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Auditing and Knowledge-based Systems

AIIDE-06

Machine Learning and Natural-Language Processing at ILK

News from the Belgium-Netherlands Association for Artificial Intelligence

Yet Another Challenge

Editor-in-Chief

Every now and then Artificial Intelligence accepts a challenge to develop a knowledge-based system to be applied in society. Although many of such challenges may come to mind, I mention two of the most intriguing ones, followed by a third challenge reported on in this issue of the Newsletter.

First, and maybe best-known, is of course the early challenge to develop grandmaster-level programs in the field of board games, notably Chess. I will not go into providing an overview of AI successes in this field. It suffices to say that on the present rating list of chess programs the strongest program (RYBKA 1.2, written by International Master Vasik Rajlich) has an incredible rating of 2931, thereby surpassing the level of the strongest humans by far (currently lead by International grandmaster Veselin Topalov of Bulgary with a rating of 2813). It is also considerably higher than the highest human Elo rating ever achieved, i.e., the 2851 level of former World Champion (and now retired) Gary Kasparov. This surpassing of the top-human level by machines is now so profound, that the Chess Events Maastricht Foundation, organizing each year a match between humans and machines, decided to organize in early 2007 a new match with odds ("voorgift") for the human grandmaster! Details will be announced soon at the foundation's website.

Secondly, in his inaugural address *Kunnen computers* recht*spreken?* in 1991 at the University of Leiden, Jaap van den Herik posed the question whether computers will be able to reach a level at which their expertise at least is equal to that of human judges, possibly better. Based on work already done and in progress in several fields of law, he very convincingly answered this question positively. How far ahead this moment may be mostly is a matter of *acceptance*, and not of technological possibilities.

Thirdly, in this issue we report on another challenge accepted. (Now) Dr. Mohammed Aly Wahdan successfully defended on June 29 his Ph.D. thesis on the *Automatic Formulation of the Auditor's Opinion*. The report of an auditor concerning the financial statements of a firm is of utmost importance for the firm's evaluation. As Roel Ronken shows in his review of the thesis (see pages 60-62 of this issue), the development of an artificial auditor is far from being trivial, but the computer's performance already is remarkable. So remarkable indeed, that the Maastricht School of Management together with MICC-IKAT of the Universiteit Maastricht organized a symposium regarding this question (see the report by Pieter Spronck at pages 58-59 of this issue). Although many hurdles still have to been taken, it is clear that again the main barrier for acceptance will not be a techn(olog)ical one, but will be of ethical and societal nature.

Let me finish with a completely different field, that of natural-language processing and its many subdomains. Like computer games this domain is one with a long-standing tradition. Though human expertise in this field still exceeds machine performances with a considerable margin, notable successes have been achieved in the last years. In the Netherlands these successes arose mainly from a relatively young research group around Antal van den Bosch at Tilburg University. This group, dubbed ILK (for *Induction of Linguistic Knowledge*), has its 10^{th} anniversary this year. Although maybe enough reason for a celebration, I think that even more joy arose from the recent allotment of a NWO-VICI award for a new project entitled *Implicit Linguistics*. An extensive description of past, present, and future in this focus field at Tilburg University's ILK group is given by Antal himself (see pages 52-57 of this issue).

The Swedish Ratinglist for chess programs: http://web.telia.com/~u85924109/ssdf/list.htm
FIDE rating list: http://www.fide.com/ratings/top.phtml?list=men
The Chess Events Maastricht Foundation: http://www.chessevents.nl/cemf_home.shtml
ILK home page: http://ilk.uvt.nl/

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The photographs in this issue are by courtesy of Antal van den Bosch (pp. 53-56, and p. 57 left), Pieter Spronck (p. 57 right and p. 58), and Mohamed Wahdan (front cover and p. 59).

Front cover: Taken from *Automatic Formulation of the Auditor's Opinion*, Ph.D. thesis by Mohamed Aly Wahdan.

The deadline for the next issue is: **August 4, 2006**.

Appeal for new BNVKI Board members

Several members of the Board of the BNVKI will step down at the next General Assembly, to be held during the BNAIC 2006, October 3-6, 2006 in Namur. Therefore, the Board of the BNVKI invites members of the BNVKI to make themselves available for becoming board member of the BNVKI. In case of several applicants of equal capability, preference will be for female applicants. If interested, please contact the chair of the Board, Prof.dr.ir. J.A. La Poutré (see the back cover of this issue for contact information).

BNVKI-Board News

Han La Poutré

At the moment that I'm writing this, it is announced that we are officially in the first heat wave ("hittegolf") of this year. Many people are already on holiday, other people don't think of anything else than holiday, and some others still are at work.

Hopefully, this summer will allow for a holiday period for those of us who want it. For, in the current period, several possibilities exist to acquire large budgets of funding for scientific research, in several programs like SmartMix, FES, and others. One can think of tens of millions of euros for research that can be acquired. Deadlines for such programs are often at the end of a holiday period and seem to be popular with policy makers, but not so much with the ones that have to do the work for it, like the scientists. So, I hope the senior scientists of our AI community have enough room for a deserved holiday this year.

A couple of weeks ago, in the beginning of June, the third BNAIS conference took place: the Belgium-Netherlands AI Symposium for Students. This time, it was organized by the students from the Radboud University in Nijmegen. Being a participant of this BNAIS, I was impressed by the high-quality program as well as the very good organization of it. My compliments and thanks to the Nijmegen students for organizing this year's BNAIS.

During the summer, several other activities are carried out, associated with the BNVKI. One of them is the refereeing and selection process of the papers submitted to the BNAIC. At the moment, the BNAIC has received about 100 submissions, which continues the trend with the increasing and high numbers of submissions in recent years. This again means, that we are facing a lively BNAIC in October, with many papers and participants. Hopefully, also the senior researchers will be present at this BNAIC, despite of the possible acquisition and management duties. We will then have a true mix of researchers that can communicate and integrate with each other.

Finally, regarding the BNVKI itself, the Board is currently looking for new Board members. For those of you who are interested to be a candidate for the BNVKI Board, please see the announcement elsewhere in this Newsletter, and let me know.

I wish you all a good summer period.

Machine Learning and Natural Language Processing in Tilburg

Antal van den Bosch
Tilburg University, Tilburg

Tilburg University, one of the smaller universities of the Netherlands, prides itself on its focus on society and humanities. Despite the fact that this focus gives the university a somewhat soft image, there are a few nuggets of hard science to be found on the compact forest-edging campus at the west end of Tilburg. For instance, there is a thriving neurophysiology department within the Faculty of Social Sciences concerning itself with empirical studies on how the brain works; and there are long-standing research programs on information systems, information management, and knowledge technology within the faculty of Economics and Business Administration. And where one might least expect it, the Faculty of Arts houses a Department of Language and Information Science, hosting over 20 researchers, which has existed since the mid-1980s under the leadership of prof. Harry Bunt, and which has since its inception focused on applications of methods from computer science and logic to natural-language processing.

INDUCTION OF LINGUISTIC KNOWLEDGE

Part of the research in this department has focused on the interplay between machine learning, the branch of artificial intelligence that concerns itself with computer programs that learn from experience, and the fundamental question whether language processing can be learned from examples. Founded by prof. Walter Daelemans (now at the University of Antwerp), this research started in the beginning of the 1990s, and currently houses eleven researchers, three scientific programmers, and three guest researchers. The group was dubbed ILK, for *Induction of Linguistic Knowledge*, in 1996, marking the start of a six-person project awarded to Daelemans, co-funded by NWO's Foundation for Language, Speech, and Logic (TSL), the Cooperation Association of the Brabant Universities (Tilburg and Eindhoven), and the joint graduate school of Tilburg and Nijmegen. Ten years later, NWO now has awarded project leader Antal van den Bosch a VICI grant for a new branch of fundamental research called *Implicit Linguistics*. Van den Bosch obtained his Master's at Tilburg University in 1992 and his Ph.D. at the Universiteit Maastricht in 1997 (supervised by promotor prof. Jaap van den Herik).

