NEWSLETTER

MYCAREVENT

MYCAREVENT project

ALAMAS 2007 symposium

Five Ph.D. thesis abstracts

News from the Belgium-Netherlands Association for Artificial Intelligence

Spring, Summer, Autumn, Winter… and Spring

Editor-in-Chief

The title of this editorial is the name of a film that came into my mind when I was contemplating on the evolution of AI (and on a lesser level, reading Antal van den Bosch' present BNVKI-Board News). The film is about the life of a Buddhist monk, starting with his adoption as a very young pupil by an adult monk at a beautifully situated floating sanctuary, and ending with him being an adult monk at the same sanctuary and adopting himself a new youngster as pupil. The theme is not so much the perishableness of individual life, but more the eternity of spiritualism. Likewise in AI, people come and go, but the developments continue.

One of the people saying goodbye is Dr. Katja Verbeeck. She acted as editor for Belgium for this newsletter for quite some years. Luckily she doesn't say goodbye to AI, but accepted a new job, as postdoc in Maastricht. And she has shown to be very active there already. She was, e.g., a member of the program committee of the ALAMAS 2007 symposium and co-editor of the proceedings. See also the report on pages 31-33 in this issue. Being in Maastricht she understandably feels she should not longer act as editor for Belgium. We thank her wholeheartedly for her cooperation during the last years. Meanwhile a successor for the editorship for Belgium has already been found, in the person of Joachim de Beule. He is currently working at the Artificial Intelligence Laboratory of the Vrije Universiteit Brussel. He will introduce himself in the next issue of the newsletter. We welcome him sincerely.

Another life cycle coming almost to an end is that of the MYCAREVENT (MobilitY and CollAboRative work in European Vehicle Emergency NeTworks) project. This project deals with new technologies, applications and services for the automotive aftermarket. Key area of MYCAREVENT is the mobile service world. This 3-year research project financed by the IST (Information Society Technology) program of the European Commission within the Sixth Framework Program unites leading industry partners of the automotive sector and researchers, focussing on service development, process and organization management, e-business, communication networks

Katja Verbeeck

as well as human-computer interaction. The project finishes coming September. Two researchers in the field report on new insights and findings, with respect to expert systems for decision support, arising from this project (see pages 28-31).

A third example of a life cycle is the process from start to finish of a Ph.D. thesis, a topic reported on repeatedly by Jaap van den Herik in our newsletter. When this trajectory successfully has been traversed, the AI community especially is interested in the results of the research, as laid down in the theses. As said before, we therefore have opened the pages of our newsletter for abstracts and reviews of Ph.D. theses. In this issue we have no less than five such abstracts (pages 33-40), reporting the Ph.D. research by five fresh doctors (in chronological order of their defense dates: Neta Spiro, Kees Bergstra, Natasa Jovanović, Jurriaan van Diggelen, and Ronald van den Hoogen). We congratulate them all with their successful defenses and wish them an inspiring and prosperous future, hopefully still within AI research.

Spring, Summer, Autumn, Winter… and Spring	**http://www.sonyclassics.com/spring/**
MYCAREVENT project	**http://www.mycarevent.com/index.aspx**
ALAMAS 2007	**http://www.cs.unimaas.nl/alamas/**

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The photographs in this issue are by Sander Bakkes.

Front cover: the logo of the MYCAREVENT consortium.

The deadline for the next issue is: **June 1, 2007**.

BNVKI-Board News

Antal van den Bosch

Two "News from the board" ago I said goodbye to the falling leaves in mid-December; now, mid-April, I'm welcoming the summer. Global warming seems to be leaving winter and spring little time. The same seems to be the case with the economy. After a mini-ice-age, summer is ready to take over. This is good news; it allows me to suspect we will be able to welcome back many friends from industry at our fora, such as the BNAIC in Utrecht (November 5-6, 2007, when probably the trees will still be green), as many companies will want to spread their wings and think about innovations again.

BNAIC-2007 is appearing at the horizon.[1] Dear colleagues, Ph.D. students especially, now is the time to start writing a paper for BNAIC (deadline: June 25). Whether you want to describe some exciting experimental results, formulate a fresh insight, or make some final observations before the thesis is written, BNAIC is always an excellent opportunity to have your local peers take a look at what you have been cooking.

The local organization of BNAIC-2007, headed by Mehdi Dastani and Edwin de Jong, is doing a great job in preparing our 19th conference, to be held in the centre of Utrecht, in the beautiful Akademie-gebouw.

The board, in the mean time, has been active in endorsing and sponsoring AI-related meetings in the Netherlands and Belgium. We welcome further suggestions and requests. In return, you will find these events announced, and read about these events afterwards, in your faithful BNVKI Newsletter.

State-based Expert System with Information Entities

Tiberiu Lupascu (Euro IT&C) and Mark Winands (MICC-IKAT, Universiteit Maastricht)

INTRODUCTION

MYCAREVENT[2] (Mobility and Collaborative Work in European Vehicle Emergency Networks) is a 3-year research project financed by the IST (Information Society Technology) program of the European Commission within the Sixth Framework

Program. One of the goals of the project is to implement *a road-side-assistance decision-support system* capable of providing manufacturer-specific car-repair information according to the problems identified by cars' Off-/On-Board-Diagnosis systems. The decision-support system is designed and implemented as an expert system.

The evolution of expert-system development has proven in the last twenty years that a combination of different technologies is suitable for complex problem solving. Technologies like case-based reasoning systems, fuzzy or frame systems, neural networks or genetic algorithms have all different problems in implementation, starting from information management and ending with learning and adaptation capabilities.

The following criteria are important on choosing an intelligent system for problem solving [3]: knowledge representation, uncertainty tolerance, imprecision tolerance, adaptability, learning ability, explanation ability, knowledge discovery, and maintainability. A short study will reveal that the existing technologies are still not able to aim at problem solving together with offering maintainability and knowledge representation for the end user. In this article a new AI concept is presented and the associated expert system proposed which is used in the MYCAREVENT project.

REASONING

Consider a rule-based expert system. The components are: shell, knowledge base, and inference engine. This system is able traditionally to perform reasoning on a certain area. The adaptability is low, it doesn't work with uncertainty, and it has no capability of learning. We try to find a way to improve the above characteristics and transform the expert system in a competitive AI tool.

Adaptability defines the capacity of a system to transform its behavior based on extern stimuli. Transforming behavior means actually **changing the inference** and the knowledge. If the knowledge representation and management will allow easy transformation of inference then the system would become moderately adaptable. A system can work with uncertainty when it is able to reason in not completely described situations. Bayesian reasoning for instance offers a good solution for uncertainty reasoning but it is hard to be implemented in generic conditions. A better solution is to accept working with fuzzy theory. It indeed doesn't allow real uncertainty management but it allows solving complex tasks using fuzzy sets and **linguistic variables**. A system that would be able to work in

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[1] http://www.cs.uu.nl/bnaic2007/

[2] For more information see http://www.mycarevent.com/.

the above conditions would have as well moderate capability of working with uncertainty.

In our opinion, there are two clear types of expert systems that learn: neural-networks-based systems and genetic-algorithms-based systems. Considering the knowledge representation is poor in these systems, they are used only for solving narrow situations. However, the learning potential allows for those systems to **define new knowledge** and/or new inference chains. If this definition is acceptable, a system that is able to create new knowledge is moderately able to learn. Considering the above-explained system, where the characteristics of adaptability, learning and working with uncertainty are handled, the new system is a hybrid AI system able to stand for complex problem solving.

CONCEPT

One single expert system, which has a knowledge database and an inference engine, can solve one particular situation. Multiple expert systems having each separate knowledge databases and inference engines, connected and able to communicate, would allow problem solving in more areas. The interconnectivity is a direct source for knowledge. Instead of having more systems connected, we define information entities. The information entity is a component enriched with personal knowledge and personal inference engine (basically one simple expert system) [1].

The characteristics of information entities are being able to:

- Maintain and control interdependence relations with other information entities.

- React to extern stimuli. These stimuli are events on which the information entities react or they are messages sent by other information entities.

- Alter the knowledge themselves.

- Create stimuli.

- Maintain its own inference engine. In a system with more information entities, the inference engines are built in the same way for each information entity.

- Maintain an interface with the human expert and with other entities.

Considering the above characteristics, an information entity has the following components:

its own inference engine, properties (knowledge), methods (knowledge), events (knowledge), sensors (shell), interface (shell). Based on the frame theory, an information entity can aggregate other information entities. Moreover, complex informational models are now easy to maintain. Figure 1 explains the functional concept of such information entity.
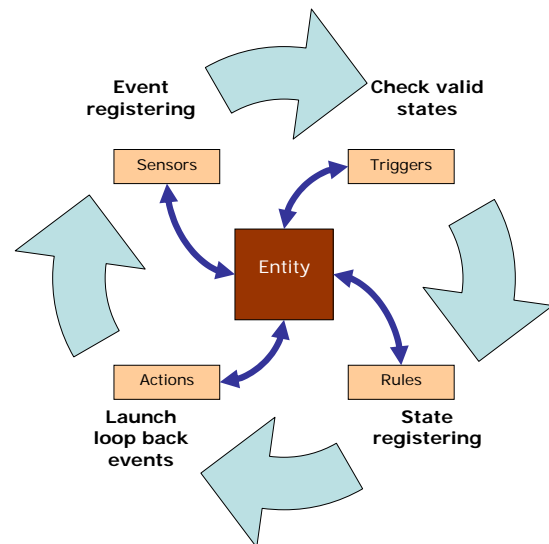

Figure 1. Functional diagram.

