



Kramnik vs. Deep Fritz

Natural versus Artificial  
Productive Problem  
Solving

Students Sharing their  
Interest!

## AI in the Press

*Editor-in-Chief*

AI in The Netherlands and Belgium is thriving. This is also noticed by reporters and journalists. In the last weeks I noticed three examples of AI research that found their way to newspapers or magazines.

Firstly, on pages 64-73 of the magazine *Vrij Nederland* of February 10, 2007, a special issue on knowledge capital, Peter Pijls reports in his contribution entitled “Spin in het Semantische Web” (*Spider in the Semantic Web*) on the research in this field at the Free University of Amsterdam. This research group, led by professors Frank van Harmelen and Guus Schreiber, illustrate their latest findings. It is shown that within some years computers can be expected to autonomously gather, organize, and interpret information, leading to automatic discoveries. A well-written report indeed. If you missed it, you can still read it at Van Harmelen’s website: <http://www.cs.vu.nl/~frankh/spool/VrijNederland.pdf>.

Secondly, in *De Volkskrant* of February 22, 2007, Rob Gollin reports in a contribution entitled “Meesterwerk in Getallen” (*Masterpiece in Numbers*) on the Authentic project, a joint research effort between Delft University of Technology (dr.ir. Jan van der Lubbe) and the Universiteit Maastricht (prof.dr. Eric Postma). A state-of-the-art computer program is under development that aims at recognizing the authors of well-known paintings and exposing forgers. Van der Lubbe shows that the latest version of this program clearly separates genuine from false masterpieces. The interest from the side of art experts is very high, although at present human expertise still is needed.

Thirdly, in the popular science magazine *Quest* of March 2007 we find on pp. 20-24 a story entitled “Mens versus Computer: Wat is de tussenstand?” (*Man vs. Computer: What is the interim score?*). In this contribution Philip Fontani compares the level of machines with humans in different fields. Several researchers from our domain utter their views, such as John-Jules Meyer, Jaap van den Herik, Richard Starmans, Antal van den Bosch, Martijn Wisse, and Eric Pauwels. Whereas the computer clearly outperforms humans in the fields of calculations, games, and imperturbability (0-3), humans are clearly superior in the fields of speech, motion, and vision (3-3). Then the author mentions that computers can not be compared in fields in which they are not involved, such as joking, laughing, writing poetry, and many others, rushing to an interim score of 13-3 for human mankind. Whereas this conclusion may be a little premature, the lesson to us researchers is clear: there is still a lot to do!

In the present issue (pp. 4-6) we also report on the latter encounters between humans and computers in one of the fields for which *Quest* recognizes the supremacy of computers, namely Chess. A day-by-day overview of the match between World Champion Vladimir Kramnik and computer program DEEP FRITZ shows the reader how the machine clearly outperforms the human, not only when the human blunders as in the 2<sup>nd</sup> game (indeed, a rather human characteristic), but also in a deep strategic struggle (game 6). Talking about encounters between humans and machines, Henk Visser makes us witness of an imaginary encounter between a mathematician, a logician, and a computer, discussing different styles of productive problem solving (pp. 6-10).

Finally, in this issue we follow two promises regarding the contents of the BNVKI Newsletter. A first promise was to include more abstracts of Ph.D. theses. This issue publishes two of these, namely of the fresh dr. (since January 18, 2007) Wouter Teepe (*Reconciling Information Exchange and Confidentiality: a formal approach*) and the soon-to-be dr. (March 15, 2007) Marius Bulacu (*Statistical Pattern Recognition for Automatic Writer Identification and Verification*). Congratulations and success to both of them, for their Ph.D. defense as well as their future scientific career. The second promise was to have more information on issues by and for AI students. With this in mind we are happy to include a report on pp. 14-15 of the establishment of the Dutch Students Association for Artificial Intelligence, the NSVKI, by its fresh secretary, Joris Janssen, plus a call for papers for the 1<sup>st</sup> NSVKI Student Conference (pp. 18-19). We wish the NSVKI a prosperous future and hope to establish a fruitful cooperation with them!

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The photographs on pages 5 and 6 in this issue are by courtesy of ChessBase.

Front cover: poster of the Kramnik – DEEP FRITZ match.

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

## BNVKI-Board News

*Antal van den Bosch*

The BNVKI, that's you and me. It's useful for a society like ours to realize occasionally that we are in essence a social network of people who share a professional interest in AI. Usually, our interest in AI goes beyond the occupational, but the fact that most members are employed scientists distinguishes us from, for example, the AI user group of the HCC<sup>1</sup> (the Dutch national computer club), or the NSVKI<sup>2</sup>, the Dutch Society of AI Students. Or does it? These two groups, and of course their Belgian counterparts, share essentially the same interest, and especially the latter group of students actually overlaps with us, when seen over time. The influx in our network comes from young people who, once Master's students, decided to push through and take up one of the Ph.D. positions available in the AI field in Belgium or the Netherlands.

I am mentioning the NSVKI in particular because it is a brand new and very welcome initiative of three local AI student societies to form a bigger umbrella student society. I would like to congratulate the fresh board of the NSVKI with their initiative, and wish them luck. With the new national society we have recently established contacts in order to continue coordinating events such as BNAIS, and we will particularly look for new ways to encourage Master-level students, also from Belgium of course, to participate in BNAICs, to give them an idea of the academic job market they may consider entering.

Speaking about market, there is of course the fourth network of AI companies, that also overlaps with ours. The BNVKI is intent on including industrial research and development in AI in its network, for example by organizing special tracks in BNAIC. Besides professional members, we share a common interest in the job market; both students and academic personnel may find their way into the labs of Belgian and Dutch AI companies, certainly now that the economy is starting to look forward again, and the companies return to recruiting specialists.

In sum, we are a network connected to networks. We may be the ones having the professional relation to AI and we may claim to be the keepers of academic knowledge and fundamental research, but we are symbiotic with the other networks; we need them as they need us. The board intends to add links between our networks in order to make the

<sup>1</sup> <http://www.ai.hccnet.nl/>

<sup>2</sup> <http://www.nsvki.nl/>

best possible use that one can make out of a well-connected, scale-free small-world professional AI network – not only theoretically speaking.

### **Kramnik vs. DEEP FRITZ 10 Computer wins match by 4-2<sup>3</sup>**

*Matthias Wüllenweber, Frederic Friedel, and  
Mathias Feist  
ChessBase, Hamburg, Germany*

The chess duel Man vs. Machine, Vladimir Kramnik vs. DEEP FRITZ was being staged from November 25 until December 5, 2006. It was sponsored by the RAG AG, one of Europe's largest energy companies. The venue was the National Art Gallery in Bonn, Germany.

Rumours of its demise have been greatly exaggerated – the “Man vs. Machine” contest still draws the attention of a wide audience, world-wide. In Germany, where it was all happening, it was simply a mega-event. The press and television coverage was unprecedented, with reports in all channels. The outcome was a convincing win by the computer. For a convenient overview we start with the final standing (see Table 1).

Player	Rating	1	2	3	4	5	6	Tot.
Vladimir Kramnik	2760	½	0	½	½	½	0	2.0
DEEP FRITZ 10	-	½	1	½	½	½	1	4.0

**Table 1:** The Final Standing.

Below we provide a game-by-game account of the contest.

#### **GAME ONE**

Game one was a vintage Kramnik effort against DEEP FRITZ 10. The world champion's precise and methodical style is dangerous against humans and ideal against computers. Kramnik employed the same tranquil Catalan opening he used against Veselin Topalov several times in their world championship match. It is just the sort of line to squeeze a mild positional advantage with minimal risk, something that is especially important when facing a computer looking at eight million moves per second. Kramnik obtained a tiny endgame edge that was more optical than real. Fritz played some

<sup>3</sup> This is an abridged version of a contribution appeared in the *JCGA Journal*, Vol. 29, No. 4 (December 2006), pp. 208-213. Reproduced with permission of the authors and the editor-in-chief.

unorthodox moves but never seemed in doubt of the eventual draw. An impressive control game by Kramnik, although it should be much harder to achieve with the black pieces the day after.