What ties the new VICI project *Implicit Linguistics* to the 1996 ILK project is the working hypothesis

that language processing can be modeled in a memory-based fashion. In memory-based language processing, fragments or snippets of language processing (the pronunciation of a part of a word, the syntactic analysis of a fragment of a sentence, the meaning of a word in a particular context) are stored in memory. When faced with a new example of a surface form of language (a string of letters and words) that needs to be pronounced, syntactically analyzed, or needs to have its meaning disambiguated, the memory-based learner compares the new example to all examples stored in memory. Upon finding the set of most similar examples, it makes an analogical reasoning step, copying the most likely mapping of the *nearest-neighbor* memory examples to the new example.

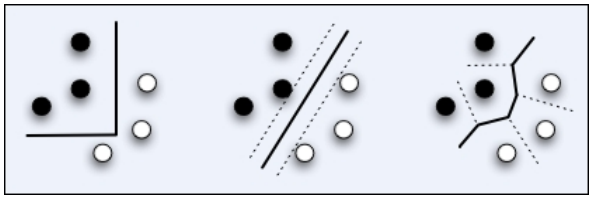


Figure 1: A simplistic visualization of prototypical decision-tree and rule learning (left), hyperplane discrimination (middle), and k-nearest neighbor storage (right).

This method, which was described, theoretically analyzed, and implemented already in the 1950s and 1960s under the name of the *k*-nearest-neighbor algorithm, stands in a remarkable contrast with most other machine-learning algorithms in the sense that it is able to generalize to new cases of a task it has been trained on, without resorting to any kind of abstraction beforehand. Abstraction, such as drawing axis-orthogonal decision boundaries or hyperplanes as depicted on the left and in the middle of Figure 1, is often considered as the core of learning, or even as the definition of learning, but that foregoes the crucial insight that learning is all about being able to *generalize* to new cases – and generalization is perfectly possible by using analogical reasoning on unabridged, "un-abstracted" examples stored as such in memory.

In fact, memory-based learning was shown to outperform several abstracting algorithms on natural-language processings tasks, in research by Daelemans, Van den Bosch, and colleagues during the 1990s; for example, see Daelemans, Van den Bosch, and Zavrel, 1999, or Daelemans and Van den Bosch, 2005, for an overview. In this research it turned out that virtually all language processing data carry a property that seriously violates a standard assumption that underlies "abstracting" machine-learning algorithms, that low-frequency events can safely be ignored. Language data is full of low-frequency events that seem unlikely to ever return in new data, but they actually always do eventually. In machine-learning terms, what appears to be ignorable noise is in fact a vast scattered disjunctive cloud of productive examples that, if used as nearest neighbors, tend to predict the right outcome. For instance, when learning to pronounce English words, the word "yacht" (a loan word from Dutch) appears to defy several "rules" of English word pronunciation, but keeping it in memory remains essential since the same word might occur in some future text, as well as its plural form "yachts" and its inflection "yachting". Simply storing everything, in anticipation of even the rarest events recurring at a later point in time, gives memory-based learning an intrinsic advantage over abstracting methods.

THE VICI PROJECT: LANGUAGE MODELING AND MACHINE TRANSLATION

In the new VICI project *Implicit Linguistics*, awarded to Van den Bosch, which will become fully operative in the fall of 2006 with a post-doc researcher, a Ph.D. student, and two scientific programmers alongside Van den Bosch, the powers of memory-based language processing are put to extreme tests in two areas of natural-language processing that have long been the topic of research, and are still considered two of the hardest nuts to crack: *word prediction*, and *machine translation*.

Word prediction, or language modeling, is the concededly weird and essentially impossible task of predicting a word given some context words, for instance a left context only (what follows after "Ruud van Nistelrooy scored a …"?), or a left and a right context (which word is missing in "machine learning is a branch of … intelligence"?). Hard and in the end impossible as this task may seem, it is possible to do it partially correct and make reasonable guesses most of the time. It is a strong asset to have a word prediction system in cases where incoming text is somehow corrupted, and where it is necessary that the text is repaired. This is the case, for example, in *speech recognition*; state-of-the-art speech recognizers still make many errors, but often their errors can be detected and corrected with the help of a good word guesser. The same applies to *spelling correction*; a mistyped word might be detected and corrected when a system is aware that in that context a particular word is unlikely, and a similar variant of the word is far more likely.

Machine translation, in turn, is the task of converting a piece of text in one language to a piece of text in another language having approximately the same meaning, which is a vastly complicated task, even for humans. Unfortunately, the topic has

accumulated a bad reputation for having a low return on investment, but in recent years the field of research has been reinvigorated by new successful methods that rely heavily on data. Google has organized a huge research lab around the topic, backed by probably the largest computer infrastructure and text resources in the world, producing the current world-best *statistical machine translation.* In a similar vein but at a smaller scale, the sub-area of *example-based machine translation* is gaining influence and success partly because of a dramatical increase in the availability of parallel corpora (i.e., bilingual translated collections of texts, in which the texts are aligned up to certain level of granularity, e.g., at the sentence level), such as the proceedings of the European Parliament. The VICI project will focus on a new type of example-based machine translation, where memory-based learning systems will be trained to map subsequences of chunks (multi-word units) of words in one language to subsequences of chunks of words in another language, as illustrated in Figure 2. Predicting overlapping chunks not only performs the core translation, but also offers the necessary information to change the order of words in the resulting output sentence.

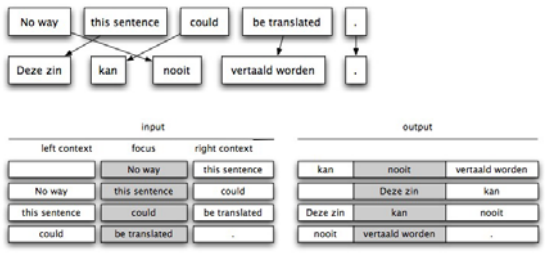


Figure 2: Schematic visualisation of a chunk-aligned pair of sentences, and the four examples created on the basis of this pair (below).

The name *Implicit Linguistics* reflects the fact that both word prediction and machine translation are tasks for which virtually endless amounts of examples can be gathered in digital form, without the need for any linguistic theory on how the examples should be represented: the working elements both in input and output are simply letters and words. This is in contrast with most other tasks in natural-language processing, where typically the output (in understanding tasks) or the input (in generation tasks) contain abstract linguistic concepts such as part-of-speech tags (noun, verb, adjective, etc.), or semanto-syntactic symbols (predicate, argument, subject, object). Purely memory-based models of word prediction and machine translation could be developed that are completely devoid of these symbols, and if successful, these methods can then be argued to be linguistic models in a totally implicit sense: without linguistic abstraction, they are able to generalize in non-trivial language-processing tasks.

INFORMATION ASSISTANTS, SPELLING CHECKERS, TALKING ROBOTS, AND DEAD ANIMALS: OTHER RESEARCH IN ILK

The ILK group has a history of applied research in language technology, often as spin-offs of fundamental Ph.D. research, for example in language-technology modules such as part-of-speech tagging, morphological analysis and lemmatization, and named-entity recognition. Applied language and speech technology is of interest to industry and society, and is playing a significant role in information and communication technology developments. This is recognized by funding organizations such as NWO, and is realized in thematic programs such as NWO IMIX (*Interactive Multimodal Information Extraction*) and NWO CATCH (*Continuous Access to Cultural Heritage*); also, NWO, in concert with the Dutch Language Union (Taalunie) and its Flemish counterpart FWO, has shown and continues to show a strong commitment to funding applied research in language and speech technology aimed at the Dutch language (e.g., in the STEVIN programme, *Spraak- en Taaltechnologische Essentiële Voorzieningen in het Nederlands*). The Dutch language region is not alone in this language-specific interest. The Spanish government is also funding a two-year post-doc research project (carried out by Roser Morante) to develop a semantic role labeling module (the syntacto-semantic task of identifying and typing the arguments of verbs in a sentence) for Spanish, partly using Tilburg-based technology, within the ILK group.