The dynamic of the system is built upon state transitions. The information entity reacts to stimuli and changes its state. The state transition is the basis for task solving. An information entity has many states defined. Each state is defined by a set of rules. These rules are built by the information entity, are discovered or are defined by the entity in itself. The rules are defined by triggered events. One state is defined by more rules. Each rule has the possibility of triggering events. In this way, independent reasoning is allowed.

Each information entity has a state history and an event history. The history allows heuristic forward or backward chaining. When the states are defined as "learning states", the system will produce a new state, with an associated rule containing a trigger and generator. The trigger and the generator events are computed based on learning functions. These learning functions determine the best event to consider for launching in given circumstances. The link between the new state and existing states is also considered. The dynamics of the system will change by creating the new state. In Figure 2 the entity-relationship model for an information-entity-based expert system is depicted.
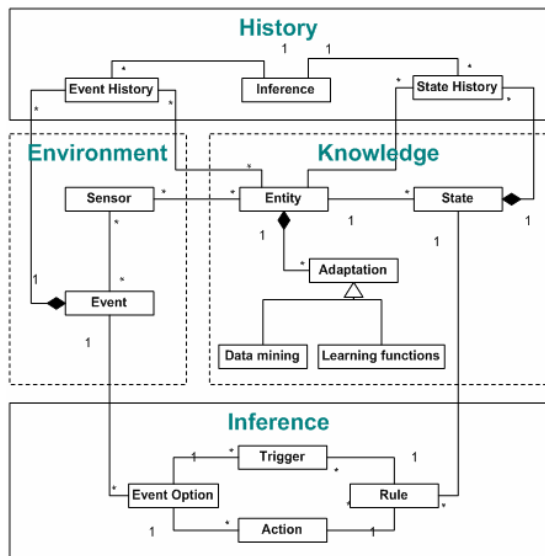
Figure 2. Entity diagram [1].

The knowledge representation is quite simple and based on Boolean logic. The rules are made of linguistic variables defined on events. The logic behind the rules is composed by AND and NOT expressions. The OR expressions are modeled by combination of different rules that will lead to the same state. Interesting to note is the temporal dispersion of logic reasoning. Asynchronous logic management allows very complex reasoning with little cost. Another interesting addition for the information entities is the sensors. Being logic components, the sensors allow the events to be caught by information entities. A special metric could be defined by giving each sensor a sensitivity degree range. In this way, the active sensors in the entity could compel a state transition.

APPLICABILITY

Many problems can be solved using AI. When electric equipments are used to decide what needs to be done we can speak already of AI, within a given environment. Starting from simple domestic applications like controlling the lights in a room and up to controlling the traffic on an airport, or the continental water system, it's all in the tasks. In Table 1 we list the following problem areas that can be defined and solved using AI techniques [3].

Problem	Description
Decision	Solving specific problems
Interpretation	Inference realized on "sensorial" activities
Prediction	Inference realized in given conditions
Diagnosis	Inference realized for finding errors

Design	Object configuration in given conditions
Planning	Workflow configuration
Monitoring	Compare real with expected results
Debugging	Solving problems in erroneous situations

Table 1. Problems to solve with AI.

Some of the problems can be solved using a state-based approach, some of them not. However, the level of abstraction within the data model looks promising in taking the challenge of implementing the state-based approach in any area needed. In the next sections we present a short overview of the problem areas.

Decision
The rules matched during a state transition can store the information for decision. Well-known decision-support systems using rule-based technologies or decision trees capture rules for giving results back. In the state-based expert system case, the state transition will explain also the decision taken. The rules can be defined considering open situations (when the state-transition sequences are not known, there is no script predefined) or closed situations (when possible scripts predefined can lead to certain decisions).

Interpretation
The interpretation problem can be aligned with pattern recognition, work in uncertainty, work with belief percentages. Using virtual or real sensors like perceptrons and generating a layer of states where different configuration of sensor inputs can lead to different state transitions, also interpretation can be modeled. The knowledge model supports interpretation but the software applications require adjustments on a functional level to allow users properly managing the information.

Prediction
The prediction is a particular case of a decision problem. The knowledge is built in such a way that user interaction is not required. The user interaction will be simulated by launching loop-back events during state transitions.

Diagnosis
The diagnosis is also a particular case of a decision problem. The end-user is employed for gathering relevant information about a problem area. The inference can use loop-back events to automate the diagnosis process. Proven test cases for this problem solving using state-based expert systems are currently in development in the automotive industry.

Design

The design can be a quite complex problem. By building analytic and synthetic evaluation functions, the system is able to create new knowledge based on the existing knowledge gathered from an environment. Creating new entities and correlations between the entities (static and dynamic) is a task that needs further refinement.

Planning

The planning is again a particular case of a decision problem. The knowledge is built on the finite-state machine approach. Workflow-management systems' information infrastructure is one of the closest matches to the state-based approach. There are proven test cases for this problem solving using state-based expert systems in simulating planning on industrial robot behavior [2].

Monitoring

The monitoring is an extension of the planning problem. The system can be enriched with sensors to interact with the environment and to monitor the work flows. There are no proven test cases for this problem solving; however connecting real sensors to the system is relatively simple, using industrial digital-analog interfaces.

Debugging

The debugging is an extension of the diagnosis problem. The system can consider based on the gathered experience different tests to identify erroneous situations and identify the cause. The problem can get complex when forward chaining (prediction) and backward chaining (interpretation) can be used in debugging. The system will try to find a solution on the existing problem. There are no proven test cases for this problem solving.

CONCLUSION

A state-based expert system based on information entities is the natural development of AI technologies, where object orientation, systems integration and standard communication are major keys in application development. The old approach of structured-programming-based applications for AI is not able to react on the today's continuous change in requirements. The approach with information entities aims not to turn down the existing technologies, but to enrich them by defining new ways in managing knowledge, in a static and dynamic environment. Moreover, we want to stress that our system architecture is quite open which enables plugging-in different AI techniques like data mining. For example, one of the core functionalities of the system is a machine-learning classifier for road-side assistance. The classifier has to predict the status of a car that experiences problems. Due to substantial costs involved, in addition to good generalization performance, the classifier has to provide reliability values for each possible classification of a car problem. In this way a system user can estimate the risks of actions s/he takes for each possible classification (car-problem status).

REFERENCES

[1] Lupascu, T., *Artificial Intelligence System for Autonomous Industrial Robots with Object Recognition*, Ph.D. thesis, Petrol-Gas University of Ploiesti, 2005.

[2] Lupascu, T., Lupascu, A., Dinu, O., Mirodotescu, B., *Integrated Intelligent Systems*, Scientific conference meeting "35 years of Petroleum-Gas University Activity", Ploiesti, November 27-29, 2002.

[3] Negnevitsky, M., *Artificial Intelligence: A guide to intelligent systems*, 2nd ed. Addison Wesley, 2005.

The 7th ALAMAS Symposium
April 2-3, 2007

Steven de Jong and Karl Tuyls
MICC-IKAT, Universiteit Maastricht

The Maastricht ICT Competence Centre (MICC) took up the challenge to organize the 7th European annual Symposium on Adaptive and Learning Agents and Multi-Agent Systems (ALAMAS 2007). We received a great number of submissions this year, i.e., 27, of which 16 were accepted for publication as short or long paper after a thorough reviewing process. The topics of these papers were highly diverse, but still formed a coherent whole and provided a good insight in current work in the fields of adaptive (multi-)agent systems and (evolutionary) game theory.
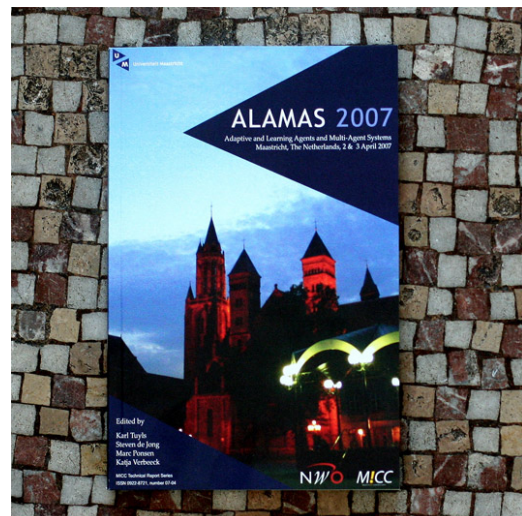
The proceedings of ALAMAS 2007.

The two-day Symposium took place in the beautiful auditorium of 'Minderbroedersberg 4-6'. This building was originally a monastery. Later, it served as a court of law and a prison. In 1998, after a drastic modernization, the building became property of Maastricht University.

The Symposium started on Monday with a combination of lunch and registration. Due to the lovely weather, everyone was soon sitting in the courtyard, already getting to know the other participants. Many members of MICC and many program committee members were also present.

After lunch, Prof.dr. Simon Parsons opened the program with an inspiring invited talk at the boundaries of multi-agent learning, auctions and evolutionary game theory (EGT).

Simon in action during his invited talk.