Mathias Feist of ChessBase shakes hands with Vladimir Kramnik at the start of Game 1. In the background Dr. Werner Müller, head of RAG, and Peer Steinbrück, the German minister of finances.

### Vladimir Kramnik - DEEP FRITZ 10

1. d4 Nf6 2. c4 e6 3. g3 d5 4. Bg2 dxc4 5. Qa4+ Nbd7 6. Qxc4 a6 7. Qd3 c5 8. dxc5 Bxc5 9. Nf3 0-0 10. 0-0 Qe7 11. Nc3 b6 12. Ne4 Nxe4 13. Qxe4 Nf6 14. Qh4 Bb7 15. Bg5 Rfd8 16. Bxf6 Qxf6 17. Qxf6 gxf6 18. Rfd1 Kf8 19. Ne1 Bxg2 20. Kxg2 f5 21. Rxd8+ Rxd8 22. Nd3 Bd4 23. Rc1 e5 24. Rc2 Rd5 25. Nb4 Rb5 26. Nxa6 Rxb2 27. Rxb2 Bxb2 28. Nb4 Kg7 29. Nd5 Bd4 30. a4 Bc5 31. h3 f6 32. f3 Kg6 33. e4 h5 34. g4 hxg4 35. hxg4 fxe4 36. fxe4 Kg5 37. Kf3 Kg6 38. Ke2 Kg5 39. Kd3 Bg1 40. Kc4 Bf2 41. Kb5 Kxg4 42. Nxf6+ Kf3 43. Kc6 Bh4 44. Nd7 Kxe4 45. Kxb6 Bf2+ 46. Kc6 Be1 47. Nxe5 ½-½

### GAME TWO

Vladimir Kramnik played another wonderfully profound game, piling the pressure on DEEP FRITZ 10 on the black side of a Queen's Gambit Accepted, and taking the computer to the edge of defeat. As usual the computer defended tenaciously and by move 34 DEEP FRITZ 10 had equalised and the game was clearly drawn. And then Kramnik overlooked mate in one (see diagram 1)!

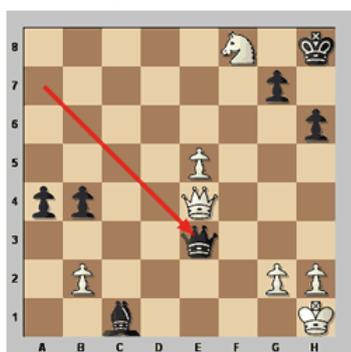


Diagram 1: After 34. ... Qe3??

Kramnik played the move 34. ... Qe3 calmly, stood up, picked up his cup and was about to leave the stage to go to his rest room. At least one audio commentator also noticed nothing, while the DEEP FRITZ 10 operator Mathias Feist kept glancing from the board to the screen and back, hardly able to believe that he had input the correct move. DEEP FRITZ 10 was displaying mate in one (35. Qh7#), and when Mathias executed it on the board Kramnik briefly grasped his forehead, took a seat to sign the score sheet and left for the press conference, which he dutifully attended.

### DEEP FRITZ 10 – Vladimir Kramnik

1. d4 d5 2. c4 dxc4 3. e4 b5 4. a4 c6 5. Nc3 b4 6. Na2 Nf6 7. e5 Nd5 8. Bxc4 e6 9. Nf3 a5 10. Bg5 Qb6 11. Nc1 Ba6 12. Qe2 h6 13. Be3 Bxc4 14. Qxc4 Nd7 15. Nb3 Be7 16. Rc1 0-0 17. 0-0 Rfc8 18. Qe2 c5 19. Nfd2 Qc6 20. Qh5 Qxa4 21. Nxc5 Nxc5 22. dxc5 Nxe3 23. fxe3 Bxc5 24. Qxf7+ Kh8 25. Qf3 Rf8 26. Qe4 Qd7 27. Nb3 Bb6 28. Rfd1 Qf7 29. Rf1 Qa7 30. Rxf8+ Rxf8 31. Nd4 a4 32. Nxe6 Bxe3+ 33. Kh1 Bxc1 34. Nxf8 Qe3 35. Qh7# 1-0

### GAME THREE

The third game in the National Art Gallery in Bonn, Germany, saw DEEP FRITZ 10 playing some surprisingly strategic moves. These included a pawn sacrifice for initiative in an imbalanced position on the black side of an Open Catalan. In the end the computer was pressing for a win, but Vladimir Kramnik defended well and the game ended after 44 moves in a draw.

### Vladimir Kramnik - DEEP FRITZ 10

1. d4 Nf6 2. c4 e6 3. g3 d5 4. Bg2 dxc4 5. Qa4+ Nbd7 6. Qxc4 a6 7. Qc2 c5 8. Nf3 b6 9. Ne5 Nd5 10. Nc3 Bb7 11. Nxd5 Bxd5 12. Bxd5 exd5 13. 0-0 Nxe5 14. dxe5 Qc8 15. Rd1 Qe6 16. Qd3 Be7 17. Qxd5 Rd8 18. Qb3 Rxd1+ 19. Qxd1 0-0 20. Qb3 c4 21. Qc3 f6 22. b3 Rc8 23. Bb2 b5 24. Qe3 fxe5 25. bxc4 Rxc4 26. Bxe5 h6 27. Rd1 Rc2 28. Qb3 Qxb3 29. axb3 Rxe2 30. Bd6 Bf6 31. Bc5 a5 32. Bd4 Be7 33. Bc3 a4 34. bxa4 bxa4 35. Rd7 Bf8 36. Rd8 Kf7 37. Ra8 a3 38. Rxf8+ Kxf8 39. Bb4+ Kf7 40. Bxa3 Ra2 41. Bc5 g6 42. h4 Kf6 43. Be3 h5 44. Kg2 ½-½

This blockade position is a theoretical draw, which DEEP FRITZ 10 operator Mathias Feist accepted for the computer, although DEEP FRITZ 10 would have liked to battle it out, fruitlessly, for another hour or two.

### GAME FOUR

Facing his computer opponent and 1. e4 with the black pieces world champion Vladimir Kramnik chose the solid Petroff Defence, but DEEP FRITZ 10 played very well and obtained a clear advantage.

But then Kramnik showed his defensive skills by setting up a fortress the computer could not penetrate. The game ended in a 54-move draw.

#### DEEP FRITZ 10 - Vladimir Kramnik

1. e4 e5 2. Nf3 Nf6 3. d4 Nxe4 4. Bd3 d5 5. Nxe5 Nd7 6. Nxd7 Bxd7 7. 0-0 Bd6 8. Qh5 Qf6 9. Nc3 Qxd4 10. Nxd5 Bc6 11. Ne3 g6 12. Qh3 Ng5 13. Qg4 Qf4 14. Qxf4 Bxf4 15. Nc4 Ne6 16. Bxf4 Nxf4 17. Rfe1+ Kf8 18. Bf1 Bb5 19. a4 Ba6 20. b4 Bxc4 21. Bxc4 Rd8 22. Re4 Nh5 23. Rael Rd7 24. h3 Ng7 25. Re5 Nf5 26. Bb5 c6 27. Bd3 Nd6 28. g4 Kg7 29. f4 Rhd8 30. Kg2 Nc8 31. a5 Rd4 32. R5e4 Kf8 33. Kf3 h6 34. Rxd4 Rxd4 35. Re4 Rd6 36. Ke3 g5 37. Rd4 Ke7 38. c4 Rxd4 39. Kxd4 gxf4 40. Ke4 Kf6 41. Kxf4 Ne7 42. Be4 b6 43. c5 bxc5 44. bxc5 Ng6+ 45. Ke3 Ne7 46. Kd4 Ke6 47. Bf3 f5 48. Bd1 Kf6 49. Bc2 fxc4 50. hxc4 Ke6 51. Bb1 Kf6 52. Be4 Ke6 53. Bh1 Kf6 54. Bf3 Ke6 ½-½

#### GAME FIVE

In this critical fifth game, Vladimir Kramnik's last one with the white pieces, it was obvious that the world champion desperately wanted a win. That was required to catch up with the opponent's lead and regain chances for an overall victory in this match.