Currently, a main theme in the applied research within ILK is on language-technology components in higher-level information systems. Two of the current research projects within ILK deal with *information assistants*, software tools that assist humans in finding information. The first is ROLAQUAD, Robust Language Understanding in Question-Answering Dialogues, part of the aforementioned IMIX program. ROLAQUAD develops a question-answering module that is able to retrieve answers to medical-information questions from various medically-oriented encyclopedic sources. In this system, an answer matches a question when question and answer share concepts and a topic, such as a disease (e.g., migraine) and a treatment (how to treat migraines). Ph.D. student Sander Canisius investigates the automatic processing of questions and answer documents on these semantic levels using machine-learning techniques. Post-doc researcher Piroska Lendvai investigates mining the structure of encyclopedic

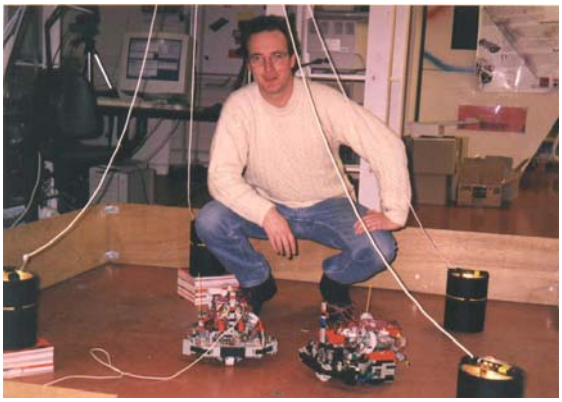
articles that contain implicit taxonomic information; for instance, an article about meningitis will contain the textual information that there is viral and bacterial meningitis, the two forms having very different causes, diagnoses, and treatments.

Figure 3: An answer found by the ROLAQUAD question-answering module on the question "what can cause RSI?".

The other information assistant project is À Propos, a SenterNovem IOP project under the MMI (man-machine interaction) program. In À Propos, a joint cooperation with the Radboud University in Nijmegen and several companies, with Ph.D. student Toine Bogers working on the Tilburg part of developing new information-retrieval methods, an information assistant is developed that runs in the background of a desktop computer used for professional document writing. Based on what the user is typing, the assistant continuously performs searches in background document sets (ranging from the person's own documents via the set of workgroup or company documents to the entire web). Upon finding a relevant hit, it suggests this document to the user using a carefully-timed alert (e.g., a pop-up screen).

Related to professional document writing is the automatic detection and correction of spelling errors. This is, contrary to what is sometimes thought, far from a solved problem. ILK member Martin Reynaert has devoted his Ph.D. thesis research on this topic, and is continuing it as STEVIN-funded post-doc researcher in the D-Coi project (*Dutch Corpus Initiative*). Spelling errors come in two types: one is the non-word error, or the typo; the other is the error where an intended word is confused for another similar word not appropriate in that context – in Dutch, the confusion between verb forms ending in –d and in –dt is an infamous example. Reynaert has shown that not only the last type of error, but also the first class of typos needs contextual knowledge (e.g., the surrounding words) to be properly corrected; the fact that most commercial spelling checkers do not use contextual knowledge is one of the reasons for their perceived weakness.

Counterbalancing the amount of applied research, the ILK research group was very happy to welcome a new branch of fundamental research on the evolution of language in 2003. On the basis of an NWO VENI fund, Paul Vogt (see photo) is conducting research into the evolution of language by letting robots and simulated agents perform language games. His research spear-point is the emergence of compositional structures, one of the key elements of human languages. Vogt, one of the Ph.D. alumni of Luc Steels' Brussels AI Lab, also joined the NewTies consortium (with coordinator Guszti Eiben at the Free University of Amsterdam) that acquired an impressive quantity of EU FP6 funding for performing large-scale simulations of multi-agent societies learning to communicate and trade; post-doc Federico Divina is working as the Tilburg researcher within NewTies.



Paul Vogt, with robot colleagues.

Finally, an exciting project which started in 2005 is MITCH, *Mining Information from Texts in the Cultural Heritage*, part of the CATCH program, with post-doc researcher Caroline Sporleder, Ph.D. student Marieke van Erp, and scientific programmer Steve Hunt. As do all CATCH projects, MITCH takes place at a cultural heritage institution, namely Naturalis, the National Natural History Museum in Leiden. The goal of the MITCH project is to develop tools to make the textual or semi-textual data available at Naturalis more accessible to researchers in the field. Such textual data sources are, for example, the field book logs that describe the circumstances under which an animal or plant specimen was collected, but also scientific publications about the specimens or manually created archival databases. These data sources are an invaluable resource if they can be searched and queried effectively. The MITCH project aims to provide the technology that is necessary for this task, for example by developing tools that can automatically link information across different documents, and tools to detect likely errors in the databases and provide sensible corrections, to be approved by experts (see Figure 4).

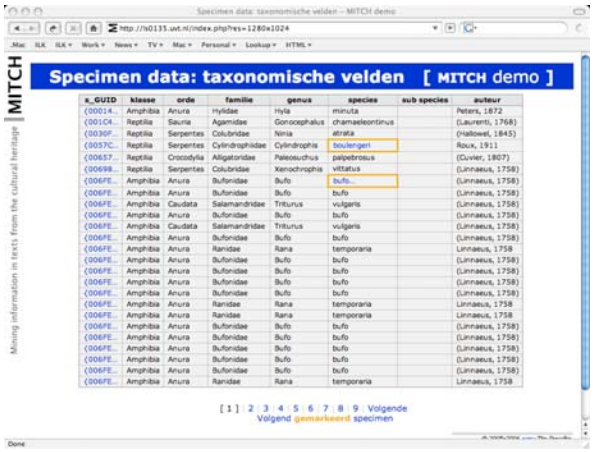


Figure 4: In the MITCH project, one focus is on the semi-automatic correction of textual databases. Two cells, likely containing errors to be corrected by an expert, are highlighted in a specimen database of amphibians and reptiles found in the Amazon region.

SOFTWARE: MEMORY-BASED LEARNING, WEB DEMOS, SPEECH SYNTHESIS

The small team of scientific programmers (consisting also of long-time ILK members Ko van der Sloot and Bertjan Busser) has been responsible for a number of software packages, originally intended for internal use by the whole ILK group, some of which have later been released to the research domain. For instance, the TiMBL software package (for *Tilburg Memory-Based Learner*) is used by hundreds of researchers in machine learning and natural-language processing world-wide. TiMBL implements a number of memory-based learning algorithms, most of which are based on *k*-nearest-neighbor classification, with several customizable extensions (types of similarity metrics and various weighting metrics). As is immediately obvious from a straightforward worst-case complexity analysis, classification by the *k*-nearest-neighbor rule can be frightfully slow, so a major part of ILK's programming efforts has been invested in optimizing the speed of pure *k*-nearest neighbor classification, as well as developing fast approximations of *k*-nearest-neighbor classification.

Other software spin-offs have been several web pages demonstrating particular natural-language processing applications, such as MBSP (memory-based shallow parsing) and MBMA (memory-based morphological analysis). ILK member Erwin Marsi combined several former national projects on text-to-speech synthesis, including Tilburg work, into a single public-domain downloadable speech synthesizer for Dutch.

For more information and links, visit the group's webpage at http://ilk.uvt.nl.

