programmers do not always have a clear view of the consequences of their decisions. This calls for formal methods.

The question is what the right level of abstraction is to study inferences about these systems. There are very many logics to reason about computers and algorithms: (propositional) dynamic logic, temporal logics (including CTL and LTL), higher order logic (especially in theorem provers). As Broersen points out, which logic one uses very much depends on the objective one has. Is one designing the system, or verifying the system? When one is designing the system, one can work at quite a high abstraction level. On the other hand, when one is verifying a system, one is dealing with a specific system, which means all the details are filled in. Broersen refines this distinction, by dividing design into *system specification* and *requirements specification*. In both areas logic plays an important role. But there are still many logics available.

To my surprise I found that deontic logic is also used to study inferences about algortihms. Traditionally deontic logic is the logic of permission and obligation, and is used especially in ethics (moral philosophy), which seems to have very little to do with computer science. However, when formulating system requirements, it seems natural to say for example that a system must perform a certain action, or when a certain condition holds a certain action is not permitted. Observe that deontic assertions are made about *actions* rather than deontic assertions are made about *assertions*, as is usually the case in deontic logic. This yields some very interesting insights into deontic logic.

Broersen studies three deontic modalities: O, P, and F, which are obliged, permitted, and forbidden, respectively. They can be applied to PDL-like actions (atomic actions, sequential compositions, non-deterministic choices, and iterations). One of the choices to be made when giving formal semantics for these logics is how to read these operators when they are applied to a choice. For example is $F(\alpha) \wedge \neg F(\alpha \cup \beta)$ consistent? This is to be read as "it is forbidden that α and it is forbidden to choose α or β." This depends on how one views these sentences. Broersen views them as norms imposed by a system designer. When a nondeterministic choice occurs, it means the system designer does not control this choice. The system makes a choice in such a case. Consequently is $F(\alpha) \wedge \neg F(\alpha \cup \beta)$ is considered inconsistent. By similar reason the desiderata for the logic developed by Broersen are that $P(\alpha \cup \beta) \wedge \neg P(\alpha)$ is inconsistent and $O(\alpha \cup \beta) \wedge \neg O(\alpha)$ is consistent. Broersen calls his view on choice *free choice* as opposed *to imposed choice*.

GOAL NORMS VERSUS PROCESS NORMS

Another choice to be made is how to read these operators when they are applied to sequential compositions. Broersen is the first to distinguish *goal norms* from *process norms*. The idea is that the deontic status of an action depends on the final state when one considers a deontic formula to be a goal norm. When a deontic formula is taken to express a process norm it expresses something about the process of performing the action. In the case of process norms permission to perform an action implies permission to perform all subactions. But this need not be the case for goal norms. This can be seen in the example of the Holy Handgrenade of Antioch. One is obliged to count to three, but one is forbidden to count to two, or four. This can be expressed as $O(1;2;3) \wedge F(1;2) \wedge F(1;2;3;4)$. Therefore one must consider the description of how the Holy Handgrenade of Antioch is to be used as a goal norm. The distinction between goal norms and process norms can only be made in the context of action logics. I think this distinction can be very beneficial for the explication of deontic concepts.

One would like to see these logics being applied in practice to reactive systems. As Jan Broersen remarks at the end of his dissertation unfortunately a case study is lacking. I look forward to his future work.

Jan Broersen. *Modal Action Logics for Reasoning about Reactive Systems*. SIKS Dissertation Series No. 2003-02, Amsterdam, 2003.

UvA Trilearn World Champion RoboCup Simulation

Jelle R. Kok
II, Universiteit van Amsterdam

Our robot soccer simulation team *UvA Trilearn* has won the RoboCup World Championship 2003. In this tournament, consisting of 46 qualified teams, UvA Trilearn won all 16 matches played with an overall goal difference of 177-7. In an exciting final we defeated TsinghuAeolus, the 2001 and 2002 champion, with a score of 4-3.

We will describe the Robot World Cup (RoboCup) Initiative and the Simulation League in particular. Thereafter, we will focus on the history of UvA Trilearn and the research aspects incorporated in the team. The last part will be devoted to a description of the World Championship tournament held in Padova, Italy.

ROBOCUP

The Robot World Cup Initiative (RoboCup) is an attempt to foster AI and intelligent robotics research by providing a standard problem in which a wide range of technologies can be integrated and examined. RoboCup's ultimate goal is to develop a team of fully autonomous humanoid robots that can beat the human world champion soccer team by the year 2050. In order to realize this goal several hardware and software competitions have been set up which all focus on different aspects of the overall problem.

Our focus will be on the Simulation League. In this league each team consists of 11 synthetic (software) agents which operate autonomously in a physical soccer simulation system, called the soccer server. This multiagent environment provides each connected player with (partial) information about the current state of the world and updates the players' state based on the low-level actions they send to the server. In this system the action selection is distributed and sensing and acting are asynchronous. Furthermore, various forms of uncertainty are added into the simulation such as sensor and actuator noise, noise in object movement, limited perception, unreliable low-bandwidth communication and limited physical ability. One of the advantages of the soccer server is the abstraction made, which relieves researchers from having to handle robot problems such as object recognition and movement. This abstraction makes it possible to focus on higher level AI concepts such as machine learning, multiagent collaboration, opponent modeling and strategic reasoning. Currently, the simulation league is by far the largest league due to the fact that no expensive hardware is needed to build a team.

UVA TRILEARN RESEARCH ASPECTS

The work on UvA Trilearn started at the end of 2000 by Remco de Boer and myself as our graduation project in the fields of Computer Science and Artificial Intelligence. In this project

much effort has gone into the lower levels. The intention was to try to improve upon the low-level methods used by other top teams from the past. This has among other things led to an advanced synchronization scheme, an optimal scoring policy and very accurate methods for position and velocity estimation using particle filters. The resulting team UvA Trilearn 2001 participated in the German Open 2001 (5th place) and the World Championship 2001 in Seattle (4th place).

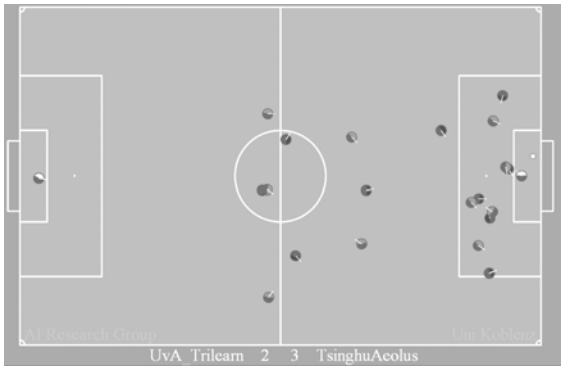
After graduation, I remained at the UvA as a Ph.D. student and continued the work on UvA Trilearn as part of my research. The main extensions to the 2001 team were the behavior modeling of teammates, and an action selection method based on a priority-confidence model. This resulted in UvA Trilearn 2002 that won the German Open 2002. During the RoboCup-2002 competition in Fukuoka, Japan (with 117,300 visitors in four days), we again failed to reach the podium at a World Championship and became fourth for a second time in a row.

This year's team showed improvements in both the intercept and the dribble skill (the latter using reinforcement learning techniques), but most work was done to specify the coordination between the different agents. For this, we used coordination graphs which offer scalable solutions to the problem of multiagent decision making via a context-specific decomposition of the problem into smaller subproblems. Coordination graphs are applied to the continuous domain by assigning roles to the agents and then coordinating the different roles. UvA Trilearn 2003 participated in three tournaments (the German Open, American Open and the RoboCup-2003 World Championship) and won all three of them.

ROBOCUP-2003 WORLD CHAMPIONSHIP

This year the 7th RoboCup World Championship was held in Padova, Italy and lasted five days. From the 100 preregistered simulation teams 46 qualified for this competition. In the first round the teams were divided into eight groups in which the first three teams would qualify for the next round. UvA Trilearn only had slight difficulties with the tight defense of the German team Mainz Rolling Brains (3-0). We won all other matches with a goal difference of more than 24 goals. The remaining 24 teams were then divided into four groups and again the first three teams of each group would go through to the (final) round. Except for a difficult match against the Chinese team Helios (2-1) all games were won easily. In this final round only the first two teams of both groups would go to the semi-final. UvA Trilearn also won this group; most surprising was the 7-1 victory over the Chinese team Everest, runner-up of RoboCup-2002. In the semi-final, UvA Trilearn defeated the German team Brainstormers, which had been responsible for our elimination in RoboCup-2002, by 4-1.

Our opponent in the final was the Chinese team TsinghuAeolus, the champion of both RoboCup-2001 and RoboCup-2002. In 2001 we lost with 0-7 against this team, but this time the game was much more balanced. The Chinese team scored the first goal after a mistake of our goalkeeper, who kicked the ball to an opponent attacker after a goal kick. In the remaining part of the first half, play shifted from side to side, but no more goals were scored. In the beginning of the second half, TsinghuAeolus scored their second goal after a nice combination from the side. Shortly thereafter, a good attack of UvA Trilearn put the goal difference again back to one (1-2). This didn't last long and in the following attack the Chinese team scored again (1-3). After this goal, the players of the Chinese team seemed to get tired and have difficulties with our quick, coordinated passes. The defenders of TsinghuAeolus, who normally would stay close to the attackers, moved slower and gave the attackers more room to maneuver. The coordination between our players was clearly



UvA Trilearn scores 3-3 in the final.

visible and all players around the ball were continuously moving to a free position in order to receive a possible pass of the ball owner. In one of the following attacks, our left wing attacker passed to a free player in front of the goal who could shoot the ball freely into the goal and so reduced the goal difference back to one. In the final part of the match, a similar attack provided the equalizer. The players kept pressing the defense of TsinghuAeolus and another 20 seconds later, they scored the fourth goal. UvA Trilearn was now leading the match. In the remaining minute, TsinghuAeolus was able to start pressing again resulting in some anxious moments in front of our goal but fortunately they were all saved by the goalkeeper. For the first time, UvA Trilearn became world champion!