#### Vladimir Kramnik - DEEP FRITZ 10

1. d4 Nf6 2. c4 e6 3. Nf3 d5 4. Nc3 Bb4 5. e3 0-0 6. a3 Bxc3+ 7. bxc3 c5 8. Bb2 Nc6 9. Rc1 Re8 10. Bd3 dxc4 11. Bxc4 e5 12. dxe5 Qxd1+ 13. Rxd1 Nxe5 14. Nxe5 Rxe5 15. Be2 Bd7 16. c4 Re7 17. h4 Ne4 18. h5 Ba4 19. Rd3 b5 20. cxb5 Bxb5 21. Rd1 Bxe2 22. Kxe2 Rb8 23. Ba1 f5 24. Rd5 Rb3 25. Rxf5 Rxa3 26. Rb1 Re8 27. Rf4 Ra2+ 28. Ke1 h6 29. Rg4 g5 30. hxc6 Nxf2 31. Rh4 Rf8 32. Kf1 Nh3+ 33. Ke1 Nf2 34. Kf1 Nh3+ 35. Ke1 ½-½

Both Kramnik and the computer cannot deviate from the repetition without losing. Here DEEP FRITZ 10 operator Mathias Feist wrote down the next black move, 35. ... Nf2. When Kramnik saw this he smiled ("Okay, you do know the rules of offering a draw") and stretched his hand out for the peace offering.

#### GAME SIX

World champion Vladimir Kramnik played a very spirited final game in his match against DEEP FRITZ 10. However, it was a very double-edged encounter. Moreover, DEEP FRITZ 10 played some highly unusual and deep ideas to gain the upper hand and win the game on move 47. DEEP FRITZ 10 has played this game very impressively, as all the GMs and Vladimir Kramnik himself have admitted.

#### DEEP FRITZ 10 – Vladimir Kramnik

1. e4 c5 2. Nf3 d6 3. d4 cxd4 4. Nxd4 Nf6 5. Nc3 a6 6. Bc4 e6 7. 0-0 Be7 8. Bb3 Qc7 9. Re1 Nc6 10. Re3 0-0 11. Rg3 Kh8 12. Nxc6 bxc6 13. Qe2 a5 14. Bg5 Ba6 15. Qf3 Rab8 16. Re1 c5 17. Bf4 Qb7 18. Bc1 Ng8 19. Nb1 Bf6 20. c3 g6 21. Na3 Qc6 22. Rh3 Bg7 23. Qg3 a4 24. Bc2 Rb6 25. e5 dxe5 26. Rxe5 Nf6 27. Qh4 Qb7 28. Re1 h5 29. Rf3 Nh7 30. Qxa4 Qc6 31. Qxc6 Rxc6 32. Ba4 Rb6 33. b3 Kg8 34. c4 Rd8 35. Nb5 Bb7 36. Rfe3 Bh6 37. Re5 Bxc1 38. Rxc1 Rc6 39. Nc3 Rc7 40. Bb5 Nf8 41. Na4 Rdc8 42. Rd1 Kg7 43. Rd6 f6 44. Re2 e5 45. Red2 g5 46. Nb6 Rb8 47. a4 1-0



Mathias Feist (second from right) receives the trophy for the computer.

## Natural versus Artificial Productive Problem Solving

*Henk Visser  
Haarlem*

*(Comp, Log and Math have come together in Math's room. After some small talk, Log tries to start a serious discussion.)*

LOG. We have already had many discussions about 'productive problem solving', Math, and we have seen several examples of different solutions, given either by a computer or by a mathematician. Nevertheless I still miss a philosophical distinction, if not definition, of the two ways of problem solving, given that both can be productive.

COMP. I am glad that you acknowledged that computer solutions can be productive, Log. It improves on the rather unfruitful terminological discussions about the intelligence of artificial intelligence, so to speak.

MATH. I agree, but there are differences, as Log rightly remarked, although I do not want to go into a philosophical discussion of them.

COMP. I do not speak for Log, but I am an anti-philosopher just like you.

LOG. You know that I worked at the E.W. Beth Institute for Foundations of the Exact Sciences, and this institute was a section of the Philosophy Department before it went over to the Science Department. That is the reason why I still use the word ‘philosophy’ for discussions *about* mathematics, in other words for dealing with meta-problems.

COMP. I have no difficulties with it, as long as it implies no *Gefasel*, I mean: waffle.

LOG. What do you take me for?

COMP. I always appreciate your philosophical remarks, LOG.

MATH. So do I, and Log’s philosophical question about differences in natural and artificial productive problem solving can not be dismissed as unproductive. Moreover I thought about this myself last week and I have at least some concrete examples at hand with which the differences can be illustrated.

COMP: Perhaps we can draw some conclusions about them and give a preliminary answer to Log’s question.

LOG. I hope so, go ahead, Math.

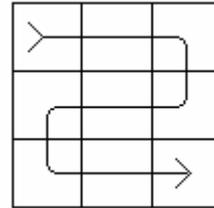
MATH. All examples concern cases in which a state space problem has no solution at all. This result can be or has been established by a computer program, simply by searching the whole space, but human problem solvers reached the same conclusion in a different way. Perhaps this is important for Log’s meta-problem. But let me begin with my first problem. You know the eight puzzle with its goal state

1	2	3
8		4
7	6	5

You know also that half of the eight puzzle problems have no solution, with the following state as a characteristic example:

8	1	2
7		3
6	5	4

The Dutch mathematician/linguist/writer Hugo Brandt Corstius gave a simple explanation for the unsolvability states with the fifteen puzzle.<sup>4</sup> He introduced a ‘snake ordering’ that we can also apply in the eight puzzle:



He noticed that moving a tile downwards to the empty space, for example the 1 in the above characteristic example, can be described as a ‘jump’ over an even number of tiles, and similarly moving a tile upwards as a jump ‘back’, also over an even number of tiles, and a horizontal move as a jump over zero tiles, an even number as well. It follows that it is impossible to interchange two tiles and keep the other tiles in the same place. For two adjacent tiles to interchange their position, one of them would have to jump over only one tile.

COMP. I don’t see it.

MATH. Suppose we could interchange the 1 and the 2. Then we get the following simple solvable problem:

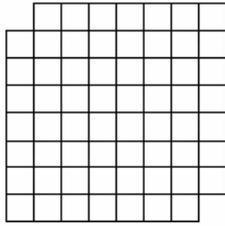
8	2	1
7		3
6	5	4

COMP. I see, but we cannot reach this state, so the original problem has no solution.

MATH. But suppose that a computer program that can perform all series of elementary moves, decides that the end state cannot be reached when all possible states have been passed. This program is productive, but this is achieved in a quite different way from Hugo’s solution.

COMP. This reminds me of the famous tiler problem, to cover an area of 8 by 8 of which two opposite corners of 1 by 1 are lacking, with tiles of 2 by 1:

<sup>4</sup> Battus. *Vrij Nederland*, 12.07.1980.

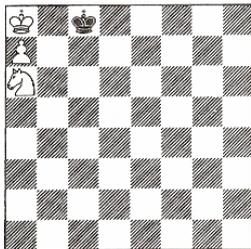


MATH. It is my favourite example of a problem solution with the help of an anti-abstract model. Colouring the tiles black and white



means introducing differences that are not present in the original. Again, a computer program which discovers that the problem is unsolvable after it has gone through all possibilities, gives a completely different solution than the person who models the area as a mutilated chess board.<sup>5</sup>

LOG. Talking about chess, I remember a chess problem by Lasker<sup>6</sup> in which White to move cannot win, because his knight will always cover a square of the wrong colour.



LOG. Until now, we haven't seen logical or mathematical problems. I'd like to see how they are solved differently by computers and men.