Finally, much to the curiosity of the Faculty of Arts colleagues and of the computing center of Tilburg University, the ILK research group has actively pursued the creation of a large computing infrastructure allowing for parallelization, the allocation of large amounts of memory (a logical consequence of implementing and running memory-based learning), and grid computing. It should be noted that the curiosity of colleagues concerning the ILK machine park has moved from utter bewilderment to an eagerness to learn more about it. In recent years, researchers in the fields of humanities and arts have increasingly started to realize that their objects of study, once digitized, could be automatically searched and mined for information and knowledge at a scale that they would never achieve by classical manual labor. Projects such as MITCH are encouraging examples to back up this argument. At the same time, at the fundamental end of the spectrum, the VICI project integrates very well with research of linguists in Tilburg and elsewhere working in the field of *constructions* and *construction grammars*, representing an influential and radically new view on linguistics of which the ground principles remarkably resemble the "knowledge-free" and bottom-up basis of the VICI project. The hope is that all of these multidisciplinary bridges will extend into serious branches of future ILK research.

A snapshot of some of the current ILK members. From left to right: Piroska Lendvai, Toine Bogers, Iris Hendrickx, Antal van den Bosch, Erwin Marsi, Roser Morante, and Martin Reynaert.

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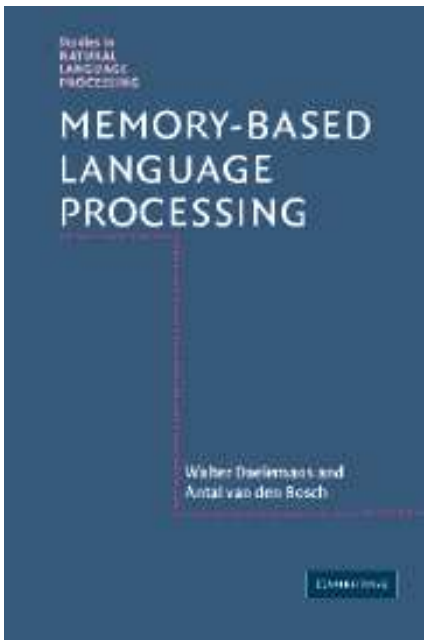


AIIDE-06

Pieter Spronck
MICC/IKAT, Maastricht

The second AAAI conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE-06) was held between June 20 and 23, 2006, in Marina del Rey, California. The goal of the AIIDE is to bring together computer scientists and people from the entertainment industry, to let them discuss ways of bringing the artificial intelligence in digital entertainment (i.e., computer games) to a higher level of quality. As the Innovation Platform considers the "creative industry" one of the key areas of Dutch economy, this conference should be of particular interest to BeNeLux AI researchers.

Of the 40 to 50 papers submitted, sixteen were accepted as full-paper presentations, and ten more as posters. Furthermore, there were six invited talks, and ten demonstrations. June 20 was intended for tutorials, but as there was little interest in those, they were replaced by a visit to the Institute of Creative Technologies, which does research into virtual characters for military training tools. The main conference ran from Wednesday, June 21, until the following Friday afternoon.

While the AIIDE has growth potential, it is still rather small. It was visited by 90 participants, of which about 20 from the games industry. The number of participants actually went down from last year, when more people from the games industry joined. The probable reason was this year's lack of a high-profile invited speaker from the games industry, a role which last year was filled by Will Wright of "Sims" fame. The organisers did not manage to get someone of his calibre this year, but fully intend to make good on that for next year's conference.

Still, four of the lesser gods of the games industry were present to deliver invited talks. Craig Reynolds, from Sony Computer Entertainment, (in his own words) "continued milking his 20-year old idea of flocking" and demonstrated how he managed to get 60,000 virtual fish to move naturally on the new PlayStation 3. Matt Brown, from Maxis, talked about the representation of emotions in virtual characters in the game "Sims 2". Ben Geisler, of Radical Entertainment, discussed how a game could gauge the human player's satisfaction with the game's progression, demonstrating this in "Hulk". And Steve Crane, from Midway Games, discussed how to make virtual characters more sophisticated. There were also two invited talks from the science world. Jonathan Gratch of the Institute of Creative Technologies discussed how to create human-like virtual characters, and Yours Truly gave a talk on adaptive entertainment.


Craig Reynolds listening to a colleague invited speaker.

The conference had full-paper presentations on Abstraction and Planning, User Interactions, Learning, Pathfinding, and Applications. Rather surprising was the fact that a good many talks focused on the player experience, i.e., making a game more enjoyable to a player by letting it adapt to what the player actually finds fun. Several solutions were offered for this issue, among which difficulty-scaling methods, satisfaction metrics, and giving the player immersive ways to express his or

her feelings towards the game. Flocking and crowds were also a major focus point of several talks, posters, and demonstrations, as was the automatic generation of high-quality game content, such as the behaviours of virtual characters, opponent tactics, and even storylines and conversations.

TURING TEST

The glue connecting all the presentations was the question how game characters can be created that manage to win the Turing test. While general artificial intelligence has a long way to go before it will be able to do that consistently, in the limited virtual worlds of games winning a Turing test might be possible in the near future. Game developers seem to understand that they need academic researchers to help them on that path, and I personally was pleasantly surprised that the game developers in the audience showed a clear willingness to experiment with the novel techniques relayed to them.

The final talk of the conference was by Michael Buro of the University of Alberta, who discussed the results of the ORTS tournament. Similar to RoboCup, this tournament is about AI-controlled teams in a Real-Time Strategy game fighting each other. The ultimate goal of the ORTS tournament is to bring RTS game AI to a higher level through regular competitions.

The first edition of the tournament consisted of three different games: (1) a resource-gathering game, (2) a combat game, and (3) a complete RTS game. Four universities submitted AI teams for some or all of the games. The first and third games were won by the University of Michigan, the second game by the University of Alberta. The Universiteit Maastricht entered one AI team for the second game, and scored second place, defeating the entry of the University of Michigan. Being the organisers of the tournament, the University of Alberta was ineligible for the first-place award, so that the money prize of $250 (donated by Mad Doc software) was awarded to the four students who created the entry for the Universiteit Maastricht.

Michael Buro stated that the current entries for the tournament were still fairly basic, and surmised that this was because of the limited time that had been available to develop the teams. However, now that the tournament software is in place, we might expect more competent AI teams to be entered for the next event. The competition is open to anyone, with the free ORTS software available for download from the University of Alberta (see the link below).

The third AIIDE is planned to be held in San Francisco, in the beginning of June, 2007.

AIIDE website: http://www.aiide.org/.
ORTS website:
http://www.cs.ualberta.ca/~mburo/orts/orts.html.

Michael Buro presenting the results of the ORTS competition.

SYMPOSIUM ON AUDITING AND KNOWLEDGE-BASED SYSTEMS

Pieter Spronck
MICC/IKAT, Maastricht

Cross-disciplinary theses are fairly rare. So, when Mohamed Wahdan was going to defend his Ph.D. thesis which crossed the boundaries between Computer Science and Economics, it was sufficient reason to organise a symposium on his research area: Auditing and Knowledge-Based Systems. The symposium was organised by the two institutes behind Wahdan's work, namely the MICC-IKAT institute of the Universiteit Maastricht, and the Maastricht School of Management (MsM), with financial support of SIKS and NWO. It was held in the afternoon of June 28, 2006, at MsM, in Maastricht.

Auditing concerns the investigation of financial reports of a firm, to evaluate whether they are a fair and accurate representation of the firm's finances. While most computer scientists probably have little

interest in auditing, in the business world it is an issue of high importance. The recent scandals involving Enron, Ahold, and WorldCom, could have been avoided if proper auditing had taken place. Evidently, some (if not all) human auditors cannot be relied upon. In his thesis, Wahdan gives reasons for why that is the case, and shows that a computerized auditor can make the auditing process more reliable. The aim of the symposium was to explore the problems of computerized auditing.

It is deplorable that the audience for this highly interesting symposium was rather limited. Fifteen to twenty people were in the room, which is rather small considering the importance of the subject matter. The small audience is mainly explained by poor planning, since most MsM students were on a field trip to Groningen that day.

Prof. Jaap van den Herik of MICC-IKAT kicked off the symposium by introducing the program, followed by a welcome address of prof. Fred Philips, associate dean at MsM.