More information about UvA Trilearn, publications of the above mentioned research aspects, results of the various tournaments and flash files of the matches can all be found at http://www.science.uva.nl/~jellekok/robocup

Developments in Evolutionary Computation: GECCO-2003

Report by Edwin de Jong
ICS, Universiteit Utrecht

From July 12 to 16, hundreds of AI researchers gathered in sunny Chicago to report and hear about the most recent developments in evolutionary computation. In this report, I will try to give an impression of the conference and discuss several interesting developments in an introductory manner. I thereby hope to give an idea of what is going on in the evolutionary computation field at the moment to readers not specialized in the area.

BACKGROUND

The GECCO conference series started in 1999, and brought together the International Conference on Genetic Algorithms (ICGA) and the Annual Genetic Programming Conference (GP). GECCO aims to be a general forum for high-quality research from all branches of evolutionary computation, and along with the Congress on Evolutionary Computation it is one of the main conferences in the field.

The conference took place at the rather large Mart Plaza Holiday Inn hotel in downtown Chicago. All conference rooms were one floor below the hotel reception, but as the reception was located on the 15th floor, this should not be taken to mean that the meeting was an underground event!

BUILDING BLOCKS

On Monday morning John Holland, one of the founders of genetic algorithms in the 1960s, started off the main program of the conference by giving an invited lecture. A question that currently occupies Holland is how useful *building blocks* may be formed. This question has a long history in evolutionary computation, but recently the issue is becoming clearer. Several interesting developments relating to this question were reported, but first some background is in order.

In the standard genetic algorithm, candidate solutions are called individuals, and have the form of bit-strings. A schema is a partially specified individual; for example, the schema 0*10 represents the individuals 0010 and 0110. Let us call a schema *small* when it defines only a small number of bits *and* the distance between the outermost defined bits is small. Then a hypothesis that can explain the operation of the genetic algorithm is that small schemata of above-average fitness, called *building blocks*, are combined to form strings of potentially higher fitness. However, the standard genetic algorithm can only work in this way for problems with a certain structure, and it is therefore important to understand *what kind* of structure is required. Moreover, it will be seen that a much larger class of problems can be addressed by variants of the genetic algorithm that *learn* the structure of a problem.

REPRESENTATIONS AND OPERATORS

An important aspect of the structure of a problem is the way the problem is *encoded*. This aspect determines to a great extent whether a genetic algorithm will be successful in addressing the problem. This issue was the topic of the workshop called Analysis and Design of Representations and Operators (ADoRO), organized by Dirk Thierens and Franz Rothlauf. The encoding or *representation* of an evolutionary or learning algorithm refers to the way features of the problem domain are mapped to bit-strings used by the algorithm. For example, a checkers setup could be represented by a list of the positions of the black and white stones, or by a list specifying the contents of each position. A second choice to be made when using an evolutionary algorithm is what *operator of variation* should be used; typical examples are one-point and two-point crossover, both of which take two bit-strings, cut them in one or two places, and exchange a consecutive series of bits between the individuals.

A central theme of this workshop was the notion that the encoding or representation of a problem cannot be seen separate from the operators of variation that are used. Thus, while it is well-known that choosing an appropriate representation can greatly influence the performance of the algorithm, it is equally important to make sure that the operator that is chosen fits well with the representation. The identification of fruitful combinations of representations and operators is therefore essential, and the workshop featured several interesting papers contributing to this goal, e.g. [4,8].

CROSSOVER AND ITS LIMITATIONS

Coming back to our earlier question, the close relation between representations and operators

already makes clear why the standard genetic algorithm will not always work as desired; the algorithm uses a single, fixed operator (crossover), independent of what representation will be used. Since the crossover operator breaks strings and combines them it can easily try out and move around different schemata consisting of neighboring bits, while for other schemata this can be much less likely. For example, while any series of consecutive bits can be exchanged by applying one-point crossover twice, swapping the zeroes in 1101111011 with the ones in 0010000100 would already require four operations. As a result of this, schemata with variables that are far apart are disfavored: it is unlikely that different schemata of this form will be sufficiently explored and combined with other successful schemata.

DEPENDENCIES

As seen above, the normal crossover operator can successfully explore combinations of schemata containing neighboring bits. So far however, we have not considered which schemata one would *want* to be explored. This question has become much clearer thanks to a statistical view of genetic algorithms. The overall goal of a genetic algorithm is to find individuals with high fitness values. If we consider how much each bit in the bit-string contributes to fitness, then a lot can be said about the structure of a problem. For example, it could be the case that the value of each bit is completely independent of the setting of the other bits in the statistical sense: if for two bits we know the probabilities that the bits will contribute a high value to the overall fitness, and that the fitness contributions of these bits are independent, then we can obtain the probability that they will both contribute a high value simply by multiplying these probabilities. If this is the case, the bits can be optimized independently. That is, the best combination for bits A and B is simply the combination of the best settings of A and B.

If all bits in an n-bit bit-string are independent of one another, the problem is really quite easy; the optimization problem can be solved in $O(n)$ time, as the individual only has to be evaluated twice for each bit it contains. Unfortunately, this is rarely the case in any practical problem; in most problems, the effect of a bit on the overall fitness depends on the setting of one or more other bits. For sets of bits that are interdependent, different combinations of their settings will have to be considered.

Now it can be seen for what kind of problems the standard genetic algorithm is likely to work; namely, for problems where bits whose fitness contributions depend on one another are close to each other on the genome. For such problems, the standard crossover operator is likely to explore just the combinations we are interested in.

CHANGING THE REPRESENTATION

For problems whose natural representation does not correspond with the available operators of variation, there are several things that can be done. First, a new representation can be designed by hand to fit the operator, or vice versa. For standard crossover, this would mean determining which bits are interdependent, and placing them near each other on the genome. An interesting question however is whether the algorithm *itself* can determine what the dependencies between the variables are, and use this information in searching for good solutions.

It turns out that automatic determination of dependencies is indeed possible, and in a sense this allows algorithms to perform 'black-box optimization', i.e. optimization by methods that employ minimal knowledge about the problem domain. By comparing different settings of bits and comparing the resulting fitness values, dependencies between variables can be identified; this idea is known as *linkage learning*. The only drawback of this promising approach is that it can be a costly process. Thus, a topic that currently receives considerable attention is how linkage learning can be performed in efficient ways.

LINKAGE LEARNING

Several papers at the conference addressed the above issue. Heckendorn and his co-author, éminence grise Alden Wright, presented a method where schemata of increasing length were considered, thereby using information from the previous steps [6]. Danica Wyatt, working with Hod Lipson at Cornell University, presented an interesting approach using the Hessian matrix to discover linkage and employing this information to transform the representation during the search [15]. Steven van Dijk of the Universiteit Utrecht more generally discussed principles that should be taken into account when designing a genetic algorithm [13]. One particular algorithm using linkage learning is BOA. Instead of using crossover, BOA uses a Bayesian network to represent the population and generate new individuals. Martin Pelikan presented new results with a hierarchical version of BOA on Ising spin glasses (the problem of finding minimal energy states for models of magnetic materials) and MAXSAT [11]. H-BOA and SEAM [14] identify useful modules in a hierarchical fashion. In this way, certain problems a

simple genetic algorithm would not be able to address can be solved in a scalable manner.

By letting the algorithm learn the linkage structure of a problem rather than using a fixed crossover operator, an important bias or assumption is removed from the genetic algorithm, thereby making it more general. A second important source of biases that remains is the fitness function; for many problems, the fitness function provides little information of the distance (e.g. number of mutations) to high-quality individuals, and for some problems it even provides little more than a wild guess of the relative quality of individuals. However, having an accurate evaluation function can be instrumental in solving a problem. For example, if the MiniMax evaluation function for chess would be available, it would be possible to play optimal chess (against a utility minimizing opponent) by considering only about 35 board positions per move. Clearly, such an evaluation function would be very valuable to have, and an important question therefore is how the use of the typically very inaccurate fitness function could be avoided or circumvented.

COEVOLUTION

The approach within evolutionary computation that aims to achieve this is called coevolution, as it employs setups where the evaluation of individuals depends on other (co-)evolving individuals; more on this topic can be found in Vol. 18, No. 2 of this Newsletter. Specifically, coevolution can be used when the quality of individuals can be determined using tests; in this case, evolving individuals can be evaluated on tests, which are in turn evolved based on the outcomes they return. A seminal paper using this setup co-evolved sorting networks with test sequences functioning as parasites [9].

Although coevolution holds the promise of an evolutionary optimization method that does not require designing a fitness function, evaluation based on a changing population can easily become very inaccurate. Indeed, the use of coevolution has often resulted in problems such as disengagement (where the tests become too easy or too difficult), over-specialization (where the tests only focus on certain aspects of the problem), and intransitivity, which (like over-specialization) can lead to cyclic behavior. Recently however, substantial advances have been made regarding evaluation in coevolution.

ENSURING PROGRESS

As a result of long-term efforts aimed at understanding coevolution and making it reliable, it has become clear what is necessary to provide monotonic progress without making overly strict assumptions, such as a one-dimensional objective function. In particular, the collection of tests required to provide accurate evaluation of learners can be specified. Four papers related to accurate evaluation and ensuring progress were presented at the conference [2, 5, 7, 12]. It will be interesting to see whether algorithms based on these ideas can be made practical so as to make coevolution a standard problem-solving technique. Formalisms used to analyze coevolutionary setups include the mathematical theory of pre-orders, evolutionary multi-objective optimization (EMOO), and game theory. The latter approach was used in [5], where a Nash-memory was proposed, and this paper won the Best Paper award in the Coevolution track. An interesting new tool in the analysis of coevolution was the use of Markov chains [10]; this approach can be used to produce exact results for finite size populations.

FINALLY...

Naturally, this report has only been able to discuss a small fraction of all the research that was presented at the conference. I hope that it may serve to give an impression of some recent developments in the field. To the reader who is interested in learning more, we point out that the proceedings of this year's GECCO are available online [3]. Next year's GECCO conference will take place in Seattle, and will be co-located with the Congress on Evolutionary Computation. Hope to see you there!