He started with a nice introduction to computational auctions and continued with the application of the replicator dynamics from EGT in this field. More precisely, he discussed two forms of double auctions, i.e., continuous double auctions (cda), in which matches between buyers and sellers can occur every time one makes an offer, and the clearing house auction (ch) in which buyers and sellers are matched only at some predetermined time point. One of the interesting results is that when plotting the direction field of the replicator dynamics for these auctions, given an initial mixture of strategies adopted by agents playing the game, one immediately sees where the stationary points are located. For example, in the cda if

initially half the agents play a human strategy (Roth-Erev) and half play an automated one (Preist and van Tol) then the system will reach equilibrium with all traders playing the automated one. In contrast, in the ch auction, the same initial conditions will lead to all agents using the Roth-Erev strategy.

The program continued with a short session on applications of learning techniques in three practical applications: aircraft deicing, open shop scheduling problems and traffic lights. After a coffee break in which Limburgian 'vlaai' was served, four papers were presented in a session on game theory. Each of the speakers stressed the importance for MAS of concepts such as fairness, trust, cooperation and stability.

After a short break, participants were invited to join a tour of the city of Maastricht, which was particularly enjoyable due to the sunshine and the lively discussions taking place. The tour went straight on to the restaurant, where a nice conference dinner was waiting.

Steven de Jong leads the way during the guided city trip.

Next day, the program continued with a session on large-scale multi-agent systems. Three speakers presented their work on optimal control, bee-inspired foraging algorithms, and sensitive stigmergic agents. After a short coffee break, the first session on learning started, with three papers being presented, on collaborative learning, networks of learning automata, and conflicting interest games.

Lunch was served once again in the refter of the university building, the place were, originally, the monks had their meals. After lunch, the second learning session took place. This session, consisting of three presentations, focussed on reinforcement

learning. Speakers discussed bifurcation analysis of reinforcement learning agents, reinforcement learning for intrusion detection, and continuous-state reinforcement learning.

Yet another coffee break, and the progam neared its end. The closing invited talk was delivered by Prof.dr. Eric Postma, who opened by telling the audience that he would take the perspective of an 'outsider'. In an inspiring talk, he discussed his own work in the field of statistical mechanics, based on the Ising model, and how such techniques may be applied in the multi-agent domain.

Eric preparing his voice.

After this talk and the closing remarks, a small reception was held. The organisers can look back at a fruitful Symposium, with many interesting submissions, high-quality presentations, lively discussions and enjoyable social events.

Next year, the Symposium will be organized by the group of Franziska Klügl at the University of Würzburg in Germany.

Selected and revised papers of ALAMAS 2007, together with those of AAMAS-5 (Paris) and ALAMAS 2006 (Brussels), will be published by Springer in the Lecture Notes in Computer Science series. The resubmission deadline is June 18th.

Additional information on the Symposium can be found at http://www.cs.unimaas.nl/alamas/. The full proceedings can also be downloaded from this address.

What Contributes to the Perception of Musical Phrases in Western Classical Music?

Ph.D. thesis abstract
Neta Spiro

Promotor: prof.dr. R. Bod
Co-promotor: dr. Ian Cross
Date of defense: February 7, 2007

The musical phrase
Is it? Who is it for? Where is it? What is it? When is it? Why is it?

This commonly used term, so intuitive to many musicians, has a variety of associations with the terminology of many disciplines including music, psychology, and linguistics. However, its nature remains obscure.

Is it?
One of the primary aims of this study was to establish to what extent there are common ideas about the nature of the phrase, its description, definition, identification and function.

Who is it for?
Another aim was to identify the types of population to whom this entity is relevant. This was done through investigating: 1) verbal and musical responses provided by listeners of different musical experience, 2) musicians annotating scores as if in preparation for performance, 3) performance characteristics of publicly available recordings, 4) discussions by music psychologists, music analysts and theorists, and 5) the musical analysis of pieces according to features. This comprehensive approach is referred to as 'the combined approach' below. These response groups have been studied before, though not with such direct and detailed methods. The results indicate that common aspects of the phrase are not learnt; listeners of different degrees of musical training or lacking it altogether responded similarly to phrasing tasks and questions.

Where is it?
This study discusses musical phrase examples of various musical genres and media. Some of these examples were previously investigated in the context of different disciplines. These range from

folk to western classical music. However, the core of this study is the application of the combined approach to eight case-study pieces followed by analyses of seven test pieces all from the western classical repertoire.

One of the questions concerns the extent to which the phrases and their structures are clear 'from the score' (i.e. from the musical features that can be identified in the score) and to what extent they are only clear in performance. By using responses to MIDI renditions (from listeners with different musical experience) and score annotations (by musicians), it is observed that common phrase structures are clear from their musical features. Musical features are musical elements that are combined and have particular characteristics in relation to their context. These include: cadences, relatively large pitch intervals, long notes or rests, repetitions, and changes in texture, motive, and harmonic rhythm.

Furthermore, the results show that there is also a rôle for performance features (changes in tempo and intensity). The identified tempo and intensity changes in recorded performances were also compared with: 1) phrase structure identified by analysts, score annotators and listeners to MIDI renditions, and 2) listeners' responses to the same performances. These, in turn, indicate that the same positions highlighted in performance are also identified in the other modes, and the listeners' responses to performances relate to the performance features. The main positions identified in response to performances and MIDI renditions are the same, but the proportions of responses differ. Furthermore, having heard one performance, its phrase structure seems to be remembered and affects the phrase identification of a subsequent performance (leaving "footprints"). Phrasing seems to be fundamentally 'in the music' and accentuated, clarified or obscured by performance.

Phrasing has mainly been discussed in the context of monophonic music. In this study, music of different textures is explored. The results of the combined approach indicate that in polyphonic music (e.g. melody and accompaniment) there may be differences between the phrase structures of different parts; phrases in different voices can lead to and complete each other, overlap or coincide, and these differences are often identified by participants. This indicates that we identify both the individual phrase parts and structures of the different musical voices, and accommodate these in a more general identification of conflicting, complementary or similar phrase structures.

What is it?
The term phrase has several related ones occurring in the literature and used by participants in the current study (including, segment, unit, chunk, sentence). Music psychological and computational approaches to grouping, segmentation and phrasing concentrate on the identification of boundaries, whilst other music theoretic approaches to phrasing discuss internal characteristics.

The results of the combined approach developed in this study (and described above), indicate that phrases include some of the following parts: beginning, beginning of the end (implication/ expectation), end (initial arrival), prolongation (continuation of the end) and end of the end (end of the resolution), and that each one is indicated by specific musical features. Though all these different parts may be present, they do not have to be for the 'phrase' to be identified, recognised or implied. The above analyses also investigated the relative importance of different phrase parts, which determines the character of the phrase, such as front-heavy and end-heavy phrases, and possible relationships between phrases, such as, antecedent-consequent phrase pairs.

For all of these, the key seems to lie with the presence or absence of musical features. These belong to different categories, which have their different scopes of presence, impact and function. Some can be instantaneous (occurring, being identified and having their repercussion from one note to the next, such as a large pitch interval), some can be predictive (occurring over an area and creating expectations, including developing harmonic progressions such as cadences), and some can be retrospective (again occurring over an area but revealing their importance in retrospect, such as repetitions). Different features and feature combinations seem to systematically coincide with varying degrees of response, identified by the combined approach. Some features and their combinations are strongly indicative whilst others are less so. The former are rare whilst the latter are more common. Depending on the musical context (such as genre, instrumental combinations, or local context) common features acquire greater importance. Moreover, this combined approach highlights the interdependence of the musical features; different combinations of harmonic, metrical and pitch structure, for example, can form weaker or stronger phrase ends. The feature and phrase-part combinations can be such that more than one possibility can arise (sometimes resulting in 'ambiguity').

Though the relationships between the features, phrase parts and phrases are complex and depend on several parameters, they are formalised in a rule base. Unlike other rule bases the intention here is to reflect the process of phrase identification, including the 'weak' phrases, by participants, and providing alternative possibilities, using the concept of musical features developed on the basis of the combined approach. This rule base is formalised as an algorithm resulting in clear and consistent phrase structures, and may in future be implemented for the study of a larger corpus of music.

When is it?
These features and feature-combinations seem to result in candidate positions for phrase starts, ends and internal parts. Some positions are chosen by a majority of participants whilst others are less frequently identified. The latter coincide with weaker features and the respective weaker phrase parts. These would probably not be included in 'clean annotations' such as in the Essen Folk Song Collection, but seem to be an integral and important part of the processes of listening, performance, and analysis.

Moreover, through the combined approach discussed above and through the use of 'click' studies, unlike in previous psychological studies, it is here revealed that phrase parts are often identified over a period rather than on specific notes.

Why is it?
This study indicates that the phrase is both an organising and organised unit (in this way similar to a linguistic sentence) that is related to memory, breath, and physical motion. It gives structure, framework, order and reference, and interacts with other structures of different types (such as, metrical structure). Its length is often described as constant. However, the results of the combined approach indicate that there is great variability in phrase length. The identification of these units may contribute both to recollection and comparison between similar phrases and to the more general structuring and memory of the music. The phrase helps in following motion or progressions from a beginning to arriving at a destination or returning. Musical implications, and therefore expectations, seem to play an important rôle in this progression. Moreover, from the way in which it, its musical features and characteristics are used, and their frequent occurrence in discussions of music analysis, performance and perception, the phrase seems to be essential to our capacity to follow the kind of music studied here.