After the opening speeches, Prof. Eddy Vaassen of the Universiteit Maastricht discussed whether an auditor could be enticed to rely on decision aids by applying certain audit quality pressures, such as severely limiting the time available for performing an audit. From practical experiments, he discovered that auditors tend to trust even less reliable tools, if sufficient audit quality pressures were applied.

Invited speaker prof. Hazem Yassin, of the American University of Cairo, Egypt, focused on the application of auditing standards in Egypt, which is the case study in Wahdan's thesis. He looked at international standards in auditing, how these are applied in Egypt, and in what Egypt differs from other countries.

Prof. Hazem Yassin.

Dr. Hans Verkruijsse of the Universiteit Maastricht brought computer science and accountancy close together in a discussion of the application of datamining and neural networks to business data files, to discover irregularities which could be indications of, for instance, fraud. He also discussed, based on his own practical experience, why auditors might resist the introduction of such helpful applications.


Dr. Hans Verkruijsse.

Prof. Hamdi Ali of the Maastricht School of Management cast severe doubts on the auditor's ability to detect fraud and money laundering practices. The main reason he gave was that auditors first and foremost look at balance sheets, which do not contain sufficient information to discover most illegal activities. Automated tools could greatly extend the auditor's abilities to look deeper into a firm's business.

Mohamed Wahdan brought the contents of all previous talks together in a discussion of his thesis subject, the building of a knowledge-based system called AREX that can aid, and actually for a large part replace, an auditor in his investigation of a business. All speakers agreed that the job of an auditor will soon become impossible without such aids, which demonstrates the high value of Wahdan's work.

On June 29, the day after the symposium, Mohamed Wahdan successfully defended his thesis and received his doctor's title.

Symposium website (which contains several presentations and further information): http://www.cs.unimaas.nl/auditing-symposium/.

Ph.D. thesis review: Automatic Formulation of the Auditor's Opinion

by Mohamed Aly Wahdan

Drs. Roel Ronken
Universiteit Maastricht

INTRODUCTION

This thesis reports on research of knowledge-based systems in auditing. It focuses on constructing, implementing, and validating a knowledge-based system that is capable of formulating an opinion on financial statements to be expressed in the auditor's report. The auditor's opinion enables shareholders and other users to put greater reliance on financial statements, which would not be possible without any audit. Nowadays, investors, tax authorities, banks, and other financial institutions do not acknowledge the reliability of financial statements without the availability of such a report. To formulate the requested report, auditors use a "personal-judgment" approach, i.e., they heavily depend on their own experience and expertise. For several reasons this approach may be ineffective. The thesis explains why, in the financial world, the formulation of the auditor's opinion is a suitable task for knowledge-based systems. Moreover, it investigates how the formulation of the auditor's opinion may be improved by using a knowledge-based system. In particular, it discusses how a knowledge-based system for formulating the auditor's opinion on financial statements can be constructed, implemented, and validated.

BACKGROUND

The relationship between auditing and knowledge-based systems may seem strange at first, but makes sense after an explanation. It should be clear upfront that auditing is a broad area and is subject to many (national and international) standards.

The auditor's opinion is one of the most important aspects of the auditor's job. The auditor's opinion is an independent view on the fairness of the financial statements. It is used by many different parties (shareholders, creditors, banks, etc.) and given its importance and the trust put in these reports, it ultimately adds to the fluency of capital markets and the economy as a whole.

The auditor's opinion is derived by means of reviewing the financial statements as submitted and prepared by the company. The auditor normally checks for any misstatements by taking a sample from the client's accounting record. Furthermore the auditor checks whether sufficient and adequate internal controls are in place, as these controls limit the chances of financial misstatements occurring. Lastly, it should be added that the auditor can issue five different opinions, ranging from an unqualified opinion in which the auditor indicates that everything is fairly represented, to an adverse opinion in which the auditor indicates that the financial statements are not fairly represented and/or problems regarding accounting principles exist. Given the size of (multinational) firms and the according vastness of the financial statements, as well as the ever changing rules and regulations with respect to auditing, means that the auditing profession is difficult and the use of IT in this field is widely advocated.

The relationship between auditing and knowledge-based can now be explained in detail. Knowledge-based systems are in this research defined as computer programs that use a wide base of expertise in a specific field and structure reasoning to perform a task as adequate as human experts would do. Such as a system should const of five capabilities: they should be goal oriented, should be efficient, must possess an explanation facility, include preservation as well as consistency.

As said, the auditing profession is changing rapidly and the audit process is becoming increasingly difficult. It can therefore be expected that an auditor can successfully use knowledge-based systems, as they help to preserve knowledge as possessed by senior staff, which can be transferred to lower-level staff. It enhances the efficiency of the audit by reducing planning time and improving personal productivity. A knowledge-based system speeds up training of novices and with lower need for supervision by senior staff. It adds to the effectiveness of the audit, by improving decision consensus, can handle more complex situations and it allows for a more effective analysis. Lastly, it increases the quality of the audit output and educational benefits can be gained.

Practically speaking, four applications of knowledge-based systems in auditing can be distinguished. First in the audit planning stage, knowledge-based systems can help with gathering and evaluating audit evidence. Second, knowledge-based systems can be used in evaluating internal controls in place. Third, knowledge-based system can be used to aid in going-concern[1] uncertainties.

[1] The idea that a company will continue to operate indefinitely, and will not go out of business and liquidate its assets. For this to happen, the company must be able to generate and/or raise enough resources to stay operational.

Fourth, a knowledge-based system can assist in formulating the auditor's opinion.

RESEARCH MODEL, SETTING AND DATA COLLECTION

The knowledge-based system in this research, dubbed Auditor's Report EXpert (AREX) incorporates all four applications as described above, but the main idea was to assist in formulating the auditor's opinion. Relevant knowledge was collected by means of eliciting the expert's knowledge and expertise. The dominant approach of the research is an inductive approach. The conceptual model structure of AREX can be seen in figure 1.

The study solicited the participation of 32 experienced auditors in seventeen audit firms in Egypt. These auditors aided in the development of the knowledge base of AREX. In addition another 18 auditors participated in the validation and evaluation of the effectiveness, efficiency and acceptance of AREX.

Egypt was chosen because of the author's background, funding by the Egyptian government, but more importantly because of the results of a survey on the auditing situation in Egypt. The survey yielded three recommendations: the legal framework should be improved, more emphasis should be paid to education and standards, and more attention should be paid to professional ethics and judgments. The survey also indicated that a knowledge-based system can help in improving the current situation in Egypt. AREX can therefore be seen as a first approach to improve the current auditing situation in Egypt.

The preliminary validation of AREX was performed in two stages. In the first stage, a questionnaire was submitted to 32 auditors. The survey consisted of fifteen auditing cases that needed to be handled by the auditors as test cases. The auditors had to formulate the auditor's opinion. These test cases were also handled by AREX and the results from AREX were compared with the results from the auditors. Differences were discussed with the auditors and the overall conclusion was that the AREX prototype performed the task of formulating the auditor's opinion more accurate and consistent than the auditors; the auditors even revised their opinions in accordance with those made by AREX. The second stage consisted of three auditors applying AREX to three of their own hypothetical cases. The overall conclusion was similar to the first stage: AREX was perceived as a useful tool and possessed acceptable performance and task-relevant knowledge.

The field test evaluation of AREX was done with 26 highly experienced auditors from various audit firms in Egypt. These auditors audited 42 cases in total and the overall result was 98% agreement with real-life results. Finally a survey was used to gather the perceptions of the auditors with respect to AREX, which were yet again positive from which can be concluded that AREX is a useful tool.

IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

Overall it can be seen that the development of AREX was successful. AREX was positively perceived, showed high acceptance and can be considered both effective and efficient. This shows that AREX is a step towards a more automated auditing setting. A system such as AREX can be used for training purposes, but can also aid in real-life and assist the auditor in complex situations as well as stressful times. Furthermore, it can aid in the development of the auditing situation in countries such as Egypt, which still lack a good auditing environment.