[1] Alwyn Barry (ed.), 2003. Genetic and Evolutionary Computation Conference Workshop Program.

[2] Anthony Bucci and Jordan B. Pollack. Focusing versus Intransitivity: geometrical aspects of co-evolution. In [3], pp. 250-261.

[3] Erick Cantu-Paz, James A. Foster, Kalyanmoy Deb, Lawrence David Davis, Rajkumar Roy, Una-May O'Reilly, Hans-Georg Beyer, Russell Standish, Graham Kendall, Stewart Wilson, Mark Harman, Joachim Wegener, Dipankar Dasgupta, Mitch A. Potter, Alan C. Schultz, Kathryn A. Dowsland, Natasha Jonoska, and Julian Miller (eds.), 2003. *Proceedings of the Genetic and Evolutionary Computation Conference.*
http://link.springer.de/link/service/series/0558/tocs/t2723.htm
http://link.springer.de/link/service/series/0558/tocs/t2724.htm

[4] Uday K. Chakraborty and Cezary Z. Janikow. Binary and Gray Encoding in Univariate Marginal Distribution Algorithm, Genetic Algorithm, and Stochastic Hillclimbing. In [1], pp. 8-14.

[5] Sevan G. Ficici and Jordan B. Pollack. A Game-Theoretic Memory Mechanism for Coevolution. In [3], pp. 286-297.

[6] Robert B. Heckendorn and Alden H. Wright. Efficient Linkage Discovery by Limited Probing. In [3], pp. 1003-1014.

[7] Edwin D. de Jong and Jordan B. Pollack. Learning the Ideal Evaluation Function. In [3], pp. 274-285.

[8] Bryant A. Julstrom and Guenther R. Raidl. A Permutation-Coded Evolutionary Algorithm for the Bounded-Diameter Minimum Spanning Tree Problem. In [1], pp. 2-7.

[9] Daniel W. Hillis (1990). Co-Evolving Parasites Improve Simulated Evolution in an Optimization Procedure. *Physica D*, Vol. 42, pp.228-234.

[10] Anthony M.L. Liekens, Huub M.M. ten Eikelder, and Peter A.J. Hilbers. Finite Population Models of Co-evolution and their Application to Haploidy versus Diploidy. In [3], pp. 344-355.

[11] Martin Pelikan and David E. Goldberg. Hierarchical BOA Solves Ising Spin Glasses and MAXSAT. In [3], pp. 1271-1282.

[12] Lothar M. Schmitt. Coevolutionary Convergence to Global Optima. In [3], pp. 373-374.

[13] Steven van Dijk, Dirk Thierens, and Linda C. van der Gaag. Building a GA from Design Principles for Learning Bayesian Networks. In [3], pp. 886-897.

[14] Richard A. Watson, and Jordan B. Pollack (2003). A Computational Model of Symbiotic Composition in *Evolutionary Transitions*. *Biosystems* Special Issue on Evolvability. Vol. 69, no. 2-3, pp. 187-209.

[15] Danica Wyatt and Hod Lipson. Finding Building Blocks through Eigenstructure Adaptation. In [3], pp. 1519-1529.

CLIF Symposium

Report by Joris van Looveren
AI Lab, Vrije Universiteit Brussel

Linguistics is becoming a very diversified field. This was proven once more on the CLIF (Computational Linguistics in Flanders) symposium on April 25 in Brussels. The goal of the CLIF symposium is to allow Ph.D. students of the CLIF member institutions to present their work to fellow students, researchers and other interested parties. There were seven speakers, who each tackled a different subfield of computational linguistics: human-machine interaction, and especially voice recognition and face animation, and a number of more classical CL subjects.

HUMAN-MACHINE INTERACTION

Louis ten Bosch (KU Nijmegen) presented a framework for human-machine (HM) interaction that is being developed within a European project. The interesting aspect of this project is the way in which the different components that play a role in HM interaction work together: it is not a simple pipeline architecture in which information flows from the microphone to the application; rather, there is also feedback from higher-level modules (such as a dialogue management module) to lower-level modules about what is to be expected. In this way, the lower-level modules can focus on what is likely to come in an interaction, and perform better accordingly.

Another presentation on human-machine interaction focused on animating a virtual face based on a speech stream. Traditional methods do this by transforming a phoneme stream into visemes (face shapes associated with the pronunciation of phonemes). This is fairly easy, but it has some potential drawbacks. For example, it is not certain that phoneme boundaries correspond very well with viseme boundaries; in other words, it is very well possible that the articulation pattern of the mouth is different from the acoustic articulation pattern. Therefore, Ilse Ravyse (VU Brussel, ETRO) built a model that directly converts a speech stream into visemes, without the intermediary step of transforming speech to phonemes. The first results indicate that the approach works, but there is still a lot of fine-tuning to do.

In a final presentation on speech recognition, Mathias De Wachter (KU Leuven, ESAT) explored the potential of example or memory-based methods for speech recognition. Here, instead of building

Markov models for words from examples, the examples themselves are kept in memory, and are directly compared to the input speech stream, using a Dynamic Time Warping algorithm. The algorithm presented tackled the explosion of the search space in an interesting way.

MULTI-LINGUAL SYSTEMS

Paul Buitelaar from the DFKI in Saarbrücken spoke about developing semantic ontologies in a cross-lingual setup. The work he is involved in is about building a multi-lingual data base system of journal abstracts in the medical domain, and retrieving them not only using queries in the articles' original language, but also in other languages.

Vincent Vandeghinste and Peter Dirix (both KU Leuven, CCL) are working in the context of machine translation. Research in machine translation suffers from a number of specific problems, such as the non-availability of translating corpora. Therefore, techniques for getting by with monolingual corpora have been developed, as they are widely available. The research at CCL is to achieve better translation quality by not only using statistical techniques (which are used in the state-of-the-art), but mixing statistical techniques with rule-based techniques.

IMPACT OF PARAMETERS

The colors of the Universiteit Antwerpen were defended by Veronique Hoste (CNTS), who delved into the interaction between an algorithm and its parameters. Hoste showed for two algorithms that parameter settings had a higher impact on the end result than the biases of each algorithm. Hence, she concluded that it is not possible to say that one algorithm is better than another based on one or two parameter settings. The real difference can only be seen by testing exhaustively all parameters, so that the complete picture of an algorithm's behaviour emerges.

More information can be found on the CLIF home page: http://clif.uia.ac.be

Reasoning

Jaap van den Herik
IKAT, Universiteit Maastricht

Being a 'columnist' is a relatively easy job, since one particular topic suffices for a good story. Obviously, this statement is not open to generalisations, such as "being a Ph. D. student is a relatively easy job, since one particular topic suffices for a good Ph.D. thesis". Many Ph.D. students have one topic and have still difficulties to write a thesis on that topic. Some have difficulties with writing, others with restricting themselves. For historians and writers of overviews a completely different problem occurs in the form of how to classify the material. It is a problem I feel related to when writing this 'column'. For instance, AI can be subdivided into research areas (natural language, games, etc.) and research topics (reasoning, pattern recognition, etc.). Even within a research topic we may distinguish layers of equivalent topics. In the last fifty years every library has developed an own taxonomy, starting from the main layers 'knowledge' and 'search'. Without any doubt 'reasoning' is one of the key topics of artificial intelligence. Hence, your editor is pleased to announce two theses that deal with this topic. Also, related topics on 'analysis', 'searching', 'knowledge', and 'pattern recognition' (lip reading) are present. The list itself is a joy to browse through since the titles are challenging and promising. It will be a stimulus for other researchers in the field to get acquainted with the contents of these theses. The Editorial Board invites such readers to submit a review of one of the theses for publication in the October or December issue. It is certainly worth the effort and it serves our community. I look forward to receiving your reviews. In this issue we are pleased to publish the review by Barteld P. Kooi on the Ph.D. thesis by Jan Broersen (SIKS Dissertation Series No. 2003-02) titled *Modal Action Logics for Reasoning About Reactive Systems*.

PH.D. THESES

S. Keizer (September 3, 2003). *Reasoning under Uncertainty in Natural Language Dialogue using Bayesian Networks*. TU Twente. Promotor: Prof. dr.ir A. Nijholt.

B.P. Kooi (September 5, 2003). *Knowledge, Chance, and Change*. RU Groningen. Promotor: Prof.dr. G.R. Renardel de Lavalette. Co-promotor: Dr. L.C. Verbrugge.

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

J.C. Wojdel (November 11, 2003). *Automatic Lipreading in the Dutch Language.* TU Delft. Promotor: Prof.dr. H. Koppelaar. Assistant promotor: Dr. L.J.M. Rothkrantz.

A.C. Roth (November 26, 2003). *Case-based reasoning in the law*. Universiteit Maastricht. Promotor: Prof.dr. H.F.M. Crombag. Co-promotor: Dr. H.B. Verheij.

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.

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.

Finally, in the framework of new professorial posts (see the three previous issues of the BNVKI Newsletter) we reiterate the inaugural address by Professor René Bakker (Open Universiteit Nederland). The official ceremony is anticipated by a symposium with the title *Leren en samenwerken in ICT-opleidingen*. For details you can visit the website of the Open Universiteit: http://www.ou.nl/info-alg-inf/nieuws.htm

Prof.dr. R. Bakker (September 19, 2003). Open Universiteit Nederland. *Evolutionair informaticaonderwijs*.

SECTION KNOWLEDGE SYSTEMS IN LAW AND COMPUTER SCIENCE

Section Editor
Marie-Francine Moens

Accessibility of Historical Legal Sources

JURIX lecture by Floris Wiesman
Universiteit Maastricht
May 21, 2003

Report by Marie-Francine Moens
ICRI, KU Leuven

Legal sources - even the ones that are in effect today - can be quite old. Their accessibility by modern computers and information retrieval techniques is not always guaranteed due to technical problems such as the difficulty of optical character recognition (OCR) on old paper and due to text related problems such as a different vocabulary and spelling. The lecture of Floris Wiesman concerned the retrieval of a collection of Dutch and Belgian law texts known as the *Antwerpse Compilatae* and the *Gelders Land- and Stadsrecht*, dating from the 16th and 17th century. Although our current legal sources are not going back so far in time, the problems that these historical texts pose to modern information retrieval are still quite relevant.