Motion in Image Sequences of Living Cells

Ph.D. thesis abstract
Kees Bergstra

Promotor: prof.dr.ir. A.W.M. Smeulders
Date of defense: February 7, 2007

This thesis describes the estimation and classification of motion in multidimensional microscopy images. In image sequences of three dimensional recordings of chromatin in the cell nucleus of a living cell the motion is estimated through the use of an optical flow technique. In addition to this technique a method is developed to estimate the accuracy of the found motion vector field.

Optical flow techniques will give less accurate results for relative small objects. For objects at the scale of the imaging resolution object shape is not a unique feature. For these objects an intertwined set of Kalman filters is applied in a tracking method to track small fluorescent spots in living cells. With this method fluorescently labeled telomeres are tracked.

Each measurement has a predictable error if all the basis errors are defined. An error propagation is described for motion estimation. This error propagation is verified in experiments.

The deformation and geometrical relationship within a living cell gives more information than the motion of single particles in itself. A method is described to estimate the geometrical relationship and the deformation from a group of objects or a large shape. This method is applied on different types of microscopy image sequences. The obtained motion information can be applied to the research of structure and dynamics of living cells.

To Whom It May Concern – addressee identification in face-to-face meetings

Ph.D. thesis abstract
Natasa Jovanović

Promotor: prof.dr.ir. A. Nijholt
Co-promotor: dr.ir. H.J. op den Akker
Date of defense: March 14, 2007

This thesis is concerned with automatic addressee identification in face-to-face meetings. A great number of meetings are organized everyday around the world to exchange ideas, share information,

negotiate alternatives and make decisions. Despite their importance and prevalence there is a general observation that meetings are neither as productive nor as efficient as we would like them to be. To overcome these problems, technology to support meetings has been developed. With advances in multimedia technologies, it has become feasible to record all aspects of interaction taking place in meetings and thus to enhance traditional ways of documenting meetings: meeting minutes and personal notes. To make benefits out of meeting recordings, the recorded content needs to be automatically analyzed: relevant information needs to be extracted from the meeting content and the extracted information needs to be structured in such a way as to enable an efficient access to meeting data. Recently, research has begun to develop in that direction establishing a new research area: automatic meeting analysis. Since meetings are a domain where multi-party dialogues take place, automatic analysis and understanding of meeting discussions comprises not only identification of who speaks, what is said or what type of communicative act the speaker performs with his utterance but also *to whom the speaker addresses that act*.

To model addressing, we need to understand the basic processes that underlie this activity. The first part of the thesis is thus devoted to gaining theoretical insights into addressing based on the outcomes of the research in conversational and interaction analysis. Addressing is communicated through various communication channels such as speech, gaze, gestures and postures. In many cases, addressing is accomplished not explicitly but tacitly. In the latter case, the content of what has been said and various features of conversational context play the major role. The multi-modal nature of addressing as well as its context sensitivity pose challenges not only for computational systems but also for humans in determining who is being addressed in a particular situation. This thesis investigates the difficulties of the task of addressee identification for both humans and systems.

To develop computational models for addressee prediction, a collection of audio and video meeting recordings annotated with addressee information as well as with phenomena related to addressing is required (e.g. where participants are looking, what type of communicative act the speaker is performing). The second part of the thesis describes two meeting corpora employed in our study. The corpora were developed using annotation schemas designed in the interaction between data observed and theoretical insights into addressing obtained from the literature. To assess the credibility of the annotated data for drawing research results relying on them, the thesis provides an exhaustive reliability analysis of the annotation schemas. A detailed investigation of the problems human observers had in determining who is being addressed by the speaker shows that it is intrinsically difficult to distinguish between group and individual addressing. This certainly brings an additional challenge in modeling this process automatically.

The third part of the thesis deals with the development of a computational model for automatic addressee identification. As a computational framework, we use Bayesian Networks. Features employed to model addressing are obtained from speech and gaze communication channels as well as from conversational and meeting contexts. Conversational context features, which relate to conversational history, are shown to be the most valuable for addressee prediction; they dominate over utterance and gaze features. We observe that utterance features, which contain a set of lexical features extracted from the utterance content as well as the type of dialogue act performed with the utterance, are the most uninformative cues for determining the intended addressee. Furthermore, knowing who is looking at whom in a meeting does not provide sufficient information for determining who is talking to whom during the meeting, although one would intuitively expect that it would. Meeting context, which comprises various types of activities participants perform in a meeting, does not add valuable information for addressee identification to utterance, gaze and contextual features. By combining all these four types of features addressees are predicted with the highest accuracy.

Evaluation of several static Bayesian Network classifiers indicates that Bayesian Networks are effective computational models for the task of addressee prediction. Among all evaluated models, augmented Naive Bayes classifiers show the best performances over all feature sets. Similar to human annotators, Bayesian Network addressee classifiers "observe" addressing in a particular situation using a set of defining features and classify the observed process into several categories denoting the intended addressee: a particular individual or a group. In that sense, Bayesian Network classifiers can be considered as automatic annotators. The present study reveals that Bayesian annotators behave in a similar way to human annotators regarding the type confusion between addressee values.

As we rely on hand-annotated values for the input features instead of automatically computed values based on measurements, the present study aims to investigate the upper bounds for the results that could be obtained in a more realistic, fully-

automatic scenario. As the first step in the automation of addressee detection process, we propose a Dynamic Bayesian Network model. The evaluation of performances of addressee classifiers relying on fully automatic features remains one of the tasks for future research.

Achieving Semantic Interoperability in Multi-agent Systems: a dialogue-based approach

Ph.D. thesis abstract
Jurriaan van Diggelen

Promotor: prof.dr. J.-J.Ch. Meyer
Co-promotores: dr.ir. R.J. Beun, dr. F.P.M. Dignum, dr. R.M. van Eijk
Date of defense: March 21, 2007

Software agents sharing the same ontology can exchange their knowledge fluently as their knowledge representations are compatible with respect to the concepts regarded as relevant and with respect to the names given to these concepts. However, in open heterogeneous multi-agent systems, this scenario would be very unlikely, because it would require all involved system developers to reach consensus on which ontology to use. Furthermore, different agents may regard different concepts as relevant which causes their ontologies to differ in granularity and scope.

In such an environment, the agents must possess the right conversational skills to effectively exchange information even when the speaker's ontology is only approximately translatable to the hearer's ontology. Furthermore, the agents must be able to autonomously establish an ontology translation by exchanging parts of their ontologies. In this thesis, we propose a layered communication protocol in which the agents gradually build towards a semantically integrated system by establishing minimal and effective shared ontologies.

We will use the formal notions of sound and lossless communication to state the requirement that sufficient information should flow between the agents in a correct manner. The communication protocol detects when communication is ineffective and applies techniques for ontology exchange to build a shared ontology of minimal size. In this way, the agents exchange ontological information on an as-need basis. Agents first try to cope with the situation as it is; when communication fails to be effective, the agents seek a minimal solution which solves their communication problem at hand.

The communication mechanism consists of three layers. The upper layer of the protocol is the Normal Communication Protocol (NCP) which deals with the kind of social interaction that agents normally exhibit when no ontology problems exist in the system. Every conversation starts in the NCP layer. If the agents fail to understand each other, the agents switch to the middle layer in the protocol which is the Concept Definition Protocol (CDP). In this layer, the agents explain the meaning of a concept to each other by exchanging concept definitions. The meaning of a concept is explained in terms of other concepts. If the communication difficulties are so severe that the agents do not even understand each other's concept definitions, the agents switch to the lowest layer in the protocol, i.e. the Concept Explication Protocol (CEP). In CEP, the agents exchange the meaning of a concept using non-symbolic communication, e.g., by pointing to examples of the concept.

We tested our system, called ANEMONE, in three ways. Firstly, we provide a mathematical analysis. By formalizing the communication protocol, we can give solid proofs that it possesses the desirable properties. Secondly, we perform simulation experiments. By making the agents communicate in a simulation environment, we can analyze whether the agents indeed build a minimal communication vocabulary. Thirdly, we describe a case study with heterogeneous internet news agents. We show how these agents successfully exchange information on news articles, despite initial difficulties caused by heterogeneous ontologies.

E-Justice – beginselen van behoorlijke elektronische rechtspraak

Ph.D. thesis abstract
Ronald van den Hoogen

Promotores: prof.dr. A. Koers and Prof.dr. A.H.J. Schmidt
Date of defense: March 28, 2007

During the coming years the administration of justice will change drastically as a result of the possibilities of information and communication technology (ICT). These possibilities will have to be used as much as possible, with a view to the conservation and improvement of the legal quality of court procedures. The question that has been answered in the present research is the following: when does the quality of the procedure come into danger? But also: how can quality be improved by using ICT? So far, little research has been carried out into the legal implications which the use of ICT has for court procedures. Both for researchers,

legislatures, policy makers and (potential) litigating parties as well as for the members of the Judiciary itself, it is important to obtain a greater insight into this meaning. The principles of a fair electronic trial, formulated in this research, offer a framework for discussion concerning the opportunities for and the threats posed by ICT for court procedures.