MATH. I will give an example of a problem that can arise when we consider the following axioms in finite geometry:

- (1) There are exactly 10 points
- (2) There are exactly 5 lines
- (3) Each line contains exactly 4 points
- (4) Every two lines have exactly 1 point in common

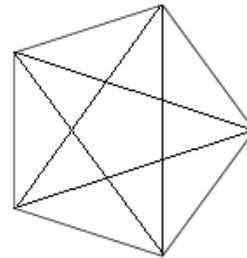
LOG. Is this a joke? What a strange axiom system! Where did you find it?

MATH. Wait until you have drawn a model of this system!

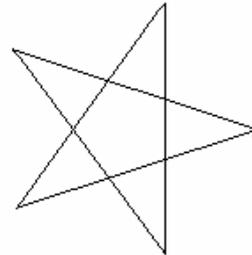
<sup>5</sup> Cf. Philip C. Jackson, Jr., *Introduction to Artificial Intelligence*. New York: Petrocelli Books, 1974, p. 113.

<sup>6</sup> Emanuel Lasker, *Lehrbuch des Schachspiels*. Berlin: Wetbuchhandel, 1926, p. 21.

LOG. Let me think. Intuitively, the 10 points and 5 lines suggest that it has something to do with pentagons or decagons. (She draws the following figure)



Ah, here is your model:



MATH. Excellent! Now for the problem. Can you put numbers at the points in such a way that the sum of every four numbers on the same line is everywhere the same?

COMP. There are five such sums, but each number occurs twice, so the sum is one fifth of the double of the sum of the numbers 1 to 10.

LOG. Yes, it is 22. Given the preceding problems, I assume that the problem has no solution, but how do we prove this?

COMP. I will write a computer program. I will be back in a few minutes. (He leaves the room.)

MATH. In the mean time I will sketch a non-artificial proof. Suppose that we begin to write all possible sums:

- 1 + 2 + 9 + 10
- 1 + 3 + 8 + 10
- 1 + 4 + 7 + 10
- 1 + 4 + 8 + 9
- .....

Apparently each sum consists of two odd and two even numbers, with only two exceptions, that is when all terms are odd, and when all terms are even:

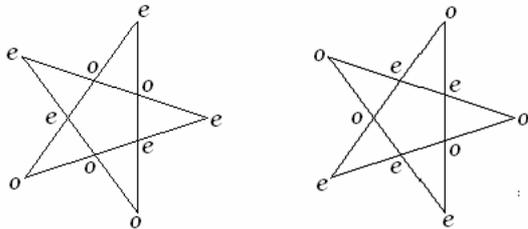
- 1 + 5 + 7 + 9
- 2 + 4 + 6 + 10

But these two sums are useless. They swallow almost all numbers of the same kind. If there is a solution, then each sum always consists of two odd

and two even numbers. This has consequences for the general shapes of a solution, but that is relatively unimportant.

LOG. Nevertheless I would like to see them.

MATH. Look:



LOG. Nice, but it is obvious that the one can be derived from the other, simply by replacing each number  $n$  by its complement  $11 - n$ . But go on.

MATH. Now we know that each line would contain two odd and two even numbers, we can make a list of them in the following way:

1 3 8 10	3 5 4 10	5 7 4 6	7 9 2 4
	3 5 6 8	5 7 2 8	
1 5 6 10			
	3 7 2 10	5 9 2 6	
1 7 4 10	3 7 4 8		
1 7 6 8			
	3 9 4 6		
1 9 2 10	3 9 2 8		
1 9 4 8			

That 1 3 8 10 cannot be an element of a model is clear. There is no line which has only the point 1 in common with 1 3 8 10.

Is 1 5 6 10 a better candidate? We find 1 9 4 8, that is nice, 3 7 2 10, but this line cannot go together with 1 9 4 8, because they have no point in common, 3 9 4 6, which also cannot go together with 1 9 4 8 because they have two points in common, and 5 7 2 8. At most we can find three lines which satisfy axiom 4, for example 1 5 6 10, 1 9 4 8, and 5 7 2 8.

The point 1 7 4 10 is as bad as point 1 3 8 10, because there is no other line which has only the point 1 in common with 1 7 4 10.

Therefore we try 1 7 6 8, and find 1 9 2 10, 3 9 4 6, 5 9 2 6, and 7 9 2 4. All these four lines contain 9, so there is no need to go further on this course. There are at most three lines satisfying axiom 4.

With 1 9 2 10, we must go back to 1 7 6 8, and with 1 9 4 8 to 1 5 6 10, so that is not helpful either.

This ends our search. It follows that the axiom system has no model.

LOG. I am completely convinced.

COMP. (*returning*) There is definitely no solution, and I assume that you came to the same conclusion in your way! My program checked all possibilities. But the blackboard shows that you had to do some systematic work as well.

MATH. That is true. But the difference with a systematical search through the whole state space is obvious. There was ample attention to structural properties which a solution, if any, would have.

LOG. So your presentation of this Magical Star problem by means of a geometrical axiom system helped you, and the same holds for the closer inspection of the sums.

MATH. Indeed, so instead of distinguishing 'form' and 'content' as some philosophers do, in order to argue that computers can only do 'formal' work, I think that mathematicians can regard mathematical problems as related to other problems, and thereby find other ways of solving them.

COMP. Do you mean that associations are important? I thought that the time is over that psychologists put all their cards on associations.

MATH. There is nothing wrong with associations, as long as one does not think that there are laws about them. What matters is that trained mathematicians have seen and given all sorts of solutions. Faced with a new problem, they sometimes think of one of them, maybe only in the form of an intuitive inference together with a promising conclusion to the effect that it is worthwhile to work it out for the present problem. I admit that this is very vague, but I know no better way of articulating this idea. Psychological analysis of mathematical activities is still in its infancy, but this is a difference with computer programs: talking about their psychological processes is nonsense.

LOG. What do you think of the thought processes of computer scientists?

MATH. My remarks have only to do with mathematical abilities, about computer scientists I hesitate to give an opinion, although they are also mathematicians of a kind.

COMP. Hm. Let us go back to the problem. I have not seen your derivation, Math, but can you conclude from it about the fundamental difference between the computer proof and yours?

LOG. I would suggest that the computer only showed *that* there is no solution, whereas you showed *why* there is no solution. This can be easily generalized. Am I right, Math?

MATH. Superficially, it looks as if this is the criterion we need. In the examples of the eight puzzle and the tiler problem, there was a short answer why a certain configuration had no solution. But as is mostly the case with why-questions, the five point star problem has no simple answer to the question why it is unsolvable. And since we are not philosophers who are satisfied with simple slogans, we must dismiss why-questions as irrelevant.

LOG. But don't you want an *explanation* of the fact that a certain problem has no solution?

MATH. The proof is the explanation!

COMP. Does this mean that the computer proof in which all possibilities are gone through is also an explanation?

MATH. Yes, why not? The difference with my explanation, I mean, proof, is only that mine is more perspicuous, at least for us. Moreover it does not stand alone, like the other solutions. Hugo's approach to a fifteen problem position could without difficulties be taken over for an eight problem position, the solution of the tiler problem can also be attempted for similar problems. Lasker's problem seems to have a general character, because two moves were sufficient to generate the impossibility. And I have the feeling that my way of dealing with the pentagon problem might be used in other problems.

COMP. Does this not also hold for the computer way of checking all possibilities?

MATH. In a sense it does, but it has taught us nothing new, apart from the result. Moreover, even a slight change in a problem situation might again require a full systematic search through all possibilities, whereas human solution procedures and strategies might immediately be applied without much search or even without any serious search, that is, after a brief inspection of the situation only.

LOG. Is this then a significant difference between productive problem solving procedures by men and by computers?

MATH. It is a difference, but I think that it is not very fruitful to call it significant. What does that mean? And should such a difference hold for all times, as philosophers want it to be? That would be preposterous. Moreover I do not exclude that

computer programs will use more and more humanlike procedures, whereas I know as well as you that human beings sometimes resort to computerlike procedures, although these are also invented by human beings.