METADATA

Historical sources are usually described by metadata that contain administrative (e.g., data, place, use) and fixed content descriptors. In retrieval applications these metadata are used for searching and filtering the documents. Searching metadata restricts the search to these content elements that are assigned to the texts. Usually people want to search in a more flexible way such as by a full text search. Searching the historical sources by means of search terms in modern Dutch poses a number of problems. The old texts use a different vocabulary and spelling and typically contain many synonyms and spelling variants.

SPELLING VARIANTS

The talk of Floris Wiesman concentrated on algorithms for resolving spelling variants. The research was carried out by Loes Braun, in collaboration with Louis Berkvens of the Department of Metajuridica. Because we do not have thesauri or machine-readable dictionaries that contain all the spelling variants, conflation procedures are here the most promising approach. A conflation procedure matches different forms of the same word. Compared to the basic approach of an exact match of a search term and a term in the old texts, the requirement of exact occurrences is loosened to approximate occurrences. This can be done by allowing a match according to some fixed heuristic and language-specific rules (e.g., certain stemming algorithms that conflate words to their stem) or by introducing a distance or similarity function to measure the match between the search term and a term in the old texts (e.g., *n*-gram matching, Wagner-Fischer algorithm). Braun tested various conflation procedures such as stemming, tri-gram matching, the Wagner-Fischer matching of approximate strings and the combination of these procedures for searching the collection of Belgian and Dutch law texts.

For her experiments, Braun used the Porter stemmer (1980), which is a simple, but powerful suffix removal algorithm. Porter uses a list of suffixes that are frequent in the language. The

Porter stemmer is also available for the modern Dutch language; next to suffixes it deals with prefixes and infixes (Kraaij and Pohlmann, 1996). A kind of preprocessing to the stemming regards the application of heuristic rules to map old word forms to forms closer to modern ones in order to make the words suitable for processing with the modern Dutch stemmer. Transformation heuristics for suffix, prefix and infix transformations were developed by Braun and integrated in the Dutch Porter algorithm.

An *n*-gram is a substring of length *n* characters that is derived from a word of length not less than *n*. Braun considers tri-grams of three adjacent letters for matching approximate strings. Old and modern terms are considered similar if their overlap of tri-grams (computed with the DICE coefficient) exceeds a pre-defined threshold value.

Another procedure regards the application of the Wagner-Fischer algorithm, which computes the edit-distance of two strings (Wagner and Fischer, 1974). The edit distance measure is defined as the minimum number of character insertions, deletions and substitutions that are needed to make the two strings equal. The algorithm uses a dynamic programming approach by recursively breaking the strings in smaller substrings and computing the subproblem solutions. The purpose is to find all the approximate occurrences, where the distance between the search term and the term in the old text is at most a given error threshold.

The different procedures were also combined. The best results in terms of a high precision and recall of the conflation were obtained by using the transformation heuristics, stemming and tri-gram matching. Procedures that involved the Wagner-Fischer algorithm resulted in low precision values. Even when the allowable error rate was set very low, the conflated terms did not correspond with modern ones. By using the combined procedures, Braun demonstrated that the results of a standard vector-space retrieval model for searching historical texts could be significantly improved in terms of retrieval recall and precision.

MODERN APPLICATIONS

After this interesting lecture, the audience posed many questions on the details of the conflation approaches and their use in modern retrieval of law texts. With regard to Belgian legislation, many older texts (e.g., of the 19th century) are still valid. They use a slightly different spelling, or are currently not electronically available and could be made accessible through OCR scanning. It might be too expensive to manually correct the scanned texts. The problems might not be as severe as in 16th or 17th century texts, but approximate matching when searching these texts might be a practical solution. Besides, techniques for approximate searching of names might interest legal professionals and criminal investigators from a completely different angle. The conflation technologies are used in the search for criminal and terrorist names (e.g., in airport security services). There are currently a large number of algorithms for approximate string matching that can be tested.

Braun, L., Wiesman, F. and Sprinkhuizen-Kuyper, I. (2002). Information retrieval from historical corpora. In *Proceedings of the Third Dutch-Belgian Information Retrieval Workshop* (pp. 105-111). Leuven: KU Leuven.

Kraaij, W. and Pohlmann, R. (1996). Viewing stemming as recall enhancement. In *Proceedings of the 19th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval* (pp. 40-48). ACM: New York.

Porter, M.-F. (1980). An algorithm for suffix stripping. *Program*, 14 (1), 130-137.

Wagner, R.A. and Fischer, M.J. (1974). The string-to-string correction problem. In *Journal of the ACM*, 21 (1), 168-173.

Law and Defeasibility

JURIX lecture by Jaap Hage, Universiteit Maastricht
May 21, 2003

Report by Laurens Mommers
R&I, Universiteit Leiden

In the movie *The Big Lebowski* (1998), the main character makes a statement that adequately expresses the main issue of defeasibility: “What I'm blathering about - new shit has come to light, man.” It may not have been Jeff Bridges' best role – nor does his statement constitute the most appealing quote in film history – but his point is clear: newly acquired information may wreck the conclusions that were drawn so carefully from what was already known.

DEFEASIBILITY VERSUS NON-MONOTONICITY

In recent years, defeasibility has become a major research issue in artificial intelligence and law research. Jaap Hage, senior lecturer on law at the

Universiteit Maastricht, provided a view on what he thinks defeasibility really amounts to, separating it from the logical notion of non-monotonicity. In order to define the concept, Hage set out to explain what defeasibility is *not*. First, it does not arise from changes that occur in reality because, for instance, legal rules are altered. Second, it does not emanate from changes in our knowledge about reality.

What, then, *is* defeasibility? According to Hage, defeasibility is the phenomenon that certain conclusions, that are justified in the light of a certain body of information, are no longer justified if new information is added to this body of information. Thus, defeasibility is a characteristic of the *justification of* a conclusion, not of knowledge, sentences or concepts. The relationship between defeasibility and non-monotonicity is somewhat obscure. They are sometimes regarded as equivalent to each other, or defeasibility is regarded as the informal version of non-monotonicity.

Jaap Hage, however, makes a more radical distinction between the two concepts. He regards non-monotonicity as a meta-logical notion, indicating the derivability relation between a set of premises and a conclusion, whereas he specifies defeasibility as the question whether one is justified in accepting a conclusion on the basis of certain assumptions. Hage claims that the use of a non-monotonous logic to model the idea of non-defeasibility requires us to drop the classic notion of validity.

The classic notion of validity says that a conclusion is true if the premises on which it is based are true. Instead, Hage claims that the conclusion has to be *justified in the light of* the premises. I interpret the alternative concept of validity as a transition from a syntactic notion to a semantic one. The derivation from premises to conclusion within the framework of a classic (monotonous) logic is a syntactic process: the content of the premises, once established, does not really play a role in determining the validity of the conclusion.

AUTOMATIC DERIVATIONS AND REASONING

With Hage's notion of validity, such 'automatic' derivations can hardly be made. Determining whether a conclusion is justified in the light of the premises requires us to regard the content of reasons and weigh them – in the light of the specific conclusion we have in mind. For an automatic derivation, we do not only need a mechanism to weigh reasons, but we also need to assign weights for each reason with regard to a specific conclusion. What counts as a decisive reason for one conclusion, may only play a minor role for a different conclusion.

Hage claims that legal reasoning is defeasible because it is partly rule-based, and partly reason-based. Rule-based reasoning is analogous to the idea that law finding is essentially attained by the application of rules to facts. Reason-based reasoning means that conclusions are drawn on the basis of a process of weighing reasons. Hage's theory is that rule-based reasoning only occurs by default. If a judge does not want to apply a rule, for instance because it leads to an undesirable conclusion, then the weighing process *pro* and *contra* a conclusion starts, and reason-based reasoning takes the place of rule-based reasoning.

DISCUSSION

The discussion that accompanied Hage's lecture concentrated on the main subjects of his lecture: the meaning of defeasibility, and the difference between the classic notion of validity and Hage's definition. Emphasis was put on the possibility that not only the addition, but also the removal or change of information may induce the defeasibility of a conclusion. Additionally, not everyone present agreed on the difference between the classic validity notion and Hage's one.

Henry Prakken asked Dory Reiling, a judge present at the Jurix meeting, whether she could apply the concepts and explanations in the lecture to her work as a judge. She claimed that much of the reasoning done by judges has a somewhat intuitive nature, aiming at a specific conclusion and using reasons to support that conclusion rather than starting with reasons and deriving a conclusion from them.

Hage's lecture shed light on the relation between logical and 'real-life' notions of defeasibility. My question on this matter would be: Why try to translate the defeasibility notion into a logical one? It seems to me that Hage's definition of validity is not particularly suitable for a formal approach. Rather, it is a fruitful starting point for a discussion about the true nature of legal reasoning (if there is such a thing). In my view, a logic imposes too many constraints to be of use before that nature is clarified. The development of theories on the issue may be hampered if those constraints are present.

Section Editor
Richard Starmans

Successful Application for Re-Accreditation

John-Jules Meyer and Richard Starmans
ICS, Universiteit Utrecht

In June 2003 SIKS received the formal confirmation of KNAW that our research school has successfully applied for re-accreditation for another period of six years.

As many of our senior-members may have experienced, the last two years were dominated considerably by all kinds of "ECOS-related" activities (ECOS: Erkenningscommissie Onderzoekscholen): additional board meetings, strategy days, new research and educational plans, research reports, electronic questionnaires, visitation days and - not forgetting - quite a substantial heap of formal letters, recommendations and agreements with departments, institutes and CvBs.