The main question in this research was the following: what principles indicate what a fair electronic trial exactly entails? Two preliminary questions are answered: 'what are the main principles of a fair trial?' and: 'what can be considered an electronic trial?' To find principles of a fair trial the framework of article 6 of the European Convention on Human Rights has been used. In the case law of the European Court of Human Rights these principles are more accurately developed. The principles are: accessibility, publicity, a judgement within a reasonable time, independence and impartiality, as well as fair treatment.

In the third chapter the electronic trial is described. Relevant IT systems are: websites, electronic data interchange, digital files, courtroom technology and knowledge-based systems.

WEBSITES

Rechtspraak.nl is the most important Dutch website belonging to the Judiciary. The site contains a great deal of information on court procedures, a list of commonly used legal definitions, frequently asked questions, all the court organizations, complaining procedures and national directives and guidelines. An important part of the website is the integrated database with a selection of interesting case law.

ELECTRONIC DATA INTERCHANGE (EDI)

EDI refers to lodging requests and announcements, as well as the lodging and submitting of documents relevant to a case. It is possible to do so by e-mail, but also by using a so-called e-room, a disclosed website to which process documents can be sent and downloaded.

DIGITAL FILES

A digital file is a file containing all documents that are available electronically and which can be consulted and edited by all the members of the Judiciary independent of their physical location. At several courts experiments are taking place using digital files.

COURTROOM TECHNOLOGY

Courtroom technology refers to the use of ICT in courtrooms. For instance, recording a witness hearing in an electronic format or hearing witnesses and suspects using video conferencing.

In the fourth to the eighth chapter a link has been made between the principles of a fair trial and an electronic trial. For every principle of a fair trial it has been examined which principles of a fair *electronic* trial can be formulated. The following questions have been answered: which principles of a fair electronic trial indicate how an electronic trial should proceed, regarding the requirements of accessibility, publicity, a judgement within a reasonable time, independence and impartiality and fair treatment?

The following sixteen principles of a fair electronic trial have been formulated: continuity, co-ordination for non-professionals, traceability, durability, reliability, press freedom and privacy protection, public accessibility, online publication, anonimization, the correct nature of the proceedings, chain control, responsibility, transparency, the automated judgement, well-reasoned decisions and equivalence. These principles are commented upon in greater detail below.

1. Continuity: information relations which have been established by employees of the Judiciary must be kept in line, unless it has been first indicated that the relation is of a temporary or experimental nature.
2. Co-ordination for non-professionals: for non-professional litigating parties the non-electronic method must be preserved. Professional litigating parties can be obliged to use ICT in their communication with the Judiciary.
3. Traceability: electronic data that facilitate access to Justice should be accessible, traceable, understandable and current.
4. Endurability: the applications of ICT used by the Judiciary must, as far as possible, be technology which is commonly used.
5. Reliability: litigating parties must be able to rely on the fact that the data they receive or send has not been manipulated, does not originate from an unmentioned person and is not accessible to persons for whom it is not intended.
6. Press freedom and privacy protection: journalists must be free to carry out their work at the courts. The privacy of litigating parties must be protected.
7. Public accessibility: the press, the public and the litigating parties must be able to follow the hearing, also when the components of the hearing are digitised or if the hearing takes place entirely digitally.
8. Online publication: all legal judgements must be published on the Internet within a reasonable period of time.

9. Anonimization: the anonimization of judgements is only necessary in certain circumstances.
10. The correct nature of the proceedings: matters must be dealt with expeditiously, taking into account the possibilities which IT has to offer.
11. Chain control: data interchange between the Judiciary and the chain partners should – wherever possible – be possible electronically.
12. Responsibility: the judge is responsible for the final decision, also when the decision has been made using knowledge-based systems. The legislature will decide what decision program judges should use.
13. Transparency: decision programs used by the judge have to be made public by publication on the Internet.
14. The automated judgement: computer decisions must be possible in simple cases.
15. Reasoned decisions: if decisions can be more effectively reasoned by using IT, then those decisions must consequently also be more soundly justified. Judges should explicitly mention any deviations from the recommendations made by the system.
16. Equivalence: both parties must have access to and be able to use IT applications in the courtroom in an equal manner.

SUGGESTIONS FOR FURTHER RESEARCH IN THE FIELD OF ICT AND THE LAW

In which direction is scientific research into relations between ICT and electronic trials likely to move in the forthcoming years? Three lines of research can be distinguished:
- Testing the principles of a fair electronic trial;
- Conducting research into the consequences and recognition which the principles have on non-electronic procedures;
- Conducting research into the consequences of electronic procedures on the rule of law.

An initial line of research would be that the principles of a fair electronic trial, as formulated in this research, are more closely reviewed. This could be done, for example, by the application of these principles to the existing processes of digitalisation within the Judiciary and a comparison with other organisations in which ICT is applied. The principles of a fair electronic trial can also be compared to principles which apply to the use of ICT within public government, by public prosecutors or among the judiciary abroad. After this test, it is possible that new principles will be developed or that the principles formulated in the present research still appear to have a basis which is too weak within the legal occupational groups. With that, it can be determined to what extent the

principles of a fair electronic trial at this moment in time are already part of the positive right.

Conducting research into the consequences of the recognition of the principles for non-electronic procedures could be a second line of research. Formulating the requirements for an electronic trial leads automatically to a closer reflection on the demands which are made for the non-electronic procedure. One example has already been mentioned: how reliable is the written signature? When the demands for an electronic signature are compared to the requirements for a non-electronic signature, it appears that for non-electronic, written signatures hardly any requirements are applicable. The question is whether that is correct, however. This line of research calls for a large quantity of research questions of a similar scope.

The consequences of electronic procedures for the trias politica is a third line of research. It is related to the question of which shifts the electronic administration of justice can bring about in the rule of law. The way in which court procedures progress nowadays is mainly laid down in statutory regulations. Several components of the procedure have not been more closely developed in the law. The reason for this is that these court procedures are often related to practical matters, such as: the way in which money must be paid, agreements between the Public Prosecution Service and the Judiciary concerning electronic file transportation, the area in which lawyers must remain before the hearing, and security relating to court buildings.

Because it concerns questions surrounding the management and the organisation of the procedure, the Judiciary have a great deal of freedom in stipulating the course of the procedure. During the court hearing it seems logical that the judge remains in control. But concerning electronic procedures as a whole, the question is whether the Judiciary and the judge him/herself should be able to decide what is lawful and what is not. Numerous subjects are currently determined by the Judiciary: whether or not television cameras are allowed in court hearings, arrangements concerning the public, whether or not all judgements should be published on the Internet, the anonimization of case law, whether or not video conferencing should be used, the way in which judges are supported by knowledge-management systems and the way in which judgements should be reasoned. The question is whether answering these questions is always the responsibility of the judiciary in our rule of law.

The principles of a fair electronic trial indicate that the legal quality of the electronic procedure should be very high; often higher than the quality that is

required in non-electronic procedures. The only reason for this is the transparency of and the control which we have over ICT applications. More can be asked from ICT simply because we can ask for more. The question, of course, is whether this is always justified. If that is not the case, there are there two options: setting lower requirements for the electronic procedure or setting higher requirements for the non-electronic procedure. If this is not done, unacceptable differences will exist between electronic and non-electronic hearings. I assume that the latter will occur and that the requirements we pose for the legal organisation and for judges, as a result of the process of digitalisation, will become higher. Perhaps within a number of years, along this line of thinking, human judges can no longer satisfy our needs. The question 'can computers administer justice?', as posed by Van den Herik in 1991, might be altered in thirty years' time. Instead of wondering whether computers can meet the requirements which we demand of human judges, the question might be whether human judges can still meet the high requirements which are demanded of computer systems and computers. Van den Herik's question can then be reformulated as follows: can judges actually administer justice?

Many Agents

Jaap van den Herik
MICC-IKAT, Maastricht

The notion of *agent* is nowadays quite frequently used in the title of a Ph.D. thesis. We see it in different appearances: multi-agent, software agent, agent-based. Clearly, agent technology has proven to be a scientific development of the last ten years that has deserved its place in the tabulated range of scientific publications. In the series, data technology, information technology, and knowledge engineering (I prefer knowledge engineering above knowledge technology), and agent technology, we may now speculate on the next phase.

The research in agent technology is emphasizing the use of multi-agent systems, for instance, in the research of swarm intelligence. The next phase after agent technology may therefore be *ant technology.* The metaphor of an ant is already in use in many research projects. The idea of an ant, searching for food and marking its path by pheromones is an intriguing research topic, in particular as we examine the benefits of exploration in relation to exploitation. Exploration takes place with the aim to find a shorter route. Exploitation has as its aim to

fetch large quantities of food from the food store to the ants' home.

Recently, the paradigma of the *ant* has been shifted to the *bee*. The research group of Ann Nowé (Vrije Universiteit Brussels) is involved in such bee projects. So, readers of the BNVKI Newsletter may look forward to the first Ph.D. results, usually published in draft version in the BNAIC (in Utrecht in 2007) and then in (formal) articles and Ph.D. theses. To sum up, (1) currently we have a list of announcements with agents involved, (2) after two years we may see the notion of *ant,* and (3) after five years the notion of *bee.*

Finally, I would like to reiterate that we are still interested in the publication of abstracts or reviews of the Ph.D. theses mentioned below. Five such abstracts of Ph.D. theses successfully defended during the last months are published elsewhere in this issue (Neta Spiro: *What Contributes to the Perception of Musical Phrases in Western Classical Music?*; Kees Bergstra: *Motion in Image Sequences of Living Cells*; Natasa Jovanović: *To Whom It May Concern – Addressee identification in face-to-face meetings*; Jurriaan van Diggelen: *Achieving Semantic Interoperability in Multi-agent Systems: a dialogue-based approach*; and Ronald van den Hoogen: *E-Justice – beginselen van behoorlijke elektronische rechtspraak*). We wish all candidates good defence and a beautiful day during the official ceremony.