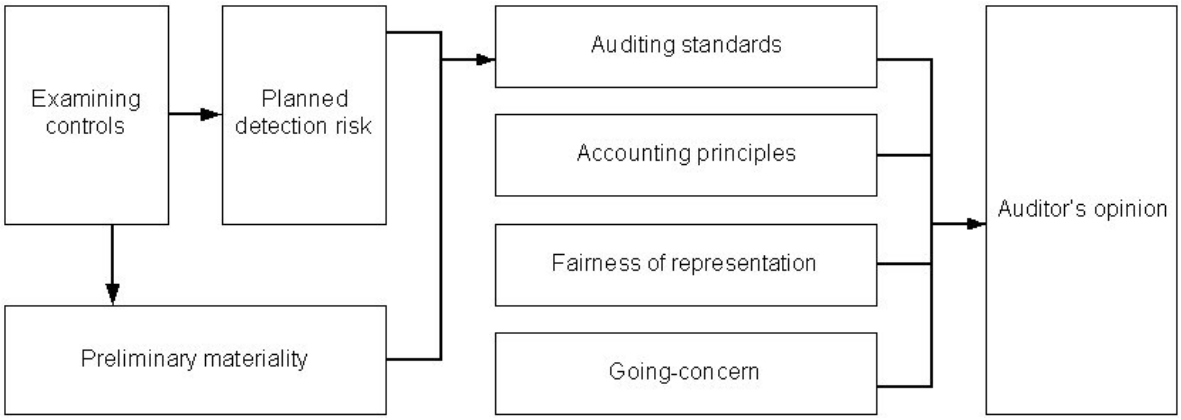


Figure 1: The conceptual model structure of AREX.

The limitations of this study refer to the limited scope: Egypt was chosen for the knowledge elicitation as well as the survey. The response scale of AREX is limited to yes and no responses, whereas in actual life the interaction does not limit to yes or no answers. Finally AREX is not a complete system in the sense that it still lacks certain materiality[2] judgments, does not include continuous auditing and the effectiveness of internal controls were not investigated.

Future research should therefore focus on larger response scales, more in-depth assessments, formatting the financial statements and off course different settings and more objective assessments.

In conclusion it can be said that this research is both interesting from a practical as well as theoretical point of view. It is well written and the system is interesting and can probably be successfully enhanced in the future.

SCRATCH Meeting

April 7, 2006
Nationaal Archief, The Hague

Svitlana Zinger
Groningen University

The NWO research programme CATCH (Continuous Access To Cultural Heritage) aims at developing new tools and methods for cultural heritage institutes, to increase the accessibility of and the interaction with our cultural heritage supporting and improving the work of the professionals.

Ten research projects are conducted in nine large Dutch cultural heritage institutions. The ten research teams, each constisting of a Ph.D., a postdoc and a scientific programmer, are physically located in the heritage institutes, to optimize the interaction between computer scientists and collection managers of cultural heritage institutes. The research teams work together, to integrate their research results. Every six weeks, a CATCH meeting is organized.

On the 7th of April 2006, a CATCH meeting took place in the Nationaal Archief in the Hague. The meeting was organized by one of the CATCH research projects: the SCRATCH (SCRipt Analysis Tools for Cultural Heritage) team. Prof. Lambert Schomaker (Groningen University, the Netherlands) was the chairman of the meeting. He is the SCRATCH project coordinator. About 35 people attended the meeting.

The SCRATCH project aims at information retrieval from handwritten documents. The project includes research in pattern recognition as well as in computational linguistics. Composing these two domains we expect to gain insight into the visual properties and semantics of the historical handwritten documents. The participants of the project are the Artificial Intelligence and the Computational Linguistics departments of the Groningen University and the National Archive in the Hague.

Working with cultural heritage collections requires not only data acquisition but also its annotation in a digital form. The task of annotation is not simple because the collections are large and opinions of experts differ. This problem of annotation and data collection was addressed by the first invited speaker: Dr. David Stork (Ricoh Innovations, USA) presented the Open Mind project and collaborative annotation. Dr. Stork showed examples of successful web-based knowledge acquisition, when users play games especially designed for collecting data that is useful for pattern recognition and machine learning. In the SCRATCH project we need to get annotations of the handwritten text and a web-based approach may be the fastest and the cheapest way to do so.

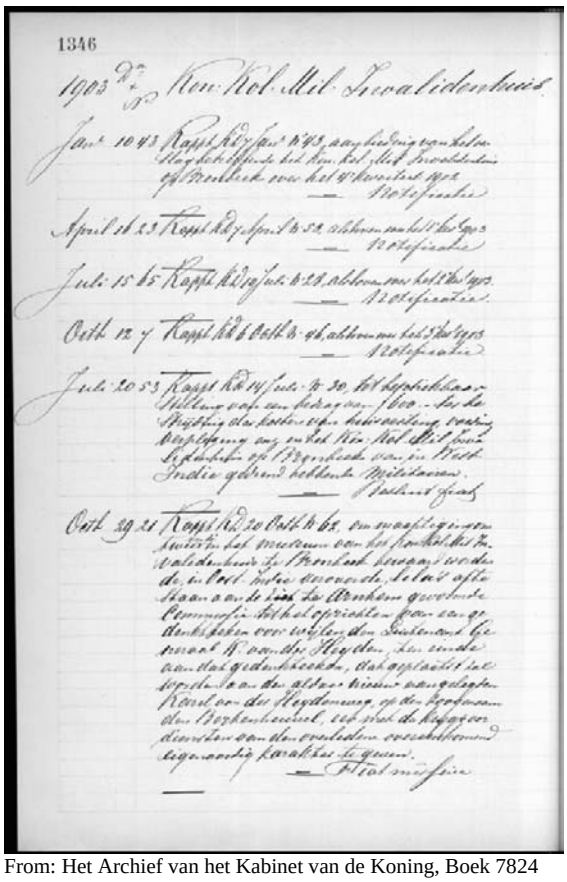
The second invited speaker was Prof. Thierry Paquet (Rouen University, France). He leads a project on handwritten texts of the novel Madame Bovary of Gustave Flaubert. The Bovary project consists of scanning the handwritten pages where Gustave Flaubert made drafts and the final version of the novel, choosing the proper visualization format for these images on the web, and creating a maximally automated system for transcribing these handwritten texts into digital ones. Obviously, this project has much in common with SCRATCH and therefore the experience of Prof. Paquet is very interesting.

The following presentation was on the archival system of the Cabinet of the Queen – a small part of these handwritten documents is digitized and we are using them in the SCRATCH project. Henny van Schie – archivist who participates in the SCRATCH project – described the way the documents are

[2] Information is material if its omission or misstatement could influence the economic decisions of users taken on the basis of the financial statements. Materiality depends on the size of the item or error judged in the particular circumstances of its omission or misstatement. Thus, materiality provides a threshold or cut-off point rather than being a primary qualitative characteristic which information must have if it is to be useful.

structured and accessed nowadays in the archive. Much work in the archive is still done manually, taking a lot of time and efforts of experts. Digitization and information-retrieval technology can make the document retrieval very much faster and easier, providing new opportunities for research and education.

After the presentations the National Archive provided guided tours and sessions on archival investigation. Another proposed activity was line annotation: the participants got lines of handwritten text from the Cabinet of the Queens and they had to type the text they could read there. This exercise proved to be not easy because often some expert knowledge is needed to read or to interpret some sentences. Drinks and an animated conversation concluded the meeting.



From: Het Archief van het Kabinet van de Koning, Boek 7824 (1903). Nationaal Archief, Den Haag.

How to Complete a Ph.D. List

Jaap van den Herik
MICC-IKAT, Maastricht

A direct consequence of the international dissemination of knowledge is the global distribution of researchers. It would be interesting to see in how many countries a Dutch professor is teaching at a professional chair. This holds for all sciences but we may restrict it at liberty, e.g., to computer science. Of course, here we do not count the Dutch names per se, but the Dutch origin per person. As far as I know we have AI professors in England (Wiebe van der Hoek), USA (parttime: Johan van Benthem), South Africa (Tim Grant). There must be more, but I have no detailed list and count on the reader (you are invited to provide me with other names and countries). This reminds me of a Ph.D. student who has submitted his thesis to assessment committee member John McCarthy (Stanford University). On page 10 he has written: "I owe John McCarthy $ 10 if he reads this line." No claim has been received by the Ph.D. student.