On behalf of the Management Team of SIKS we herewith would like to thank all our members who in some way contributed to this success. This list certainly includes Reind van de Riet, who as a former chairman of the board and currently honorary member of SIKS, was actively involved in the evaluation process until April 2003! Secondly, and maybe even more importantly, we particularly would like to thank the increasing number of lecturers who are willing to "perform" at our regular activities: basic courses, advanced courses, masterclasses and other scientific events. Owing to their commitment, we fortunately have succeeded to even extend and intensify these "regular" activities in the last two years, thus impressing the ECOS committee and – as we sincerely believe – making it worthwhile for young researchers to be a SIKS Ph.D. student.

Finally, we believe that a special word of gratitude must be directed to our Ph.D. students, who really have shown to be the backbone of the school. Especially the members of the SIKS' Ph.D. council as well as other SIKS Ph.D. students gave presentations and were interviewed on several occasions throughout the re-accreditation process. Their enthusiasm impressed both the international review committee and the ECOS committee itself.

The help of the aforementioned groups was essential. Indeed, it was obvious already in 2000 that a successful application would be a far from trivial business. In that year it became apparent that for a successful continuation of SIKS the KNAW re-accreditation was essential. Therefore our board of governors decided to apply, fully aware of the time consuming consequences of this decision, and knowing - for example - that to obtain this accreditation it is mandatory for a research school to evaluate its research and educational programs and have these programs assessed by an international "peer review" committee. Also the mere fact that in SIKS twelve research groups from ten universities and CWI cooperate, was a serious test for the quality of our internal communication.

We are particularly glad that now in 2003 KNAW declares that SIKS has proven to be a solid and mature research school. Especially in the last three years SIKS has taken great efforts to expand as the table below clearly shows. When SIKS received its accreditation from KNAW in 1998, only 35 Ph.D. students and about 70 research fellows were active in the school, which didn't remain unnoticed by the KNAW accreditation committee. But in the last few years many researchers and research groups decided to join the school. And, even more important, SIKS' senior researchers became more and more successful in attracting young researchers to step into a four years Ph.D. track. As a result of these efforts, the SIKS population doubled in a period of three years and the number of Ph.D. students nearly tripled.

	1998	**1999**	**2000**	**2001**	**2002**	**2003**
Ph.D. students	35	57	63	88	102	112
Research fellows	69	72	83	129	138	145
SIKS days	11	13	17	31	35*	39*
Dissertations	5	8	11	11	17	20*

Performance indicators **estimated*

We are confident that the recently obtained KNAW reaccreditation will strengthen SIKS' position as a interuniversity research school in the field of IKS. The spin-off of the work we did on behalf of the KNAW reaccreditation, is recognizable already; we started in 2003 with a brand-new scientific research program and a thoroughly revised educational program. We also appointed eight focus directors

to make sure that the new research foci really get shape in the next period. The regular reader of this Newsletter may have noticed these things already.

In the next issues of this Newsletter we will continue to inform you on new activities which are now closely linked to the new research foci.

SIKS Seminar: Simulation in Economics

September 17, 2003, Rotterdam

On Wednesday, September 17 2003 the research group Modeling and Simulation of the Erasmus Universiteit Rotterdam will organize a one-day seminar *Simulation in Economics* under auspices of the research school SIKS. The event is one of the first activities of the recently founded SIKS working group on Information Science and Economics.

From August 1, 2003 registration for this seminar is open. For registration and details of the program, please visit the website: http://www.few.eur.nl/few/research/eurfew21/m&s/seminar/index.htm

Participation is free for all SIKS members, but an early registration is required.

PRELIMINARY PROGRAM

8:30-9:00	Arrival with coffee
9:00-9:15	Introduction to Seminar by Dr.ir. Henk de Swaan Arons, Erasmus Universiteit Rotterdam
9:15-10:00	*Simulation: an Overview*, Prof.dr. Jack Kleijnen, Universiteit van Tilburg
10:00-10:45	*Simulation in Logistics*, Prof.dr. Rommert Dekker, Erasmus Universiteit Rotterdam
10:45-11:00	Coffee break
11:00-11:45	*Asymmetric Information in Insurance markets: Theoretical and Computational Models*, Dr. Vladimir Karamychev, Erasmus Universiteit Rotterdam
11.45-12:30	*Simulation in Management*, Prof.dr. Cees van Halem, OASIS/ Erasmus Universiteit Rotterdam
12:30-14:00	Lunch
14:00-14:30	*Case 1. Modeling Ship Arrivals in Ports*, Drs. Eelco van Asperen/Drs. Marc Polman, Erasmus Universiteit Rotterdam
14:30-15:00	*Case 2. A number of Master Theses in Discrete Event Simulation*, Mr. Rienk Bijlsma, Systems Navigator
15:00 – 15:15	Break
15:15 - 15:45	*Case 3. SIMONE, Large scale Train Network Simulations*, mr. André Gijsberts, Incontrol Enterprise Dynamics/RailNed
15:45 – 16:15	*Case 4. Parallel Simulation in Logistics*, Csaba Boer, M.Sc., Erasmus Universiteit Rotterdam / TU Delft
16:15 - 16:20	Closure
16:20 - 17:00	Social drink

AI EDUCATION

Section Editor
Evert van de Vrie

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.

ANNOUNCEMENTS

Belgian-Dutch Artificial Intelligence Symposium for Students

October 9, 2003, Amsterdam

Student association VIA, for AI, computer science and informatics students of the Universiteit van Amsterdam, is organizing the second edition of BNAIS, Belgian-Dutch Artificial Intelligence Symposium for students. This event is an initiative of the BNVKI.

This year's BNAIS theme is *Playing God? Creation and control*. A wide variety of issues are brought together in this theme. Technical, theoretical as well as ethical considerations will be brought forward. Current and future developments in AI will be discussed, with subjects ranging from the creation of artificial life to controlling that

creation, or control in modern day society using AI techniques.

BNAIS will take place Thursday, the 9th of October at the CWI in Amsterdam's Science Park in the Watergraafsmeer. BNAIS will consist of 3 lectures, ten workshops, presentation of the yearly Belgian-Dutch award for the best AI Master's thesis, various discussions and a continuous information market.

BNAIS offers the possibility for students and young researchers (AIOs, OIOs) to present their (graduation) research projects to participants in either a 30-minute workshop, a (poster) presentation or demonstration. A link to the BNAIS theme is greatly appreciated, but for students this is not a strict requirement.

Examples of theme relevant to the *Playing God?* theme are:

- Creation autonomous systems
- Evolutionary/genetic algorithms
- Artificial life
- (Losing) control over created systems (e.g. from autonomous spontaneous behavior to robot Armageddon)
- AI use in control in society from either a technological or ethical view (e.g. Big Brother)

Proposals for a contribution to BNAIS 2003 (1/2 - 2 A4) should describe:

- Subject
- Format (workshop / presentation / poster/ demonstration / discussion/ ...)
- Possible link to BNAIS theme
- Short biography student/researcher

Proposals should be sent by email to bnais@via.uvastudent.org as soon as possible with a deadline of September 6. All proposals will receive notice of acceptance on September 10.

For more information or an informal discussion please contact BNAIS at above email address or call Joram Rafalowicz, tel.: + 31 6 535 711 22 or Henriette Cramer, tel: + 31 6 421 322 61.
Studievereniging VIA - BNAIS 2003,
Universiteit van Amsterdam,
Plantage Muidergracht 24, 1018 TV Amsterdam

BNAIS@via.uvastudent.org
http://bnais.via.uvastudent.org

Learning Solutions 2003: Adaptive Intelligence in Research and Practical Applications

October 22, 2003, Nijmegen

The *Learning Solutions* Workshop will be held on Wednesday October 22, 2003 from 10.00 to 16.30 in the Radboud Auditorium, Nijmegen, The Netherlands.

Participation is free. For more information and registration see also our website www.snn.kun.nl/nederland/learning.

The *Learning Solutions* workshop will be collocated with the BNAIC 2003 conference on Thursday October 23 and Friday October 24, 2003. Authors with BNAIC contributions related to the workshop theme will be invited to present their work here as well.

INTRODUCTION

Industrial processes are becoming more and more complex, and staying competitive demands continuous optimization and adjustment. On the other hand, the knowledge of such processes has tremendously increased, since companies are now more able to register and store important process data than they were before. Optimal use of this data, however, is not a simple matter and requires advanced techniques, such as neural networks and Bayesian statistics. Neural networks are computer programs that are able to learn. Their functioning is inspired by the function of the brain. The value added by neural networks is strongest for those problems that lack explicit knowledge. A large number of neural network aided applications has already been realized. Well-known applications are pattern recognition, time series prediction, and process control. Neural networks do not always produce the best solution, however. Better solutions are therefore often obtained through a combination with explicit domain knowledge. Bayesian statistics offers an elegant formalism to combine learning and explicit modeling. Furthermore, statistical methods for quantification of reliability are of great importance. A modern trend is therefore marked by an integrated approach that combines neural networks with methods from statistics and artificial intelligence. The symposium *Learning Solutions 2003* offers an up-to-date overview of Dutch research in this area.

STW AND SNN

In 1995, the Technology Foundation STW - in close collaboration with SNN - started the implementation of the STW Neural Network program. Three calls for proposal, - in 1996, 1997, and 1999 - each resulted in the funding of 5 projects. An overview of current and recently completed STW-SNN projects will be presented during the course of the workshop. Further research will be presented as well, to provide a nearly complete survey of Dutch research in this area. The presentation of these results will be specifically addressed to commerce and industry.

AIMS AND OBJECTIVES

The aim of this gathering is on the one hand to acquaint (further) company clients with the scientific results they use and apply, and on the other hand to provide (young) researchers with the opportunity to present their work to potential clients and colleagues. Also, this day is a good occasion to strengthen personal networks.

FOR WHOM

The meeting is aimed at any person who is interested in the latest techniques for data mining in general, and neural networks and Bayesian statistics in particular. Researchers, implementers and users are invited to view - and discuss - the latest techniques and developments.