Celine Vens (March 30, 2007). *Complex Aggregates in Relational Learning.* Promotor: Dr. H. Blockeel (KU Leuven).

Aristeidis Diplaros (April 19, 2007). *Exploiting Spatial Information for Image Segmentation and Retrieval.* Promotor: Prof.dr.ir. A.W.M. Smeulders (UvA).

Lotte Scholten (April 20, 2007). *Motivation Matters. Motivated Information Processing in Group and Individual Decisionmaking.* Promotores: Prof.dr. C.K.W. de Dreu, Prof.dr. D.L. van Knippenberg (EUR).

Gilad Mishne (April 27, 2007). *Applied Text Analytics for Blogs.* Universiteit van Amsterdam. Promotor: Prof.dr. M. de Rijke (UvA).

Bart Schermer (May 9, 2007). *Software Agents, Surveillance, and the Right to Privacy: A Legislative Framework for Agent-enabled Surveillance.* Universiteit Leiden. Promotor: Prof.dr. H.J. van den Herik (UL). Referent: Prof.mr. H. Franken (UL).

Joost Vennekens (May 11, 2007). *On Constructive Processes in Knowledge Representation.* Promotores: Dr. M. Denecker, Prof.dr. D. De Schreye (KU Leuven).

David Mobach (May 21, 2007). *Agent-Based Mediated Service Negotiation.* Vrije Universiteit. Promotor: Prof.dr. F.M.T. Brazier (VU). Co-promotor: Dr. B.J. Overeinder (VU).

Huib Aldewereld (June 4, 2007). *Autonomy vs. Conformity: An Institutional Perpective on Norms and Protocols.* Universiteit Utrecht. Promotor: Prof.dr. J.-J.Ch. Meyer (UU). Co-promotor: Dr. F. Dignum.

Mark Hoogendoorn (June 18, 2007). *Modeling of Change in Multi-Agent Organizations.* Vrije Universiteit. Promotores: Prof.dr. J. Treur (VU), Prof.dr. C.M. Jonker (TUD).

Section Editor
Richard Starmans

BeNeLearn 2007

The annual Belgian-Dutch BeNeLearn Conference will be held in Amsterdam, May 14-15, 2007. BeNeLearn serves as a forum where researchers, developers and users of Machine Learning, Data Mining, Knowledge Discovery and related areas exchange ideas and present recent work. The language of the conference is English. BeNeLearn 2007 will be organized by the Adaptive Information Management group of the Human-Computer Studies Laboratory of the University of Amsterdam under auspices of SIKS.

As a result of the cooperation between SIKS and the organizers of the conference, SIKS-Ph.D. students can participate without paying entrance fee. The workshop is part of the advanced components stage of the school's educational program. However, there is a fixed number of places available for SIKS-Ph.D. students at the workshop and applications to participate will be honored in a first-come first-serve manner. For registration details, see the SIKS website.

Symposium Machine Learning for Natural Language Processing

BeNeLearn will be followed, on Wednesday May 16, by a Symposium Machine Learning for Natural Language Processing. Experts representing research programs in the Netherlands, Belgium, Germany and France will give an overview of their work along with recent results. A poster session will present recent work in this area. The topics of interest include (but are not limited to):

- ML applied to various NLP tasks (syntax and semantics)
- Supervised, semi-supervised and unsupervised techniques for NLP
- Language acquisition
- Information extraction
- Relational learning
- Ontology learning and enrichment
- Learning with the background knowledge

PROGRAM (SPEAKERS)
- Rens Bod (University of St. Andrews, UK and University of Amsterdam, the Netherlands): "Is the End of Supervised NLP in Sight?".
- Veronique Hoste (University of Ghent, Belgium): "Framing Discourse as a Classification Approach".
- Kai-Uwe Kühnberger (University of Osnabrück, Germany): "Extraction and Adaptation of Ontological Knowledge from Heterogeneous Data Sources".
- Claire Nédellec (Laboratoire Mathématique Informatique et Génome, France): "Alvis Semantic Search Engine Adaptation to Biology".
- Sander Canisius (University of Tilburg, the Netherlands): "Memory, Language, and Semantics; Machine learning for natural language in Tilburg".
- David Ahn, Maarten de Rijke, Wouter Weerkamp (University of Amsterdam, the Netherlands): "Learning to Track Sentiments in Text Streams: The Verdonk Case".
- Jakub Zavrel (Textkernel, the Netherlands): TBA.

As a result of the cooperation between SIKS and the organisers of the workshop, SIKS-Ph.D. students can participate without paying entrance fee. For details see the SIKS website.

SIKS Basic Courses "Learning and Reasoning" and "Information Retrieval"

From May 21-24, 2007, the School for Information and Knowledge Systems (SIKS) organizes two basic courses "Learning and Reasoning" and "Information Retrieval". 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.

Location: Landgoed Huize Bergen in Vught.
Date: May 21-24, 2007

SCIENTIFIC DIRECTORS
Dr. A. Ten Teije (VU), Dr. G.A.W. Vreeswijk (UU)
Learning and Reasoning (21-22 May)
Prof.dr.ir. Th. P. van der Weide (RUN) *Information Retrieval* (23-24 May)

PROGRAM
The program will be made available at the SIKS-website. IMPORTANT: the previous courses took 2.5 day each, this year's editions will take 2 days each.

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: May 7, 2007

After that date, applications to participate will be honored in a first-come first-serve manner. Of course, applications to participate from other interested groups are welcome already. They will receive a notification whether they can participate as soon as possible.

SIKS Doctoral Consortium on Enterprise Information Systems

On June 26, 2007 SIKS organizes the Second Dutch/Belgian Conference on Enterprise Information Systems (EIS 2007). The event will take place in Groningen and will include a **doctoral consortium on Monday, June 25.**

The purpose of EIS 2007 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, Conceptual Modelling, Business Innovation, Knowledge Management, Business Process Management, Product Software Development, Coordination and Communication, Collaborative Information Systems and many others.

The goal of the doctoral consortium is to create an opportunity for doctoral students in the early stage of their research (typically second/third year) to test their research ideas, present their current progress and future plan, and to receive constructive criticism and insights related to their future work and career perspectives. Mentors (peer researchers and experts in the field) will be assigned to each student to provide individual feedback and advice on the paper, the focus of the work and further developments.

All papers submitted to the Doctoral Consortium stream will undergo a thorough reviewing process with a view to providing detailed and constructive feedback. Our goal is to accommodate all papers that are reviewed positively, but if necessary, a selection will be made, in which preference will be given to papers of students in their second or third year. The two best papers will be invited for a presentation at the EIS day on June 26.

EIS 2007 and the doctoral consortium are organized under the auspices of SIKS, the Dutch research school for Information and Knowledge Systems together with Edispuut and chaired by dr. Hans Weigand, Tilburg University. We encourage all papers related to Information Systems, in a broad sense.

REGISTRATION
All Ph.D. students of SIKS and Edispuut are invited to join the doctoral consortium EIS 2007. Participation (lunch included) is free, registration is required.

Conference on Enterprise Information Systems

This year, the research school SIKS organizes the Second Dutch/Belgian conference on Enterprise Information Systems on June 26 in Groningen. The purpose of EIS 2007 is to bring together Dutch and 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, Architectures for IKS and many others. Attendance of EIS 2007 is free but participants have to register in advance. EIS 2007 is a unique opportunity for IS researchers from both Computer Science and Business Studies to meet and interact, and also welcomes interested practitioners. EIS 2006, that took place in Utrecht on September 8 2006, was a kick-off meeting, 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. Whereas the theme of EIS 2006 was IS research methodology, the theme this year will be **IS research relevance.**

- *Roel Wieringa*, scientific director of SIKS and professor at Twente University, will address this theme from a methodological point of view.
- *Frank Baldinger*, former Corporate IT staff member ING Group and chairman of NAF (Dutch Forum of Information Architects) will bring in an industrial perspective.
- Other speakers include *Olga de Troyer*, professor at Vrije Universiteit Brussels, who will talk about her research on conceptual modelling of virtual worlds.

Organisation: Prof. dr. Bert de Brock (RUG, local organizer), dr. Hans Weigand (UvT, SIKS)
Information: dr. Richard Starmans (UU, SIKS)
Email: office@siks.nl
Webpage: www.siks.nl

Summer Course "Data Mining" in Maastricht

From July 2-6, 2007 a 5-days course on Data Mining will be organized at the University of Maastricht. For all details on aims, course content, course material and location, please check: http://www.cs.unimaas.nl/datamining/

As a result of the cooperation between SIKS and the organizers of the course, SIKS-Ph.D. students can participate without paying fee. Participating in this course is a part of the advanced components stage of SIKS' educational program. However, the number of places available is limited. SIKS has reserved a number of places, primarily intended for those Ph.D. students working in the field of Computational Intelligence (machine learning, neural and evolutionary computing, datamining / intelligent data analysis, adaptive / self-organizing / fuzzy systems, quantitative / statistical empirical research, probabilistic reasoning / Bayesian networks, pattern and image recognition / intelligent search algorithms / games). Other SIKS-Ph.D. students are not excluded, however if the number of applicants exceeds the number of places available, the students working on the course topics come first.