In the current list we have two "oddities". Both have the smell of perfection. The first announcement is fully out of the current time frame. However, what to do when an email arrives so late and the contents is worthwhile to be mentioned. No fewer than four persons are involved who are well-known to the Dutch AI community. Promovendus Siewert van Otterloo has settled in Liverpool now for many years and has organized there workshops on games and on games and logic. His first promotor Wiebe van der Hoek comes from the AI group of the Universiteit Utrecht. Michael Wooldridge is a well-known speaker at the BNAICs and at SIKS meetings. It is interesting to see that a full professor can also be a co-promotor. It emphasizes the differences in Ph.D. procedures at the universities. In the list we see co-promotor (Liverpool), added promotor (Delft), and assistant promotor (Twente). Whatever the case, your editor believes that it is worthwhile to inform you on this thesis defence. However, we will not adapt the annual overview of Ph.D. theses as published in the December 2005 issue; we will adjust it silently in the December 2006 issue.

The second oddity is inclusion of three Ph.D. theses defended at the Universiteit Hasselt, but to be more precise at the transnationale Universiteit Limburg (tUL). The tUL is the first transnational university in the world (admittedly, there are a few international universities, but transnational is different from international). In all three cases, Professor Frank van Reeth is the promotor. We congratulate him

wholeheartedly with his successes. The three ceremonies were attended by members of the Universiteit Maastricht (the other partner in the tUL), namely by Eric Postma (June 21), Jaap van den Herik (July 3) and Jan van Zanten (July 14). It makes clear that the Netherlands still have 14 universities (the tUL inclusive).

In the list of announcements we have 12 Ph.D. titles. Some are more related to AI than others. Disregarding the typical SIKS-Ph.D. defences, we see other topics emerging too. Moreover, we see the second NWO ToKeN programme Ph.D. thesis by Xandra van Montfoort. My own contribution to the list has opened a new area of AI research, viz. in the domain of auditing. Is it possible that a computer program performs on equal footing or even better when writing an auditor's report? In the future, the answer is affirmative, but it is challenging to see what performancees are now already possible. Could we avoid shame and scandle in the future by using AI programs that may help detecting auditors' fraude? Can we solve the many cases, such as Parma, Ahold, Enron, and Worldcom with the help of clever computer programs? The answer is again affirmative and our community is privileged to educate the young people who would model such behaviour and construct such programs. This visionary view is supported by a contents review of Wahdan's thesis by Roel Ronken.

TWO NEW PROFESSORS IN DELFT

For a proper education as mentioned above we need excellent teachers, front-ranked researchers, and promising professors. The Delft University of Technology understands the necessity of such appointments very well. Hence, in the last two months they have appointed two new "AI professors", namely Prof.dr. Catholijn Jonker (coming from the Radboud University Nijmegen) and Prof.dr. C. Witteveen (already affiliated to the Delft University of Technology). Both professors are members of the Board of the BNVKI and therefore we may congratulate them in person and as members of our BNVKI organisation. Congratulations to both. We keep you informed on their inaugural addresses.

Siewert van Otterloo (November 25, 2005). *A Security Analysis of Multi-agent Protocols*. University of Liverpool. Promotores: Prof.dr. W. van der Hoek, Prof.dr. M. Wooldridge. Co-promotor: Prof.dr. J. van Benthem.

Patrick van der Duin (May 29, 2006). *Qualitative Futures Research for Innovation*. Delft University of Technology. Promotor: Prof.dr.ir. A.J. Berkhout (DUT). Added promotor: Dr. J.R. Ortt (DUT).

Joeri van Ruth (June 2, 2006). *Flattening Queries over Nested Data Types*. Universiteit Twente. Promotor: Prof.dr. P.M.G. Apers (UT). Assistant promotor: Dr. M.M. Fokkinga (UT).

Ronny Siebes (June 9, 2006). *Semantic Routing in Peer-to-Peer Systems*. Vrije Universiteit Amsterdam. Promotor: Prof.dr. F.A.H. van Harmelen (VUA).

Xandra van Montfoort (June 20, 2006). *Gist and its Role in Difference Detection*. Eindhoven University of Technology. Promotores: Prof.dr. D.G. Bouwhuis (TU/e), Prof.dr. E.O. Postma (UM).

Tom van Laerhoven (June 21, 2006). *An Extensible Simulation Framework Supporting Physically-based Interactive Painting*. Transnationale Universiteit Limburg. Promotor: Prof.dr. F. van Reeth (UH).

Mohamed Wahdan (June 29, 2006). *Automatic Formulation of the Auditor's Opinion*. Universiteit Maastricht. Promotores: Prof.dr. H.J. van den Herik (UM), Prof.dr. E.H.J. Vaassen (UM). Co-promotores: Prof. H.F. Ali (Maastricht School of Management), Dr. P.H.M. Spronck (UM).

Koen Beets (July 3, 2006). *New Techniques for Subdivision Modelling*. Transnationale Universiteit Limburg/Universiteit Maastricht. Promotor: Prof.dr. F. van Reeth (UH), Co-promotor: Dr. J. Claes (UH).

Bert Bongers (July 4, 2006). *Interactivation – towards an e-cology of people, our technological environment, and the arts*. Vrije Universiteit Amsterdam. Prof.dr. G.C. van der Veer (VU), Prof.dr. J.C. van Vliet (VU).

J. Franssens (July 14, 2006). *Statistical Segmentation for Computer Graphics*. Transnationale Universiteit Limburg. Promotor: Prof.dr. F. van Reeth (UH).

Henk-Jan Lebbink (September 18, 2006). *Dialogue and Decision Games for Information Exchanging Agents*. University of Utrecht. Promotores: Prof.dr. J.-J. Ch. Meijer (UU), Prof.dr. C.L.M. Witteman (RUN).

Johan Hoorn (October 9, 2006). *Software Requirements: Update, Upgrade, Redesign – towards a Theory of Requirements Change*. Vrije Universiteit. Promotores: Prof.dr. G.C. van der Veer (VU), Prof. Dr. J.C. van Vliet (VU).

Section Editor
Richard Starmans

Agent Systems Summer School for SIKS-Ph.D. students

From July 17-21, 2006, the eighth edition of the European Agent Systems Summer School (EASSS 2006) takes place in Annecy, France. Details on program and location can be found at http://www.esia.univsavoie.fr/index.php?id=233.

As a result of the cooperation between SIKS and the EASSS 2006 organisation, SIKS-Ph.D. students can participate without paying entrance fee. The summerschool is part of the advanced components stage of the school's educational program and therefore Ph.D. students working in the field of agent systems are strongly encouraged to participate. However, there is a fixed number of places available for SIKS-Ph.D. students at the summerschool, and therefore an early registration is required.

A free participation as a SIKS-Ph.D. student is only possible by submitting the electronic registration form that can be found at http://www.siks.nl/act/inschrijving_easss_2006.html. Ph.D. students will receive a notification whether they can participate as soon as possible. **So, do not contact the EASSS organisation for questions about this SIKS-arrangement and do not use the registration form at the EASSS-site.** For all questions regarding SIKS and its educational program, please contact office@siks.nl.

First Dutch/Belgian Day on Enterprise Information Systems (EIS 2006)

On September 8, 2006 SIKS organizes the First Dutch/Belgian day on Enterprise Information Systems in conference center Hoog-Brabant in Utrecht.

The purpose of EIS 2006 is to bring together Dutch/Belgian junior and senior researchers interested in the advances and business applications of information systems – a broad field, including topics such as Management Information Systems, E-Business, IS Analysis and Design, Requirements Engineering, Business Innovation, Knowledge Management, Business Process Management, Product Software Development, Coordination and Communication, Collaborative Information Systems and many others.