PROGRAM

09:30 Registration and welcome

10:00 Opening, Dr. H.J. Kappen, KU Nijmegen

10:15 *Tutorial Computational Game Theory*, Prof. M. Kearns, University of Pennsylvania. Recently there has been renewed interest in game theory in several research disciplines, with its uses ranging from the modeling of evolution to the design of distributed protocols. In the AI community, game theory is emerging as the dominant formalism for studying strategic and cooperative interaction in multi-agent systems. Classical work provides rich mathematical foundations and equilibrium concepts, but relatively little in the way of computational and representational insights that would allow game theory to scale up to large, complex systems. The rapidly emerging field of computational game theory is addressing such algorithmic issues, and this tutorial will provide a survey of developments so far. The tutorial will be self-contained, assuming no prior knowledge of game theory.

10.15 Adaptive Intelligence in Practice - *Technology applied to Knowledge Managment Platform*, Ivo de Blinde en Edgar van Oostrum, Knowlutions, SPSS

10.55 Adaptive Intelligence in Practice - *Predicting Consumer Behaviour*, Tom Heskes, SMART Research B.V.

11.35 Adaptive Intelligence in Practice - *Predicting Tourist Travel Behaviour*, Christoph Engels, Thinking Networks Germany.

12:15 Lunch

13:30 *Statistical Media Processing at Microsoft Research*, Prof. J. Platt, Microsoft Research in Redmond. Statistical Media Processing is the intersection between media (such as image, video, music, speech) and machine learning (statistical algorithms). Our research in this area has produced practical technology that can improve products. For example, we have created a clustering algorithm for automatically organizing digital photos; an algorithm to learn similarities between songs, to automatically generate music playlists; and an algorithm to automatically extract noise-robust features from audio, to identify music files or streams.

14:15 *Overview Adaptive Intelligence in The Netherlands*, Dr. H.J. Kappen, KU Nijmegen

14:45 Poster session

16:00 *Algorithms in Ambient Intelligence*, Emile Aarts, Philips Research and TU Eindhoven. In the near future our homes will have a distributed network of intelligent devices that provides us with information, communication, and entertainment. Furthermore, these systems will adapt themselves to the user and even anticipate on user needs. These consumer systems will differ substantially from contemporary equipment through their appearance in peoples' environments, and through the way users interact with them. Ambient Intelligence is the term that is

used to denote this new paradigm for in-home computing and entertainment. Salient features of this new concept are ubiquitous computing, and natural interaction. Recent developments in technology, the Internet, the consumer electronics market, and social developments indicate that this dream might become reality soon. First prototypes of ambient intelligent home systems have been developed, but the realization of true ambient intelligence calls for much additional research of multidisciplinary teams consisting of technologists, designers, and human behavior scientists. Algorithms play a central role in the development of ambient intelligence. Key features such as quality of service, load balancing, context awareness, personalization, adaptation, and anticipatory behavior can be realized through sophisticated on-line algorithms that run in real-time. The presentation will outline the current status of the development of algorithms for ambient intelligence.

16:40 Poster session and reception

BNAIC 2003 Programme

October 23-24, 2003, Nijmegen

The 15th Belgian-Dutch Conference on Artificial Intelligence (BNAIC'03) is organised by SNN. BNAIC'03 will be held on Thursday October 23 and Friday October 24, 2003 in the Radboud Auditorium and Kasteel Heyendael, Nijmegen, The Netherlands.

It will be collocated with the workshop *Learning Solutions* on Wednesday October 22, 2003. This collocation aims to promote interaction between researchers in AI and industry. BNAIC papers addressing industrial applications will be offered a poster at the workshop.

On Wednesday morning, Prof. Michael Kearns will give a tutorial on computational game theory. With support from SIKS and NICI, this event is offered free of charge for BNAIC participants.

THURSDAY, OCTOBER 23

09.50 - 10.00 Opening remarks
10.00 - 11.00 Invited Talk by Michael Kearns, University of Pennsylvania
11.00 - 11.20 Break
11.20 - 12.35 Paper presentations

Machine Learning I (Auditorium)

- Kurt Driessens and Jan Ramon
  Relational instance based regression for relational reinforcement learning
- Wojtek Kowalczyk
  Inverting multi-layer perceptrons is easy
- Floris Ouwendijk, Henk Koppelaar, Rutger ter Borg, and Thijs van den Berg
  Wind energy production forecasting

Games (Heyendael A)

- Pieter Spronck, Ida Sprinkhuizen-Kuyper, and Eric Postma
  Online adaptation of computer game opponent AI
- Doug DeGroot and Joost Broekens
  Using negative emotions to impair game play
- Wieger Wesselink and Hans Zantema
  Shortest solutions for Sokoban

Verification and Validation (Heyendael B)

- Christophe Garion and Leendert van der Torre
  Design by contract; deontic design language for component-based systems
- Tibor Bosse, Catholijn Jonker, and Jan Treur
  Representational content and the reciprocal interplay of agent and environment
- Nguyen Tran Sy and Yves Deville
  Consistency techniques for interprocedural test data generation

12.35 - 13.50 Lunch
13.50 - 15.05 Paper presentations

Evolutionary Computation (Auditorium)

- Edwin de Jong
  Combining exploration and reliability in coevolution
- Federico Divina, Maarten Keijzer, and Elena Marchiori
  Evolutionary concept learning with constraints for numerical attributes
- Peter Bosman and Dirk Thierens
  The balance between proximity and diversity in multi-objective evolutionary algorithms

Knowlege Based Systems (Heyendael A)

- Quint Mouthaan, Patrick Ehlert, and Leon Rothkrantz
  Situation recognition as a step to an intelligent situation-aware crew assistant system
- Perry Groot, Frank van Harmelen, and Annette ten Teije

A quantitative analysis of the robustness of knowledge-based systems through degradation studies

- Richard van Duijn, Jan van den Berg, and Mark Vreijling
  Intelligent maintenance scheduling using an expert-driven fuzzy-rule based object quality system

Agents I (Heyendael B)

- Guido Boella and Leendert van der Torre
  Game specification in the Trias Politica
- Catholijn Jonker, Martijn Schut, and Jan Treur
  Modelling the dynamics of organisational change
- Nico Roos and Cees Witteveen
  Problem solving in a computational society

15.05 - 15.25 Break
15.25 - 16.40 Paper presentations

Probabilistic Models (Auditorium)

- Onno Zoeter and Tom Heskes
  Multi-scale switching linear dynamical systems
- Wojciech Zajdel and Ben Kröse
  Gaussian mixture model for multi-sensor tracking
- Peter Grünwald and Joseph Halpern
  Updating probabilities

Information Retrieval (Heyendael A)

- Jan Kuper, Horacio Saggion, Dennis Reidsma, Hamish Cunningham, Thierry Declerck, Ed Hoenkamp, Marco Puts, Franciska de Jong, Yorik Wilks, and Peter Wittenberg
  Event-coreference across multiple multi-lingual sources in the MUMIS project
- Valentin Jijkoun, Gilad Mishne, and Maarten de Rijke
  Preprocessing documents to answer Dutch questions
- Heiner Stuckenschmidt and Michel Klein
  Integrity and change in modular ontologies

Agents II (Heyendael B)

- Koye Somefun, Enrico Gerding, Sander Bohte, and Han La Poutré
  Automated negotiation and bundling of information goods
- Hans Akkermans, Jos Schreinemakers, and Koen Kok
  Agents, markets, and control: Outline of a general formal theory
- Floortje Alkemade, Han La Poutré, and Hans Amman
  Intermediaries in an electronic trade network

16.40 - 19.00 Demos, posters, and reception

Posters

- Kees Albers and Bert Kappen
  Application of cluster variation method to genetic linkage analysis
- Joost Batenburg and Willem Jan Palenstijn
  A new exam timetabling algorithm
- Tibor Bosse, Catholijn Jonker, and Jan Treur
  Reasoning by assumption: formalization and analysis of human reasoning traces
- Loes Braun, Floris Wiesman, Jaap van den Herik, and Arie Hasman
  MIRA: a Medical Information Retrieval Agent
  Raquel Costa and Federico Divina
  Application of inductive concept learning to doctor-patient relation data
- Mehdi Dastani, Virginia Dignum, and Frank Dignum
  Role-assignment in open agent societies
- Mehdi Dastani, Birna van Riemsdijk, Frank Dignum, and John-Jules Meyer
  A programming language for cognitive agents goal directed 3APL
- Mehdi Dastani and Leendert van der Torre
  Decisions, deliberation, and agent types
- Bas van Gils and Eric Schabell
  User-profiles for information retrieval
- Stephan ten Hagen
  Concepts and navigation targets
- Pieter jan 't Hoen and Han La Poutré
  A decommitment strategy in a competitive multi-agent transportation setting
- Joris Hulsteijn and Leendert van der Torre
  Combining goal generation and planning in an argumentation framework
- Valentin Jijkoun
  Finding non-local dependencies: beyond pattern matching
- Edwin de Jong and Jordan Pollack
  Learning the ideal evaluation function
- Catholijn Jonker and Tim Verwaart
  Intelligent support for solving classification differences in statistical information integration
- Uzay Kaymak and Jan van den Berg
  On probabilistic connections of fuzzy systems
- Roman van der Krogt, Mathijs de Weerdt, and Cees Witteveen
  A resource based framework for planning and replanning
- Ronald Kroon and Leon Rothkrantz
  Dynamic vehicle routing using an ABC algorithm
- Wendy van Olmen and Bart Naudts
  Feature selection for future classes; proof of concept