REGISTRATION
SIKS-Ph.D. students interested in taking the course, should NOT contact the local organization, but register at http://www.siks.nl/act/inschrijving_DM_2007.html and confirm in the mail that their supervisor supports their participation! Hotel accomodation (bed, breakfast, lunch and dinner) is not part of the arrangement. Participants must make their own arrangements.

Deadline: June 1, 2007
You will receive a notification whether you can participate as a SIKS-Ph.D. student as soon as possible.

Tutorials on Information Retrieval for SIKS-Ph.D. Students at SIGIR 2007

From July 23-27, 2007 the 30th Annual International ACM SIGIR Conference on Information Retrieval takes place in Amsterdam. This year an extended tutorial program is part of the conference and will take place on Monday July 23 at the University of Amsterdam. As a result of the cooperation between SIKS and the organisers of the workshop, SIKS-Ph.D. students can participate without paying entrance fee. For details see the SIKS website. The program includes the following tutorials:

Conducting User-Centered IR System Evaluations
Diane Kelly (Univ. of North Carolina)
The purpose of this tutorial is to familiarize participants with major elements of user-centered interactive information-retrieval system evaluation and provide them with a foundation for conducting, reporting and evaluating such studies. This tutorial is appropriate for students and researchers at all levels who have little or no formal training in, or experience with, user-centered evaluations.

Dr. Diane Kelly is an assistant professor at the School of Information and Library Science at the

University of North Carolina. Kelly has extensive training in experimental design and research methods, and has taught research methods courses at UNC and Rutgers. She has been involved with numerous laboratory studies of experimental interactive IR systems, formative evaluations of interactive QA systems, and longitudinal, naturalistic studies of search behavior.

Introduction to Web Retrieval and Advertising
Ricardo Baeza-Yates, Andrei Broder, Prabhakar Raghavan (Yahoo! Research)
Part I: Introduction to Web Retrieval
This tutorial provides an introduction to the main concepts, issues, and techniques of web-based information retrieval. Topics covered include the differences between conventional and web IR, the evolution of web search technology, and an overview of the main technologies underlying current web search engines: crawling, corpus construction and indexing, ranking (including link analysis), query processing, and web spam defense.

Part II: Introduction to Web advertising
This tutorial provides an introduction to the ability of advertisers to reach their intended audience. Using information such as users' queries, the content they are currently viewing, past behavior, and registration demographics, web advertisers potentially have a much finer-grained control of their audience than what is generally achievable within traditional media such as broadcast and print. This environments triggers new and challenging retrieval problems, such as matching ads with queries ("sponsored search") and matching ads to the page being browsed ("content match") as well as new ranking problems where the objective function depends not only on the quality of the match, but also on the underlying economic model.

Ricardo Baeza-Yates is director of Yahoo! Research Barcelona and Latin-America in Santiago, Chile. Until 2005 he was ICREA Professor at UPF in Barcelona and also director of the Center for Web Research, University of Chile. In 2003 he was the first computer scientist to be elected to the Chilean Academy of Sciences. His research includes IR, algorithms, and information visualization. He is co-author of the book *Modern Information Retrieval* by Addison-Wesley (1999). He holds a Ph.D. from the University of Waterloo, Canada.

Andrei Z. Broder is a Yahoo! Research Fellow and VP for Emerging Search Technology. Previously he has been a Distinguished Engineer in IBM and VP for Research and Chief Scientist at AltaVista. His main research interests are the design, analysis, and implementation of randomized algorithms and supporting data structures, in particular in the context of web-scale information retrieval and applications (best paper awards at WWW6 & WWW9). He is a fellow of IEEE and holds a Ph.D. from Stanford University.

Prabhakar Raghavan is Head of Yahoo! Research, and Consulting Professor of Computer Science at Stanford University. His research interests include semi-structured retrieval, text mining and randomized algorithms (he is co-author of the book *Randomized Algorithms* with R. Motwani by Cambridge Press). He is Editor-in-chief of the *Journal of the ACM* and a Fellow of the ACM and of the IEEE. He is also a member of the Computer Science and Telecommunications Board and of the National Academy of Sciences. He holds a Ph.D. from the University of California at Berkeley.

Introduction to Text Mining
David Lewis (David D. Lewis Consulting)
Text mining is both an exciting new application area, and a buzzword used to rebrand well-known information-retrieval and natural-language-processing technologies. This tutorial will review both old and new technologies for learning about real-world entities (people, organizations, events, etc.) from linguistic data alone or with other data. Both case studies on proprietary data and examples using public data sets and open-source software will be presented.

Dave Lewis is an entrepreneur and consulting computer scientist based in Chicago, IL, USA. He has worked on a wide range of problems in information retrieval, machine learning, and natural language processing, and designed a variety of evaluations and data sets in these areas. He previously held research positions at AT&T Labs, Bell Labs, and the University of Chicago. He was recently elected a Fellow of the American Association for the Advancement of Science.

The Probabilistic Relevance Model: BM25 and beyond
Hugo Zaragoza (Yahoo! Research Barcelona), Steve Robertson (Microsoft Research Cambridge)
The Probabilistic Relevance Model (PRM) is the formal framework behind BM25 and some of the most widely used algorithms for retrieval. In this tutorial we will discuss the theoretical modeling and the practical tuning work that is required to understand the PRM, derive new algorithms and go beyond BM25.

Hugo Zaragoza is a researcher in Information Retrieval at Yahoo! Research Barcelona. He is interested in the applications of machine learning and natural language processing to information retrieval. Previously he worked at Microsoft

Research Cambridge (UK) and collaborated with Microsoft product groups such as MSN-Search and SharePoint Portal Server.

Stephen Robertson runs the Information Retrieval and Analysis group at Microsoft Research Cambridge (UK). He is one of the inventors of the Probabilistic Relevance Model and of Okapi BM25. Prior to joining Microsoft, he was at City University London, where he retains a part-time position. He was awarded the Tony Kent STRIX award by the Institute of Information Scientists in 1998 and the Salton Award by ACM SIGIR in 2000.

Cross-Language Information Access
Jianqiang Wang (SUNY Buffalo), Daqing He (Univ. of Pittsburgh)
The Cross-Language Information Access (CLIA) tutorial provides a comprehensive introduction to the key issues and the state-of-the-art techniques in CLIA. It also addresses the issues in the broader context of information access as well as the new applications of CLIA techniques to specific areas such as speech retrieval, question-answering, and interaction design.

Dr. Jianqiang Wang is an assistant professor in the Department of Library and Information Studies, the State University of New York at Buffalo. His research focuses on cross-language information retrieval, speech retrieval, and information seeking in multilingual and multimedia environments.

Dr. Daqing He is an assistant professor at the School of Information Sciences, University of Pittsburgh. His research focuses on multilingual and adaptive web retrieval, and interactive retrieval system design and evaluation. Dr. He has taught information retrieval, digital library, and database related courses for several years.

Supervised and Semi-supervised Learning for IR
Yi Zhang (UC Santa Cruz), Rong Jin (Michigan State Univ)
This tutorial will present a broad coverage of supervised and semi-supervised learning techniques and their application to information retrieval, with focus on semi-supervised learning. It will be organized into three parts: 1) a brief introduction to supervised learning, and its application to text categorization; 2) overview of semi-supervised classification and the related learning algorithms, illustrated by the applications to information retrieval; and 3) introduction to active learning and its related learning algorithms, with the emphasis on its application to interactive retrieval and adaptive filtering.

Dr. Yi Zhang is an assistant professor at University of California, Santa Cruz. She has published papers and served as a reviewer for conferences and journals on related topics. She collaborates with start-ups, large corporations and government agencies. She received the Best Paper Award in SIGIR 2002. Dr. Zhang received her Ph.D. and M.Sc. from Carnegie Mellon University and B.Sc. from Tsinghua University.

Dr. Rong Jin is an assistant professor at the Computer and Science Engineering Dept. of Michigan State University since 2003. He is working in the areas of statistical machine learning and its application to information retrieval. He has published over sixty conference and journal articles on the related topics. Dr. Jin received his Ph.D. and M.Sc. in CS from Carnegie Mellon University and M.Sc. in Physics from Beijing University. He received the NSF career award in 2006.

XML Retrieval: Integrated IR-DB Challenges and Solutions
Sihem Amer-Yahia (Yahoo! Research), Ricardo Baeza-Yates (Yahoo! Research), Mariano Consens (Univ. of Toronto), Mounia Lalmas (Query Mary Univ. of London)
The two distinct cultures of databases and information retrieval now have natural meeting places in the Web, Digital Libraries and Enterprise Environments with their semi-structured XML model. This tutorial will provide an overview of the different issues (basic concepts, requirements, and models) and approaches (techniques, evaluations) put forward by the IR and DB communities. It will in particular survey the DB-IR integration efforts as they focus on the problem of retrieval from XML content.