COMP. But only after the invention of computers!

MATH. You are right, Comp. But what I want to stress is that mathematicians should strive for solutions that are as perspicuous as possible. In this respect, my proof of the impossibility theorem for a five point magical star is perhaps not the last word. On the other hand, computer scientists should exploit the best possibilities of computers. This time we discussed only examples of problems that have no solution, but you know as well as I that it can be very difficult for human beings to give all solutions of solvable problems. I know from experience that we can sometimes find special solutions without great effort, but also that it can be very difficult to sum up, let alone to specify all solutions. In that case we can go to the computer scientists with their systematic procedures.

COMP. Then I suggest that we are going to investigate the solutions for larger Magical Star problems, to begin with the Mageen David!

LOG. How do you know that this star has solutions?

COMP: My former mathematics teacher gave it once as an exercise!

MATH. (*laughing*) I know.

(*Hereby their discussion ends and Log and Comp leave Math's room.*)

## **Reconciling Information Exchange and Confidentiality: A formal approach**

Ph.D. thesis abstract  
*Wouter Teepe*

Promotor: prof. dr. L.R.B. Schomaker  
Co-promotor: dr. L.C. Verbrugge  
Date of defense: January 18, 2007

In many domains, there is a demand for exchange of sensitive information and the confidentiality of the same sensitive information. Example domains include medical files, police investigations and homeland security.

Typical of these domains is that some information has to be kept secret except for some parties that

have a need to know. To establish whether there is a need to know, the information itself has to be consulted. Without proper care, this would result in a chicken-and-egg problem: either parties with a need to know do not get to see the relevant information, or the information is not kept sufficiently confidential.

This thesis explores this tension, and offers an approach and a number of cryptographic protocols to alleviate the problems that stem from this apparent paradox.

- The approach addresses problems in the matters of information integration, and shows a vision of distributed, multi-organizational databases that offers a fair balance between autonomy and reliability.
- The protocols address a number of variations of secure computation of set intersection (“Comparing information without leaking it”). The protocols heavily rely on cryptographic hash functions, and are analyzed in GNY logic.
- It is shown that a number of respected authors propose to use cryptographic hash functions in unwarranted ways, we will prove that BAN logic is not “sound” due to some misperceptions of cryptographic hash functions.

The approach and the protocols are of individual value, but combined there is a synergy that helps to reconcile information exchange and confidentiality even further.

- **Teepe, W.** (2006). BAN Logic is Not ‘Sound’, Constructing Epistemic Logics for Security is Difficult, *Proceedings of FAMAS’06*.
- **Teepe, W.** (2006). Proving Possession of Arbitrary Secrets While not Giving Them Away, *Synthese – Knowledge, Rationality and Action*, 149(2), pp. 409-443. Heidelberg: Springer, ISSN 039-7857.
- **Teepe, W.** (2005). Integrity and Dissemination Control in Administrative Applications through Information Designators, *Int. Journal of Computer Systems Science & Engineering*, 20(5), pp. 377-386. ISSN 0267 6192, Leicester: CRL.
- Hooghe, M. and **Teepe, W.** (2005). Interactive, Non-partisan Party Profile Websites during Election Campaigns – An examination of the logfiles of the 2003 and 2004 Belgian websites, *Proceedings of the 2005 American Political Science Association Annual Meeting*, Washington, DC: APSA.
- **Teepe, W.** (2004). New Protocols for Proving Knowledge of Arbitrary Secrets While not Giving Them Away, In: S. van Otterloo, P.

McBurney, W. van der Hoek & M. Wooldridge, *Proc. of the first Knowledge and Games Workshop (KAG2004)*, 10-11 July, pp. 99-116.

- **Teepe, W.**, Riet, R. van de and Olivier, M. (2003). WorkFlow Analyzed for Security and Privacy in using Databases, *Journal of Computer Security*, 11(3), pp. 353-363.

## Statistical Pattern Recognition for Automatic Writer Identification and Verification

Ph.D. thesis abstract  
*Marius Lucian Bulacu*

Promotor: prof. dr. L.R.B. Schomaker  
Date of defense: March 15, 2007

There are two fundamental dogmas underpinning handwriting identification. Their clear-cut statements are as follows:

- No two people write exactly alike.
- No one person writes exactly the same way twice.

These two principles, albeit oversimplified and disputable, unequivocally highlight the two natural factors that are in direct conflict in the attempt to identify a person based on samples of handwriting: between-writer variation as opposed to within-writer variability.

Our goal in the thesis was to automate the process of writer identification using scanned images of handwriting and thereby to provide a computer analysis of handwriting individuality. In this endeavor, a third computational factor takes center stage: the design and use of appropriate representations, computable features capturing the writing style of a person from the scanned handwritten samples. The power of such a representation or feature relies in its ability to maximize the separation between different writers, while remaining stable over samples produced by the same writer. We present in this thesis novel and very effective features for automatic writer identification on the basis of scanned images of handwriting. The similarity in handwriting style between any two samples is computed by using appropriate distance measures between their corresponding feature vectors. Our features and writer classification operate in the general framework of statistical pattern recognition. Two fundamental sources of information regarding the individuality of handwriting are exploited by our methods functioning at two levels of analysis. First, handwriting slant, curvature and roundness,

as determined by habitual pen grip, are captured by joint directional probability distributions operating at the texture level. Second, the personalized set of letter shapes, called allographs, that a writer has learned to use under educational, cultural and memetic influences is captured by a grapheme-emission probability distribution operating at the character level. Combining texture-level and allograph-level features provides a very intimate and comprehensive characterization of the individual handwriting style of a person. Our methods achieved very high writer identification and verification performance in extensive tests carried out using large datasets with handwriting samples collected from up to 900 subjects.

In our methods, writer individuality is robustly encoded using probability distribution functions extracted from handwritten text blocks. There are two distinguishing characteristics of our approach: human intervention is minimized in the writer identification process and we encode individual handwriting style using features designed to be independent of the textual content of the handwritten samples. In our methods the computer is completely agnostic of the actual text written in the samples. The handwriting is merely seen as a texture characterized by some directional probability distributions or as a simple stochastic shape-emission process characterized by a grapheme occurrence probability distribution. Our techniques have practical feasibility and hold the potential of concrete use in real applications.

Chapter 1 of the thesis introduces writer identification as a behavioral biometric modality and presents the fundamental genetic and cultural factors causing the individuality of handwriting. The task of writer identification is equivalent to answering the question: "Who wrote this sample?" A writer identification system performs a one-to-many search in a large database with samples of known authorship and returns a likely list of candidates containing the handwritings most similar to the questioned one. The hit list is further scrutinized by a human expert. The task of writer verification is equivalent to answering the question: "Were these two samples written by the same person?" A one-to-one comparison is performed and an automatic yes / no decision is taken. In the introductory chapter, a connection is also drawn between writer identification and the related, but much broader, field of handwriting recognition. In handwriting recognition, the variations between different handwritings must be eliminated to obtain invariance and generalization. In writer identification, on the contrary, these same variations must be enhanced to obtain writer specificity and discrimination. Further in Chapter 1,

a survey of recent publications in the field makes clear the distinction between text-dependent versus text-independent approaches and provides the necessary context in which to place our own research work. The thesis then shows the progression of our writer identification research from low level textural features to higher level allographic features. The thesis is divided into two main parts: Chapter 2 and Chapter 3 describe our texture-level approach. Chapter 4 and Chapter 5 present our allograph-level approach and the fusion method used to combine textural and allographic features for improved writer identification performance.