EIS 2006 is organized by the Dutch Research School SIKS as a unique opportunity for research groups from both the Computer Science-side and the Management-side to meet and interact. EIS 2006 is intended to be the first in a yearly EIS-tradition as a way of reinforcing the Information Systems field – in terms of both scientific ambition and industrial relevance.

This first year, the theme of EIS is: *Information Systems – defining the field*. In the morning session, Roel Wieringa (UT, Scientific Director of SIKS) will introduce this theme and present his view on Information Systems as a scientific discipline and its research methods. After reactions from Monique Snoeck (KU Leuven) Jaap Gordijn (VU) and Hans Akkermans (VU, Chairman Board of Governors SIKS), there will be a plenary discussion on this topic. In the afternoon session, a tour d'horizon of state-of-the-art EIS research is provided by presentations of Herman Balsters (RU Groningen), Erik Beulen (U Tilburg/Atos Origin), Slinger Jansen (UU), Ana Karla Alves De Medeiros (TUE), Aldo de Moor (VUB) and Rene Wagenaar (TUD).

The day is chaired by Hans Weigand (UvT) and is open for all SIKS-researchers, but also for EIS practitioners or interested researchers from other fields. Entrance, including lunch, is free, but prior registration is required. Details on registration will be made available in due course.

PROVISIONARY PROGRAM

09.30-10.10	coffee
10.10-10.25	welcome by Hans Weigand (UvT)
10.25-11.00	Roel Wieringa (UT): Information Systems: defining the field
11.00-11.20	Monique Snoeck (KUL): reaction
11.20-11.40	Jaap Gordijn, Hans Akkermans (VU): reaction
11.40-12.10	plenary discussion
13.00-13.30	Erik Beulen (UvT): Managing IT outsourcing
13.30-14.00	Herman Balsters (RUG): Semantics of IS outsourcing

14.00-14.15	break
14.15-14.45	Slinger Jansen (UU): Software release and delivery
14.45-15.15	Ana Karla Alves De Medeiros (TUE): Genetic workflow mining
15.15-15.30	break
15.30-16.00	Aldo de Moor (VUB): Community Information Systems
16.00-16.30	Rene Wagenaar (TUD): (to be announced)
16.30-17.00	drink

SIKS BASIC COURSES
"INFORMATION AND ORGANISATION"
AND
"ARCHITECTURES FOR IKS"

INTRODUCTION

From September 25-29, 2006 the School for Information and Knowledge Systems (SIKS) organizes two basic courses: "Information and Organisation" and "Architectures for IKS". The location will be Landgoed Huize Bergen (see www.huizebergen.nl for more details) in Vught. Both courses will be given in English and are part of the obligatory Basic Course Program for SIKS-Ph.D. students. Although these courses are primarily intended for SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS-Ph.D. students taking the course.

SCIENTIFIC DIRECTORS

- Dr. H. Weigand (UvT) Information and Organisation
- Prof. dr. ir. Paul Grefen (TUE) Information and Organisation
- Prof. dr. E. Proper (RUN) Architectures for IKS

PROGRAM

A provisionary program will be made available soon.

REGISTRATION

In the conference center there is a limited number of places and there is interest from other groups in the topic as well. Therefore, an early registration is required.

Deadline for registration for SIKS-Ph.D. students: September 1, 2006.

CONFERENCES, SYMPOSIA WORKSHOPS

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

JULY 13-15, 2006
7th Conference on Logic and the Foundations of Game and Decision Theory. Liverpool, UK.
http://www.csc.liv.ac.uk/~wiebe/LOFT06

JULY 16-21, 2006
IEEE World Congress on Computational Intelligence 2006 (WCCI'2006). Vancouver, Canada.
www.wcci2006.org

JULY 24-27, 2006
The 8th International Computer Games Conference (CGAMES'2006). Louisville, Kentucky, USA.
http://www.scit.wlv.ac.uk/~cm1822/cgames06usa.htm

AUGUST 1-5, 2006
International Conference on Informatics in Control, Automation and Robotics (ICINCO'2006). Setúbal, Portugal.
http://www.icinco.org

AUGUST 16-21, 2006
Third International Joint Conference on Automated Reasoning (IJCAR 2006). Seattle, USA.
http://ijcar06.uni-koblenz.de/

AUGUST 17-20, 2006
22nd International Conference on Logic Programming. Seattle, Washington, USA.
http://www.cs.uky.edu/iclp06/

AUGUST 28 - SEPTEMBER 1, 2006
17th European Conference on Artificial Intelligence (ECAI'06). Riva del Garda, Italy.
http://ecai2006.itc.it/

AUGUST 29 - SEPTEMBER 1, 2006
European Conference on Parallel Computing (EURO-PAR 2006). Dresden, Germany.
http://www.europar2006.de/

SEPTEMBER 1-3, 2006
Second International Congress on Mathematical Software (ICMS'2006), Castro Urdiales, Spain.
http://www.icms2006.unican.es

SEPTEMBER 3-6, 2006
The 3rd IFIP International Conference on Ubiquitous Intelligence and Computing (UIC-06), Wuhan and Three Gorges, China.
http://www.uic-conference.org/2006/

SEPTEMBER 4-8, 2006
UC 2006, 5th International Conference on Unconventional Computation, University of York, UK.
http://www.cs.york.ac.uk/nature/uc06/

SEPTEMBER 10-14, 2006
International Conference on Artificial Neural Networks (ICANN 06), Holiday Inn Hotel, Athens, Greece.
http://www.icann2006.org

SEPTEMBER 13-15, 2006
10th European Conference on Logics in Artificial Intelligence (JELIA'06). Liverpool, UK.
http://www.csc.liv.ac.uk/~jelia

SEPTEMBER 13-15, 2006
Second International Conference on High Performance Computing and Communications (HPCC-06), Munich, Germany.
http://hpcc06.lrr.in.tum.de/

SEPTEMBER 18-22, 2006
13th ISPE, International Conference on Concurrent Engineering: Research and Applications, Antibes, French Riviera.
http://www.ce2006.org

SEPTEMBER 19-21, 2006
2nd Annual North American Game-On Conference (GameOn'NA 2006). Naval Postgraduate School, Monterey, USA.
http://biomath.ugent.be/~eurosis/conf/gameon-na/gameon-na2006/index.html

SEPTEMBER 20-22, 2006
The 5th International Conference on Entertainment Computing (ICEC'2006). Cambridge, Uk.
http://www.icec2006.org/

SEPTEMBER 28-29, 2006
The 7th IEEE/ACM International Conference on Grid Computing (GRID 2006), Barcelona, Spain.
http://www.grid2006.org/

SEPTEMBER 28-30, 2006
IFSAM VIIIth World Congress 2006, Berlin, Germany
http://www.ctw-congress.de/ifsam/submissions.html

OCTOBER 3-6, 2006
The 18th Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2006), Namur, Belgium.
http://www.bnaic2006.be

OCTOBER 16-18, 2006
The First International Workshop on Intelligent Application in Product Lifecycle Management (IAPLM'06). Jinan, Shandong, P. R. China.
http://www.iaplm.org

OCTOBER 23-25, 2006
ESM2006, The 2006 European Simulation and Modelling Conference, Toulouse, France
http://biomath.ugent.be/~eurosis/conf/esm/esm2006/

OCTOBER 25-27, 2006
First European conference on Smart Sensing and Context (EuroSSC 2006). Enschede, The Netherlands.
http://www.EuroSSC.org

NOVEMBER 5-9, 2006
Fifth International Semantic Web Conference (ISWC 2006), Athens, Georgia, USA.
http://www.win.tue.nl/~laroyo/

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

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

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

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

DECEMBER 4-6, 2006
The 4th IEEE European Conference on Web Services (ECOWS 2006). Zurich, Switzerland.
http://www.ifi.unizh.ch/ecows06/

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