Sihem Amer-Yahia joined Yahoo! Research in May 2006. Until then, she was a member of Technical Staff at AT&T Labs. She is a co-editor of the XQuery Full-Text Language Specification and Use Cases published by the W3C Full-Text Task Force. Her current research focuses on issues related to processing top-k queries in online shopping and community-aware ranking in online communities.

Ricardo Baeza-Yates is director of Yahoo! Research Barcelona and Latin-America in Santiago, Chile. Until 2005 he was ICREA Professor at UPF in Barcelona and also director of the Center for Web Research, University of Chile. He is co-author of the book *Modern Information Retrieval* by Addison-Wesley (1999). He received his Ph.D. from the University of Waterloo in 1989. His research includes IR, algorithms, and information visualization.

Mariano P. Consens' research interests are in the areas of Data Management Systems and the Web. He received his Ph.D. from the University of Toronto and is presently a faculty member at University of Toronto. He has also been active in the software industry as a founder and CTO of several start-ups.

Mounia Lalmas received a Ph.D. in Computer Science from the University of Glasgow in 1996. Presently she is a Professor of Information Retrieval at Queen Mary, University of London, which she joined as a lecturer in 1999. She is the co-leader of the INEX initiative, with over 60 participating organizations worldwide.

Introduction to Recommender Systems
Joseph A. Konstan (University of Minnesota)
E-commerce sites such as Amazon.com and streaming music services have made recommender systems – systems that select items to present to a user from a variety of choices – nearly ubiquitous. This tutorial provides an introduction to recommender systems: the algorithms behind them, design factors for implementing them, case studies of applications, and lessons from research.

Joseph A. Konstan is Professor of Computer Science and Engineering at the University of Minnesota and co-Director of the GroupLens Research Group. His dozen years of research on recommender systems range from user interface design, to algorithm development and evaluation, to studies of user behavior. He co-founded Net Perceptions and is co-author of the book *Word of Mouse: The Marketing Power of Collaborative Filtering*.

ANNOUNCEMENTS

Call for Papers

Computer Games Workshop 2007

Amsterdam, The Netherlands
June 15-17, 2007

IBM, SARA Computing and Networking Services and NCF (Foundation of National Computing Facilities) are enabling the organization of the Computer Games Workshop 2007 (CGW2007) (June 15-17, 2007), the 15th World Computer-Chess Championship (WCCC) (June 11-18) and the 12th Computer Olympiad (CO) (June 11-18) to be held in Amsterdam, The Netherlands. Location: Turing Hall

(Z011) Science Park Amsterdam, Kruislaan 413, 1098 SJ Amsterdam. For information on the 15th WCCC and the 12th CO, see http://amsterdam2007. icga.org/. Below we focus on the CGW2007.

The start of the event will be in conjunction with the official inauguration of the new Dutch National Supercomputer, which will take place on June 13. The mayor of Amsterdam, Dr. Job Cohen, will attend this official meeting. CGW2007 is organized by the Universiteit Maastricht under auspices of SIKS (Dutch research school for Information and Knowledge Systems).

The workshop commences on June 15 at 8.30 h and will take place on three consecutive days, each day from 8.30 h till 12.30 h. The workshop aims in the first place at providing an international forum for computer-games researchers presenting new results on ongoing work. Hence, we invite contributors to submit papers on all aspects of research related to computers and games.

Relevant topics include, but are not limited to: (1) the current state of game-playing programs, (2) new theoretical developments in game-related research, (3) general scientific contributions produced by the study of games, and (4) (adaptive) game AI. Moreover, researchers of topics such as (5) social aspects of computer games, (6) cognitive research of how humans play games, and (7) issues related to networked games are invited to submit their contribution.

IMPORTANT DATES
Paper Submission	May 15, 2007
Acceptance Notification	May 21, 2007
Camera-ready Papers	June 1, 2007

PAPER SUBMISSION REQUIREMENTS
Papers of 8 to 10 pages are preferred. The maximum length is 12 pages. The preferred format for submission is PDF, but Postscript or Word is also acceptable. The paper must be written in the English language. We prefer the Springer Lecture Note Series (LNCS/LNAI) format. Please follow the instructions for authors available at the Springer LNCS/LNAI Web: http://www.springer.de/comp/ lncs/authors.html.

REFEREEING PROCESS
Since this announcement is rather late, the usual full refereeing process is impossible to execute. Therefore papers will be refereed in a "light" way by members of the Programme Committee. In practice, this means that papers are accepted if their topic suits the workshop and their overall quality is acceptable. Accepted papers will be scheduled for presentation during the workshop and will be

printed as workshop proceedings. Authors of accepted papers, or their representatives, are expected to present their papers at the workshop. Please submit papers via email to uiterwijk@micc.unimaas.nl, before May 15, 2007. Notice of acceptance of papers will be sent by May 21, 2007 to the principal author. Camera-ready papers are due by June 1, 2007. The best contributions of the workshop will be published in the *ICGA Journal*. Moreover, depending on the quality, a submission of material for publication in the LNCS series may be considered.

REGISTRATION

Registration Fee	Early (on or before June 1)	Late (after June 1)
Non-Students	Euro 50	Euro 70
Students	Euro 25	Euro 35

Admission to the workshop and a copy of the workshop proceedings are included in the workshop registration fee. The workshop is free for a fixed number of SIKS-Ph.D. students. Applications before June 1 will be honoured in a first-come-first-serve manner.

WORKSHOP PROCEEDINGS

The proceedings will be edited by Professor H.J. van den Herik, dr. J.W.H.M. Uiterwijk, dr. M.H.M. Winands, and M.P.D. Schadd, M.Sc. Each workshop participant will receive a copy at the start of the workshop.

CHAIRS

Professor H.J. van den Herik (UM), Dr. N.S. Hekster (IBM), Dr. A. Osseyran (SARA), and Dr. P. Aerts (NCF).

First Announcement
ToKeN Symposium 2007

The 2007 ToKeN symposium will take place on June 22, 2007 at the Academic Medical Centre, Amsterdam. The conference programme will consist of parallel workshops, an extended poster session, a keynote presentation, and presentations by ToKeN researchers.

The organizing committee is happy to announce the keynote speaker of the symposium, Professor Jeremy Wyatt, Director of Health Informatics Centre of the University of Dundee. Details on this conference will be provided on www.nwo.nl/tokensymposium. For more information about ToKeN in general or the symposium in particular, please contact dr.ir. Christiane Klöditz (phone: +31 70 3440 561, e-mail: kloditz@nwo.nl).

CONFERENCES, SYMPOSIA WORKSHOPS

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

MAY 13-16, 2007
ISCRAM 2007: 4th International Conference on Information Systems for Crisis Response and Management, Delft, The Netherlands.
http://www.iscram.org/

MAY 14-15, 2007
BeNeLearn 2007, Amsterdam.
http://staff.science.uva.nl/~katrenko/benelearn07/

MAY 14-18, 2007
AAMAS 2007: 2007 International Conference on Autonomous Agents and Multiagent Systems, Honolulu, Hawai'i.
http://www.aamas2007.org/

JUNE 11-18, 2007
The 15th World Computer-Chess Championship and the 12th Computer Olympiad, Amsterdam, The Netherlands.
http://amsterdam2007.icga.org/.

JUNE 15-17, 2007
The Computer Games Workshop 2007 (CGW2007), Amsterdam, The Netherlands.
http://cgw2007.icga.org/.

JUNE 22, 2007
1st NSVKI Student Conference, Radboud University, Nijmegen, The Netherlands.
http://www.nsvki.nl/sc.

JUNE 27, 2007
MYCAREVENT Demonstration Event, National Motorcycle Museum, Birmingham, UK.
http://www.mycarevent.com

SEPTEMBER 12-14, 2007
ACII 2007: Affective Computing and Intelligent Interaction, Lisbon, Portugal.
http://gaips.inesc-id.pt/acii2007/index.html

NOVEMBER 5-6, 2007
BNAIC 2007: The 19th Belgian-Dutch Conference on Artificial Intelligence Utrecht, The Netherlands.
http://www.cs.uu.nl/bnaic2007

HOW TO SUBSCRIBE

The BNVKI/AIABN Newsletter is a direct benefit of membership of the BNVKI/AIABN. Membership dues are € 40,-- for regular members; € 25,-- for doctoral students (AIO's); and € 20,-- for students. In addition members will receive access to the electronic version of the European journal *AI Communications*. The Newsletter appears bimonthly and contains information about conferences, research projects, job opportunities, funding opportunities, etc., provided enough information is supplied. Therefore, all members are encouraged to send news and items they consider worthwhile to the editorial office of the BNVKI/AIABN Newsletter. Subscription is done by payment of the membership due to RABO-Bank no. 11.66.34.200 or Postbank no. 3102697 for the Netherlands, or KBC Bank Veldwezelt No. 457-6423559-31, 2ᵉ Carabinierslaan 104, Veldwezelt, Belgium. In both cases, specify *BNVKI/AIABN in Maastricht* as the recipient, and please do not forget to mention your name and address. Sending of the BNVKI/AIABN Newsletter will only commence after your payment has been received. If you wish to conclude your membership, please send a written notification to the editorial office before December 1, 2007.

COPY

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

ADVERTISING

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

CHANGE OF ADDRESS

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

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