Chapter 2 shows that using the orientation of short fragments of edges along the written trace provides the basis for building several directional probability distributions that are very effective features for writer identification. The first angular feature constructed using oriented edge fragments is the edge-direction distribution, a classically known descriptor for writer identification. The mode of this distribution, i.e., the dominant direction in the script, corresponds to the slant of handwriting, which is a stable personal trait and a discriminatory characteristic between different writers. We propose further a new and potent method that considers the angle combinations of two "hinged" edge fragments and builds a joint directional probability distribution that simultaneously encodes both orientation and curvature information. This novel "edge-hinge" feature is a bivariate probability function that delivers a very significant improvement in writer identification and performance over the simple edge-angle distribution. The edge-based directional distributions, as a group of related features, outperform a number of non-angular features (run-length distributions, autocorrelation, entropy). Reducing the amount of ink in the test samples leads to an overall decrease in performance for all features, but the performance standings of the different features with respect to each other remain the same.

Chapter 3 carries on the idea of using the directionality of the script as an effective source of information for text-independent writer identification. And another new and strong feature is designed that considers the edge-angle combinations co-occurring at the extremities of run-lengths. Further performance improvements are obtained by incorporating also location information into the basic features. This is achieved by extracting two probability distributions separately from the top and bottom halves of text lines and then adjoining the two feature vectors. The asymmetry between two top and bottom distributions provides extra information regarding writer identity. The

experimental study is performed as a comparison between lowercase and uppercase handwriting on test samples containing controlled amounts of ink. We obtain similar writer identification performance for lowercase and uppercase handwriting for the battery of features considered in the analysis.

Chapter 4 introduces our allograph-level method for writer identification and verification. This theoretically founded approach assumes that each writer is characterized by the occurrence probability of elementary shapes from a common shape codebook. These elementary shapes, or graphemes, are obtained by applying a heuristic segmentation procedure on the written ink. The common shape codebook is generated by clustering the set of graphemes extracted from the handwritings of a sufficiently large number of writers, kept separate from those used in identification and verification tests. The graphemes resulting from handwriting segmentation may, but usually will not, overlap a complete character. This is a fundamental problem for handwriting recognition. Nevertheless, the ensemble of these sub- or supra-allographic shapes is very descriptive about the identity of the writer who generated them, and therefore is very effective in writer identification. In large scale computational experiments, we compare three clustering algorithms used for generating the common grapheme codebook:  $k$ -means, Kohonen Self-Organizing Maps 1D and 2D. The results prove the robustness of the proposed allograph-level writer identification method: similar good performance is obtained for all three clustering algorithms over a large range of codebook sizes.

Chapter 5 performs an extensive analysis of feature combinations. It is natural to try to combine the proposed features for improving the performance and robustness of our writer identification and verification system: while not totally orthogonal, the different features do offer different points of view on a handwritten sample and operate at different levels of analysis and also at different scales. In our fusion scheme, the final unique distance between two handwritten samples is computed as the average of the distances due to the individual features participating in the combination. In this chapter, more efficient algorithms are proposed for computing the directional features using contours, rather than edges. The functioning of the considered features is also put in an overall Fourier perspective that better explains also their relative performance merits. The evaluation experiments are extended to bigger datasets. The largest dataset comprises 900 writers and is comparable in size to the largest dataset used in writer identification studies until the present. The experimental results, consistent across the different

test datasets, show that fusing multiple features yields increased writer identification and verification performance. The best performing feature combinations fuse directional, grapheme and run-length information yielding, on the large dataset containing 900 subjects, writer identification rates of Top-1 85-87% and Top-10 96% with an error rate around 3% in verification.

Chapter 6 concludes the thesis and Appendix A presents an HTML-based visualization tool developed with the purpose of visually assessing our writer identification and verification system called GRAWIS, an acronym from Groningen Automatic Writer Identification System.

The thesis analyzes in depth the algorithmic aspects of automatic writer identification and verification. The proposed text-independent methods have possible impact in forensic science: they allow the search in a large dataset with handwritten samples with the retrieval of only those documents that pictorially look similar to the query in terms of handwriting style. In this way, the hit list containing the likely candidates is reduced to a size that can be analyzed in detail by the forensic expert to finally establish the writer identity for the questioned document. Part of the texture-level methods described in this thesis has already been used in a concrete industrial setting. Nevertheless, the wider application beyond the realm of academic research of our writer identification and verification techniques still remains a challenge for the future.

## **The Dutch-Flemish Classification Society: VOC**

*Patrick Groenen  
Erasmus University Rotterdam*

The VOC (founded in 1989 as the “Nederlands-Vlaamse Vereniging voor Ordinatie en Classificatie”) promotes the communication and collaboration of those who are scientifically interested in the use, development, and application of ordination and classification methods. Examples of ordination methods are principal components analysis and multidimensional scaling. Classification is mainly related to (un)supervised clustering. Both types of methods are widely used, as is reflected in the diverse scientific disciplines of the approximately 100 VOC-members: psychometrics, biology, economy, sociometrics, chemometrics, sensometrics, etc. The VOC is a member of the International Federation of Classification Societies (IFCS).

Twice a year, the VOC organizes a one-day meeting to advance the knowledge on ordination and classification techniques. Usually, the meetings are organized around a specific theme and often one or two prominent speakers from abroad are invited. These meetings are accessible for non-members as well. Through the Newsletter, the VOC-members receive information about conferences and workshops, references to important publications, and reviews of recently published books. More information is available at <http://www.voc.ac>.

**JOINT VOC AND BNVKI MEETING  
ON DATA MINING**

The scientific interests of the VOC and BNVKI members have a large overlap. Therefore, both societies would like to stimulate the communication between their members and organize a joint meeting in Utrecht on Friday, April 27, 2007, around the broad theme of data mining. The location is Faculty Club, Room Kanunikkenzaal, Achter de Dom 7, Utrecht. We have an interesting mix of VOC and BNVKI speakers: Patrick Groenen, Christophe Croux, Bernard de Beats, Koen Vanhoof, Lambert Schomaker, and an overseas guest Thorsten Joachims. Those who would like to participate are welcome and are kindly requested to register preferably via the VOC website (<http://www.voc.ac>) or send an e-mail to the VOC secretary Marieke Timmerman ([m.e.timmerman@rug.nl](mailto:m.e.timmerman@rug.nl)). Participation is free, however the lunch needs to be paid (17 euro).

**PRELIMINARY PROGRAM**

- 10:00-10:30 Registration and Coffee
- 10:40-11:20 Patrick Groenen (Erasmus University Rotterdam):  
Minimization for Support Vector Machines by Iterative Majorization
- 11:20-12:00 Christophe Croux (KU Leuven):  
Robust Discrimination: an influence function approach
- 12:00-12:40 Bernard de Beats (Ghent University):  
Title to be announced
- 12:40-13:50 Lunch
- 13:50-14:30 Koen Vanhoof (Universiteit Hasselt):  
Aggregation operators' measures
- 14:30-15:10 Lambert Schomaker (Rijks-universiteit Groningen):  
Title to be announced
- 15:10-15:40 Tea
- 15:40-16:30 Thorsten Joachims (Cornell University, USA):  
Efficient training of SVMs for structured outputs
- 16:30-16:45 VOC annual member meeting
- 16:45 Drinks

**Students Sharing Their Interest!**

*Joris Janssen*  
NSVKI secretary

We are proud to announce the foundation of the Dutch Study Association for Artificial Intelligence (Nederlandse Studievereniging Kunstmatige Intelligentie).



Although Dutch AI students were already able to benefit from, and participate in, well organized study organizations in their home town, it proved that they share a great interest in meeting students from other universities. This was noticed by the study associations CoVer (Groningen), Incognito (Utrecht) and CognAC (Nijmegen) and they decided to start discussing the opportunities of a joint venture about one year ago, which has resulted in the foundation of the NSVKI.

The objective of the NSVKI is to provide AI students with a mixture of social and professional activities which enables them to see beyond the limits of their own university. Our hope is that this will lead them to new insights and opportunities in the field of AI and their **future** professional career.

To make this more concrete, we aim to accomplish these goals in a wide variety of ways. In the first place, we would like to show students the scientific area by, for instance, organizing symposia and study-related excursions. Furthermore, (the) students are offered the opportunity to present their own scientific work in the NSVKI Student Conference (see the call for papers on pp. 18-19 in this newsletter). Additionally, there are more openings for involving companies since we represent the entire community of AI students in the Netherlands.