- Mireille Oud
  Internal-state analysis of a layered neural network
- Nico Roos, Annette ten Teije, and Cees Witteveen
  Multi-agent diagnosis with semantically distributed knowledge
- Marta Sabou, Debbie Richards, and Sander van Splunter
  An experience report on using DAML-S
- Stefan Schlobach and Ronald Cornet
  Non-standard reasoning services for the debugging of description logic terminologies
- Lambert Schomaker and Rudolf Fehrmann
  Learning of an approximate map of the environment by unsupervised bimodal landmark exploration
- Sander Spek, Kees-Jan van Dorp, Etienne Mathijsen, Theo de Haas, and Jaap van den Herik
  Advanced information search within a research-based multinational
- Wouter Wiersma
  Generating powertraces using neural networks
- Floris Wiesman, Geert Graat, and Evgueni Smirnov
  Information markets for agent-based retrieval
- Don Willems and Pim Haselager
  Cooperative behavior in simulated reactive robots
- Sebastiaan de Winter, Henk Koppelaar, Ronald Hamers, Muzzafer Degertekin, Kengo Tanabe, Pedro Lemos, Patrick Serruys, Jos Roelandt, and Nico Bruining
  The IntelliGate automated image-based gating algorithm for intracoronary ultrasound images
- Alexander Ypma and Tom Heskes
  Iterated extended Kalman smoother with expectation-propagation

Demos

- Eric ten Hoeve, Mehdi Dastani, Frank Dignum, and John-Jules Meyer
  3APL Platform
- Femke de Jonge, Nico Roos, Pieter Spronck, and Steven de Jong
  ProAnita: A multi-agent solution for legitimate information retrieval
- Bert Kappen, Wim Wiegerinck, Ender Akay, Marcel Nijman, Jan Neijt, and André van Beek
  Promedas: A diagnostic decision support system
- Fernando Koch
  Platform for intelligent agents on embedded devices: Project AgentLight
- Mark Leenaarts
  Distributed planning of container terminal resources with agent technology
- Debbie Richards, Sander van Splunter, Frances Brazier, and Marta Sabou
  Demonstration of web services configuration
- Jan-Joost Spanjers, Marco Bloemendaal, and Tom Heskes
  Optimizing single-copy newspaper sales with JED

19.00 Dinner

FRIDAY, OCTOBER 24

09.30 - 10.45 Paper presentations

Machine Learning II (Auditorium)

- Sjaak Verbeek, Nikos Vlassis, and Jan Nunnink
  A variational EM algorithm for large-scale mixture modelling
- Michiel van Wezel and Walter Kosters
  Nonmetric multidimensional scaling: Neural networks versus traditional techniques
- Dick de Ridder, Olga Kouropteva, Oleg Okun, Matti Pietikäinen, and Robert Duin
  Supervised locally linear embedding

Cognitive Modeling (Heyendael A)

- Niels Taatgen and Frank Lee
  Production compilation: A simple mechanism to model complex skill acquisition
- Bart de Boer
  Infant directed speech and evolution of language
- Egon van den Broek, Marc Hendriks, Marco Puts, and Louis Vuurpijl
  Modeling human color categorization: Color discrimination and color memory

Agents III (Heyendael B)

- Alexander van den Bosch, Maarten Menken, Martijn van Breukelen, and Ronald van Katwijk
  A test bed for multi-agent systems and road traffic management
- Wojtek Kowalczyk, Márk Jelasity, and Gustzi Eiben
  Towards data mining in large and fully distributed peer-to-peer overlay networks
- Mathijs de Weerdt, Roman van der Krogt, and Jonne Zutt
  Plan merging: Experimental results

10.45 - 11.05 Break
11.05 – 11.55 Paper presentations

Music (Auditorium)

- Ali Taylan Cemgil, Bert Kappen, and David Barber
  A dynamic Bayesian network for polyphonic music transcription
- Nico Jacobs, Filip Van den Borre, Lennert Smeets, Evarest Schoofs, and Hendrik Blockeel
  A symbolic approach to music recognition

Image Processing (Heyendael A)

- Ernst Bovenkamp, Jouke Dijkstra, Hans Bosch, and Johan Reiber
  Multi-agent segmentation of IVUS images
- Niek Bergboer, Eric Postma, and Jaap van den Herik
  Contex-enhanced object detection in natural images

Logic Programming (Heyendael B)

- Joost Vennekens and Sofie Verbaeten
  A general view on probabilistic logic programming
- Siegfried Nijssen and Joost Kok
  Proper refinement of datalog clauses using primary keys

12.00 - 13.00 Invited Talk by Henk Barendregt, KU Nijmegen

13.00 - 14.15 Lunch + BNVKI meeting

14.15 - 15.35 Paper presentations

Machine Learning III (Auditorium)

- Celine Vens and Hendrick Blockeel
  On heuristics for learning model trees
- Jeroen Eggermont, Joost Kok, and Walter Kosters
  Genetic programming for data classification: Refining the search space
- Rob Potharst
  Generating artificial data for monotone classification and regression problems

Robotics (Heyendael A)

- Ben Kröse, Josep Porta, Albert van Breemen, Ko Crucq, Marnix Nuttin, and Eric Demeester
  Lino, the user-interface robot
- Bart Jansen, Bart De Vylder, Bart de Boer, and Tony Belpaeme
  Emerging shared action categories in robotic agents through imitation
- Michel van Dartel, Ida Sprinkhuizen-Kuyper, Eric Postma, and Jaap van den Herik
  Reactive agents and perceptual ambiguity

Agents IV (Heyendael B)

- Mehdi Dastani, Frank de Boer, Frank Dignum, and John-Jules Meyer
  Programming agent deliberation; an approach illustrated using the 3APL language
- Wojciech Jamroga
  A confidence measure for learning probabilistic knowledge in a dynamic environment
- Henk-Jan Lebbink, Cilia Witteman, John-Jules Meyer
  A dialogue game for inconsistent and biased information

15.30 - 15.50 Break

15.50 - 16.50 Invited Talk by John Platt, Microsoft Research

16.50 - 17.00 Awards and closing

Second International Symposium on Formal Methods for Components and Objects (FMCO 2003)

November 4-7, 2003, Leiden

Large and complex software systems provide the necessary infrastucture in all industries today. In order to construct such large systems in a systematic manner, the focus in the development methodologies has switched in the last two decades from functional issues to structural issues: both data and functions are encapsulated into software units which are integrated into large systems by means of various techniques supporting reusability and modifiability. This encapsulation principle is essential to both the object-oriented and the more recent component-based sofware engineering paradigms.

The objective of this symposium is to bring together researchers and practioners in the areas of software engineering and formal methods to discuss the concepts of reusability and modifiability in component-based and object-oriented software systems.

The symposium is a four days event in the style of the former REX workshops, organized to provide an atmosphere that fosters collaborative work, discussions and interaction. The program consists of keynote and invited presentations given by leading experts in the fields of Theoretical Computer Science and Software Engineering. Participation is limited to about 80 people.

Both keynote and invited contributions will be published after the workshop in a proceedings of

Lecture Notes in Computer Science by Springer-Verlag.

PROGRAM COMMITTEE

- Frank de Boer (CWI, Amsterdam, and Universiteit Utrecht)
- Marcello Bonsangue (LIACS – Universiteit Leiden)
- Susanne Graf (VERIMAG, Grenoble, France)
- Willem-Paul de Roever (Christian-Albrechts University, Kiel, Germany)

More information can be found on the FMCO-website: http://fmco.liacs.nl/fmco03.html

CLIMA IV
Fourth International Workshop on Computational Logic in Multi-Agent Systems

January 6-7, 2004, Fort Lauderdale, Florida

Over recent years, the notion of agency has claimed a major role in defining the trends of modern research. Influencing a broad spectrum of disciplines such as Sociology, Psychology, Philosophy and many more, the agent paradigm virtually invaded every sub-field of Computer Science, not least because of the Internet and Robotics.

Multi-agent Systems (MAS) are communities of problem-solving entities that can perceive and act upon their environments to achieve their individual goals as well as joint goals. The work on such systems integrates many technologies and concepts in artificial intelligence and other areas of computing.

There is a full spectrum of MAS applications that have been and are being developed; from search engines, educational aids to electronic commerce and trade. Although commonly implemented by means of imperative languages, mainly for reasons of efficiency, the agent concept has recently increased its influence in the research and development of computational logic based systems. Computational Logic, by virtue of its nature both in substance and method, provides a well-defined, general, and rigorous framework for systematically studying computation, be it syntax, semantics, procedures, or implementations, environments, tools, and standards.

The purpose of this workshop is to discuss techniques, based on computational logic, for representing, programming and reasoning about multi-agent systems in a formal way. This is clearly a major challenge for computational logic, to deal with real world issues and applications.

Following the workshop on Multi-Agent Systems in Logic Programming affiliated with ICLP'99, the first CLIMA workshop took place in London, UK, affiliated with CL'2000. The 2001 edition of CLIMA, took place in Paphos, Cyprus, affiliated with ICLP'01. CLIMA'02 took place in Copenhagen, Denmark, and was affiliated with ICLP'02 and part of FLOC'02.

We solicit unpublished papers that address formal approaches to multi-agent systems. The approaches as well as being formal must make a significant contribution to the practice of multi-agent systems. Relevant techniques include, but are not limited to, the following:

- Nonmonotonic reasoning in MAS
- Planning under incomplete information in MAS
- Logical foundations of MAS
- Usage of abduction in MAS
- Representation of knowledge and belief in MAS
- Knowledge and belief updates in MAS
- Temporal reasoning for MAS
- Theory of argumentation for MAS
- Negotiation and co-operation for MAS
- Communication languages for MAS
- Distributed constraint satisfaction in MAS
- Modal logic approaches to MAS
- Logic based programming languages for MAS
- Distributed theorem proving for MAS
- Logic based implementations of MAS
- Decision theory for MAS
- Logic based agents for the Internet

SUBMISSION INSTRUCTIONS

We welcome and encourage the submission of high quality, original papers, which are not simultaneously submitted for publication elsewhere. Please refer to the workshop web pages for further instructions concerning the submission procedures.

IMPORTANT DATES

Submission: September 19th, 2003
Notifcation of Acceptance: October 17th, 2003
Final version due: November 13th, 2003

PROCEEDINGS

Post-proceedings will be published by Springer-Verlag as a volume of the Lecture Notes on Artificial Intelligence (LNAI) series. Informal proceedings will be available at the workshop and online.