By bringing the students from different universities together, they are able to share their interest and knowledge. So far, we have organized a study trip to Brussels, which generated very positive reactions. Furthermore, we have been busy with the foundation of this new association, its structure and the registration of our statutes. A first board has been formed with Bastiaan Fens as president, Joris

Janssen as secretary and Arlette van Wissen as treasurer. Currently, student associations from Groningen, Utrecht and Nijmegen are involved but we hope to welcome others in the near future.

It is of course not our intention to interfere with the activities of the already existing associations. Therefore we will not present an expansive list of activities, but an addition to the variety of the existing ones.

We hope that with this text we have been able to show you a little of our enthusiasm and ideas. If you have questions, comments or additional ideas, don't hesitate to contact us by email (bestuur@nsvki.nl) or by phone (Bastiaan Fens, +31 (0)638 50 7977). On our website <http://www.nsvki.nl>, which is currently under construction, you will soon find more information about the NSVKI, our activities and future plans.

Finally, we would like to invite you for a drink to celebrate the foundation of the NSVKI on March 16, from 17:00h in Utrecht (exact location to be announced).

## The Thesis Process

*Jaap van den Herik  
MICC-IKAT, Maastricht*

A structured planning of four disciplined years for performing a Ph.D. thesis is a difficult task. Once every detail has been given its place in a plan, the start may be glorious. However, the plan execution will then certainly contain many small obstacles and hurdles. Moreover, there exists a large list of pitfalls for Ph.D. students to warn them. Obviously, the pitfall area covers a wide range of themes, varying from environmental issues to disagreements with the Ph.D. supervisor. A direct consequence of the list of obstacles and pitfalls might involve that for a successful Ph.D. thesis in four years the number of obstacles should be minimal. Here, it would be interesting to know what the number of obstacles (with the estimated length and weight) is (on average), and what the maximum number is that a Ph.D. student can endure? So far, for the obstacles and pitfalls.

The conclusion is that every completed Ph.D. thesis is a success in itself, and therefore it is understandable that the BNVKI is proud to publish bimonthly a list of candidates who have reached the final stage and are allowed to defend their thesis in public.

The current issue contains two abstracts from Ph.D. students of the Groningen University, viz. Wouter Teepe (*Reconciling Information Exchange and Confidentiality: a formal approach*) and Marius Bulacu (*Statistical Pattern Recognition for Automatic Writer Identification and Verification*). Both Ph.D. students were supervised by Professor Lambert Schomaker. Wouter Teepe had much publicity with the contents of his thesis in the daily papers. He is a former SKBS prize winner. Marius Bulacu's thesis describes very well one of the main research topics investigated in Groningen. The BNVKI Editorial Board congratulates all Ph.D. students wholeheartedly.

Finally, we kindly invite readers of one of the theses mentioned below to send in the reviews to our Editorial Board in order to include it into the pages of the BNVKI Newsletter.

**Péter Mika** (February 5, 2007). *Social Networks and the Semantic Web*. Vrije Universiteit Amsterdam. Promotors: Prof.dr. J.M. Akkermans (VUA), Prof.dr. T. Elfring (VU). Co-promotor: dr. P. Groenewegen (VU).

**Kees Bergstra** (February 7, 2007). *Motion in Image Sequences of Living Cells*. Universiteit van Amsterdam. Promotor: Prof.dr.ir. A.W.M. Smeulders (UvA).

**Neta Spiro** (February 7, 2007). *What Contributes to the Perception of Musical Phrases in Western Classical Music?* Universiteit van Amsterdam. Promotor: Prof.dr. R. Bod (UvA). Co-promotor: Dr. Ian Cross (UvA).

**Kees Leune** (February 28, 2007). *Access Control and Service-Oriented Architectures*. Universiteit van Tilburg. Promotor: Prof.dr.ir. M.P. Papazoglou (UvT). Co-promotor: Dr. W-J. van den Heuvel (UvT).

**Natasa Jovanović** (March 14, 2007). *To Whom It May Concern – Addressee Identification in Face-to-Face Meetings*. Universiteit Twente. Promotor: Prof.dr.ir. A. Nijholt (UT). Co-promotor: Dr.ir. H.J.A. op den Akker (UT).

**Marius Bulacu** (March 15, 2007). *Statistical Pattern Recognition for Automatic Writer Identification and Verification*. Rijksuniversiteit Groningen. Promotor: Prof.dr. L. Schomaker (RUG).

**Jurriaan van Diggelen** (March 21, 2007). *Achieving Semantic Interoperability in Multi-agent Systems: a dialogue-based approach*. Universiteit Utrecht. Promotor: Prof.dr. J.-J.Ch. Meyer (UU).

Co-promotores: dr.ir. R.J.Beun (UU), dr. F.P.M. Dignum (UU), dr. R.M. van Eijk (UU).

**Ronald van den Hoogen** (March 28, 2007). “*E-Justice*” – *beginselen van behoorlijke elektronische rechtspraak*. Universiteit Utrecht. Promotores: Prof.dr. A. Koers (UU), Prof.dr. A.H.J. Schmidt (UL).

**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).

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



### **Advanced SIKS-course: Computational Intelligence, AI and Probability**

On April 16 and 17, 2007 the School for Information and Knowledge Systems (SIKS) will organize an advanced course on Computational Intelligence, focussing on AI and Probability. The course takes two days, will be given in English and is part of the so-called Advanced Components Stage of the Educational Program for SIKS-Ph.D. students. Although these courses are primarily intended for SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of students taking the course. The course is given by experienced lecturers actively involved in the research areas related to the topics of the course.

Location: Conference center Woudschoten in Zeist  
Scientific director: Dr. Tom Heskes (RUN)

Program: a provisional program will be made available in due course.

### **SIKS-day 2007 in Utrecht**

On May 4, 2007, the School for Information and Knowledge Systems organizes its annual SIKS-day. The location will be conference center Hoog Brabant in Utrecht. The main aim of the event is to give SIKS-members – participating in research groups all over the country – the opportunity to meet each other in an informal setting and to inform them about current developments and some new activities and plans for the coming year.

This year a small scientific symposium will be organized at the SIKS-day as well. Four guest speakers have agreed to participate:

- \* Prof. dr. A.E. Eiben (VU)
- \* Prof. dr. C.M. Jonker (TUD)
- \* Prof. dr. Yves Peigneur (Lausanne)
- \* Prof.dr.ir. Th.P. van der Weide (RUN)

By inviting these researchers we hope to have selected the right ingredients for a memorable day. All members of our research school (research fellows, associated members and Ph.D. students) as well as the members of SIKS' Advisory Board are invited to join the SIKS-day 2007. More details on program and registration will be made available soon.

### **BeNeLearn 2007**

The annual Belgian-Dutch BeNeLearn Conference will be held in Amsterdam, May 14 and 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 organisers of the conference, SIKS-phd-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 honoured in a first-come first-serve manner. For registration details, see the SIKS-website.

## Basic Courses “Combinatory Methods” and “Learning and Reasoning”

### INTRODUCTION

From May 21-24, 2007, the School for Information and Knowledge Systems (SIKS) organizes two basic courses “Combinatory Methods” and “Learning and Reasoning”. Both courses will be given in English and are part of the 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. N. Roos (UM) *Combinatory Methods*; dr. A. Ten Teije (VU) and dr. G. Vreeswijk (UU) *Learning and Reasoning*.

### PROGRAM

A provisional program is not available yet. Note that as of 2007 each basic course takes 2 days, not 2,5 days. Currently “Learning and Reasoning” is scheduled on May 21 and 22, “Combinatory Methods” on May 23 and 24. More details will be made available in due course.

## 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 (Enterprise Information Systems) 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 provide 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.