WORKSHOP ORGANIZERS

- Jürgen Dix, The University of Manchester, UK, dix@cs.man.ac.uk
- João Leite, New University of Lisbon, Portugal, jleite@di.fct.unl.pt

INQUIERIES

Please send program suggestions and inquires to either of the organizers or visist the website:
http://centria.di.fct.unl.pt/~jleite/climaIV/index.htm

CONFERENCES, SYMPOSIA WORKSHOPS

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

SEPTEMBER 3-5, 2003
Joint Conference on Declarative Programming (APPIA-GULP-PRODE 2003). Reggio Calabria, Italy
http://www.informatica.ing.unirc.it/agp03

SEPTEMBER 3-5, 2003
7th International Conference on Knowledge-Based Intelligent Information & Engineering Systems (KES'2003). Oxford, United Kingdom.
http://www.brighton.ac.uk/kes/kes2003/

SEPTEMBER 4-6, 2003
DiaBruck 2003. The seventh workshop on the Semantics and Pragmatics of Dialogue (SEMDIAL). Saarland University, Germany.
http://www.coli.uni-sb.de/diabruck/

SEPTEMBER 7-8, 2003
Semantic Web and Databases (colocated with VLDB 2003). Berlin, Germany.
http://www.cs.uic.edu/~ifc/SWDB/

SEPTEMBER 9-12, 2003
International Conference TABLEAUX 2003. Automated Reasoning with Analytic Tableaux and Related Methods. Roma, Italy.
http://pop.dia.uniroma3.it/mailman/listinfo.cgi/tab03

SEPTEMBER 15-17, 2003
Fourth International Working Conference on Intelligent Virtual Agents (IVA2003). Kloster Irsee, Germany.
http://www.sigmedia.org/iva03

SEPTEMBER 15-18, 2003
The 26th German Conference on Artificial Intelligence (KI-2003). Hamburg, Germany.
http://www.ki2003.de

SEPTEMBER 16-19, 2003
The 9th European Conference on Cognitive Science Approaches to Process Control (CSAPC 2003). Amsterdam, The Netherlands.
http://www.cs.vu.nl/~csapc03

SEPTEMBER 18-21, 2003
First Order Logic 75 (FOL75). Berling, Germany.
http://www.fol75.philog.ruc.dk/fol75welcome.html

SEPTEMBER 22-26, 2003
The International Conference on Software Maintenance (ICSM 2003). Amsterdam, The Netherlands.
http://www.cs.vu.nl/icsm2003

SEPTEMBER 22-26, 2003
The 14th European Conference on Machine Learning (ECML). Cavtat-Dubrovnik, Croatia.
http://www.cs.kuleuven.ac.be/conference/ecmlpkdd/

SEPTEMBER 25-26, 2003
Fourth workshop on Inference in Computational Semantics (ICoS-4). Nancy, France.
http://www.loria.fr/~areces/ICoS-4

OCTOBER 1-2, 2003
Kalmar Workshop on Logic and Computer Science. Szeged, Hungary.
http://www.rgai.hu/kalmar2003

OCTOBER 6-8, 2003
GI-Workshopwoche "Lehren - Lernen - Wissen - Adaptivität". Karlsruhe, Germany.
http://km.aifb.uni-karlsruhe.de/ws/LLWA/

OCTOBER 13-17, 2003
IEEE/WIC International Conference on Intelligent Agent Technology (IAT 2003). Beijing, China.
http://www.comp.hkbu.edu.hk/IAT03

OCTOBER 15-18, 2003
Fourth Annual Optical Networking and Communications Conference (OptiComm 2003). Dallas, Texas.
http://www.opticomm.org

OCTOBER 18-22, 2003
9th European Conference on Artificial Intelligence in Medicine 2003. Cyprus.
http://idamap.org/

OCTOBER 20-23, 2003
2nd International Semantic Web Conference (ISWC2003). Sanibel Island, Florida, USA.
http://iswc2003.semanticweb.org

OCTOBER 22, 2003
Learning Solutions Workshop. Nijmegen, The Netherlands.
http://www.snn.nl/nederland/learning

OCTOBER 23-24, 2003
15th Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2003). Nijmegen, The Netherlands.
http://www.snn.kun.nl/bnaic/

OCTOBER 28-31, 2003
The 2003 IEEE Symposium on Visual Languages and Formal Methods (VLFM '03). Auckland, New Zealand.
http://www.cs.dal.ca/HCC03/VLFM/

NOVEMBER 3-5, 2003
Eighteenth International Symposium on Computer and Information Sciences (ISCIS'03). Antalya, Turkey.
http://www.iscis03.metu.edu.tr/

NOVEMBER 4-7, 2003
The Second International Symposium on Formal Methods for Components and Objects (FMCO 2003). Leiden, The Netherlands.
http://fmco.liacs.nl/fmco03.html

NOVEMBER 19-22, 2003
The Third IEEE International Conference on Data Mining (ICDM '03). Melbourne, Florida, USA
http://www.cs.uvm.edu/~xwu/icdm-03.html

NOVEMBER 20, 2003
Conference on Information Science 2003. TU Eindhoven, The Netherlands.
http://wwwis.win.tue.nl/infwet03/index-en.html

NOVEMBER 22-30, 2003
The 11th World Computer Chess Championship 2003 (WCCC). Graz, Austria.
http://www.graz03.at

NOVEMBER 23-27, 2003
The 8th Computer Olympiad. Graz, Austria.
http://www.cs.unimaas.nl/olympiad2003/

NOVEMBER 24-27, 2003
The 10th Advances in Computer Games Conference (ACG10). Graz, Austria.
http://www.cs.unimaas.nl/ICGA/acg10/

DECEMBER 4-7, 2003
11th Portuguese Conference on Artificial Intelligence (EPIA'03). Beja, Portugal.
http://www.di.uevora.pt/epia03/

DECEMBER 8-13, 2003
Neural Information Processing Systems, Natural and Synthetic. Vancouver, Canada.
http://www.nips.cc

DECEMBER 10-12, 2003
The 8th Australian and New Zealand Intelligent Information Systems Conference (ANZIIS2003). Sydney, Australia
http://www.eese.bee.qut.edu.au/anziis2003

DECEMBER 15-17, 2003
The Twenty-third SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence (AI-2003). Cambridge, UK.
http://www.bcs-sgai.org/ai2003/

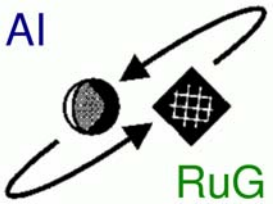
JANUARY 12-15, 2004
GI/Dagstuhl Research Seminar. Model-based Testing of Reactive Systems. Schloss Dagstuhl, Sweden.
http://www.it.uu.se/research/project/motres/

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

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

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



Faculteit der Psychologische, Pedagogische en Sociologische Wetenschappen

Universitair Docent Kennistechnologie in multi-agentsystemen 80%

De vacature is bij het Instituut voor Kunstmatige Intelligentie. Dit instituut is een samenwerkingsverband tussen de Faculteit der Psychologische, Pedagogische en Sociologische Wetenschappen en de Faculteit der Wiskunde en Natuurwetenschappen. Kunstmatige Intelligentie is een vijfjarige Bèta-opleiding met een propedeuse instroom van ongeveer 50 studenten. In het onderwijs ligt het accent op logica, cognitie, taalverwerking en biofysica.

In het onderzoek zijn er drie programma's: Multi-Agent Systems, Cognitive Modelling en Autonomous Perceptive Systems.

De functie
- Verzorgen van onderwijs op het gebied van kennistechnologie, kennis acquisitie en multi-agent-systemen
- Verrichten van onderzoek op het gebied van communicatie en teamvorming in multi-agent-systemen
- Actief participeren in internationale gremia
- Bestuurlijke en organisatorische werkzaamheden

Uw profiel
- Afgeronde promotie, bij voorkeur in de kunstmatige intelligentie
- Gedegen kennis van moderne kennistechnologie: ontologieën, het 'semantic web' en epistemisch-logische modellering van kennis en kennisuitwisseling
- Artikelen in (inter)nationale tijdschriften
- Aantoonbare didactische kwaliteiten
- Affiniteit met het realiseren van werkende modellen in teamverband
- Goede sociale en contactuele vaardigheden
- Uitstekende organisatorische kwaliteiten

Aanbod
De Rijksuniversiteit Groningen biedt een salaris afhankelijk van opleiding en ervaring tot maximaal € 4490,- (schaal 12) bruto per maand bij een fulltime aanstelling. Het betreft een aanstelling met een proeftijd van maximaal twee jaar en uitzicht op een dienstverband voor onbepaalde tijd.

Datum indiensttreding: zo spoedig mogelijk

Informatie
Voor meer informatie kunt u contact opnemen met mw. dr. L.C. Verbrugge, telefoon 050-3636334, email: l.c.verbrugge@ai.rug.nl
Voor meer informatie over het Instituut voor Kunstmatige Intelligentie: http://www.ai.rug.nl

U kunt solliciteren op deze functie door voor 15 september 2003 uw sollicitatie te sturen aan:
Rijksuniversiteit Groningen, Afdeling Personeel & Organisatie, Postbus 72, 9700 AB Groningen
Wanneer u solliciteert naar deze functie vermeld dan altijd het vacaturenummer 203190.
Email: vmp@bureau.rug.nl

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. R. Verbrugge (secretary)
Rijksuniversiteit Groningen, Cognitive Science and Engineering
Grote Kruisstraat 2/1, 9712 TS Groningen.
Tel.: + 31 50 3636334. E-mail: rineke@tcw2.ppsw.rug.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

Dr. A. van den Bosch
Universiteit van Tilburg, Taal- en Literatuurwetenschap
Postbus 90153, 5000 LE Tilburg
Tel.: + 31 13 4668260. E-mail: Antal.vdnBosch@kub.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

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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/~bnvki/