### SUBMISSION DETAILS

Doctoral Consortium papers should include a clear presentation of the Ph.D. research direction, the problem(s) addressed, a report on the work done so far and a plan of further research. Papers will be assessed on 3 main criteria: clarity, methodology, and relevance. All submissions should be 4 to 5 pages and in PDF. Paper submissions must be formatted in the (Proceedings) style of the Springer Publications format for Lecture Notes in Computer Science (LNCS). For complete details, see Springer’s Author Instructions. The final papers will be published by SIKS as EIS 2007 Doctoral Consortium Proceedings that will be available at the event.

### IMPORTANT DATES

- NOW: Registration via the SIKS website
- April 16: Paper submissions deadline (submit via office@siks.nl with subject: **EIS-doctoral**)
- May 21: Notification of acceptance
- June 14: Submission of final paper
- June 25: Doctoral Consortium program

### 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. Participants are kindly requested to fill in the registration form and indicate whether they want to present/submit a paper at the Doctoral Consortium or just participate.

## 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 and registration: Dr. Richard Starmans (UU, SIKS)  
Email: office@siks.nl  
Webpage: www.siks.nl

### Invitation: Semantic Web Seminar

Date: Wednesday, April 11, 2007  
Location: Utrecht University, room BBL-106  
Address: BBL Building, Princetonplein 5, De Uithof, Utrecht  
Organizers: Utrecht University (ICS, CKI) and SIKS

Program:

- 13:00 Jeen Broekstra (Aduna & TUE): Sesame framework
- 13:40 Sander voor 't Hekke (SemLab): TOWL – time concepts in OWL
- 14:10 Break
- 14:20 Paul Buitelaar (DFKI): Tutorial on Ontology Learning
- 15:20 Antoine Isaac (VU): SW for Cultural Heritage
- 16:00 Break
- 16:15 Anita de Waard (Elsevier & UU): Semantic Web and Science Publishing
- 16:45 Discussion panel (all): Machine readability vs Folksonomy – Can we have the best of the two worlds?
- 17:15 Borrel

The event is part of the advanced components stage of SIKS-educational program. Therefore SIKS-Ph.D. students working in the field of Web-based systems and the Semantic Web are strongly encouraged to participate. This seminar, organized in collaboration with SIKS, is the closing session of the Semantic Web course for the masters Content and Design Engineering, Cognitive Artificial Intelligence, Agent Technology and Computational Linguistics, is hosted by the Dept. for Information and Computing Sciences, and chaired by Dr. Virginia Dignum (ICS) and Dr. Paola Monachesi (CKI). Attendance is free, but registration is needed. To register, please send an email message to: Dr. Virginia Dignum, virginia@cs.uu.nl.

## ANNOUNCEMENTS

### Call for Papers 1<sup>st</sup> NSVKI Student Conference

*Sharing the interest, sharing the knowledge!*

June 22, 2007  
Radboud University, Nijmegen

The brand new Dutch Study Association for Artificial Intelligence organizes her first Student Conference. During this conference AI students from the entire country are given the unique opportunity to present their work (theses, projects, papers) to their fellow students.

By giving students the opportunity to present their own work they can share their ideas and findings, receive feedback from students of other universities

and they are able to enhance their presentation skills. Accepted papers will also be published in conference proceedings, which results for the student in perhaps his or her first publication! We think such a first scientific experience can be of great value.

We would like to ask supervisors and staff of the different AI programs to encourage their students to take part in this unique opportunity!

#### Conference fact sheet

- Date: Friday, June 22, 2007
- Time: 13:30h – 17:30h
- Location: Radboud University Nijmegen
- Time per speaker: 15 min + 5 min discussion
- Number of speakers: Nine
- Language: Dutch or English (speakers choice, discussions in Dutch)
- Review process: Even mixture of topics and affiliations

#### Paper requirements

- Maximum of 6 pages, times, 11pt, normal line spacing (1x)
- PDF-format
- Topic: AI related (see <http://www.nsvki.nl/sc> for suggestions)
- Including title, authors, affiliation (institute/university), course (ba/ma), abstract, references in IEEE format ([http://www.ieee.org/portal/cms\\_docs\\_iportals/iportals/publications/authors/](http://www.ieee.org/portal/cms_docs_iportals/iportals/publications/authors/))
- **Deadline: May 1<sup>st</sup>**
- Acceptance notification: before May 28<sup>th</sup>
- Accepted papers require presentation on the day itself

Any questions or submissions can be directed to the organization:

- Twan Goosen ([t.goosen@student.ru.nl](mailto:t.goosen@student.ru.nl))
- Joris Janssen ([jorisjanssen@student.ru.nl](mailto:jorisjanssen@student.ru.nl))

Up to date information can be found at the website <http://www.nsvki.nl/sc>.

## Call for Papers ACAI-2007: Logic for Artificial Intelligence

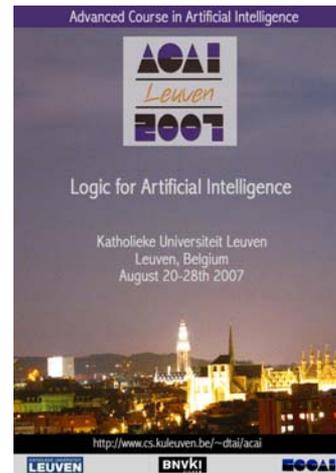
August 20-28, 2007  
Leuven, Belgium

<http://www.cs.kuleuven.be/~dtai/acai/>

In collaboration with ECCAI, the European Coordinating Committee for Artificial Intelligence, BNVKI-AIABN, the Belgian-Dutch Society for Artificial Intelligence, and SIKS, the Dutch

research school for Information and Knowledge Systems, the University of Leuven is proud to organize the ACAI-2007 Summer School on Artificial Intelligence.

ACAI, the *Advanced Course on Artificial Intelligence*, is ECCAI's two-yearly summer school on artificial intelligence. The 2007 edition will be hosted by the Declarative Languages and Artificial Intelligence research group of the Katholieke Universiteit Leuven. The topic of the school is **Logic for Artificial Intelligence**.



The school targets Ph.D. students in the area of Informatics or Computer Science with some background in computational logic, who want to broaden their knowledge of the domain. ACAI-2007 features courses by leading scientists in this domain. In addition, students will have an opportunity to present their own research in a poster session.

#### PROGRAMME

The summer school features eight courses, each treating a different subject within the area of logic for artificial intelligence, and each being taught by a lecturer with an outstanding international reputation.

#### Knowledge representation and reasoning in ID-logic

*Marc Denecker* (Katholieke Universiteit Leuven)

Marc Denecker is an associate professor and the head of the Knowledge Representation and Reasoning research group at the K.U. Leuven. His research is concerned with foundational and computational aspects of computational logic and non-monotonic reasoning which has resulted in contributions in areas such as abductive inference and knowledge representation. His course presents ID-logic, an extension of classical logic with inductive definitions, and its application for knowledge representation and declarative problem solving.

### **Probabilistic logic learning and statistical relational learning**

*Luc De Raedt* (Katholieke Universiteit Leuven)

Luc De Raedt is a research professor at the Katholieke Universiteit Leuven (and was until recently the Chair of Machine Learning at the University of Freiburg, Germany). Luc De Raedt has been interested in logic based approaches to machine learning and data mining. His research interests have more recently shifted towards combining first order logic with probabilistic reasoning, and the study of learning methods in this context. He was awarded with an ECCAI fellowship for his scientific contributions in 2005. In this course, Prof. De Raedt will address one of the central questions of artificial intelligence: the integration of probabilistic reasoning with first order logic representations and machine learning. He will present an overview of the variety of different formalisms and learning techniques that have been developed and that are being applied on applications in network analysis, robotics, bio-informatics, intelligent agents, etc.

### **Title to be determined**

*Bernhard Nebel* (Albert-Ludwigs-Universität Freiburg)

Bernhard Nebel is a Professor at the Albert-Ludwigs-Universität in Freiburg and head of the research group on Foundations of AI. His research interests concern knowledge representation and reasoning with an emphasis on algorithms and computational complexity, in particular in the areas of qualitative temporal and spatial reasoning, planning, and robotics with a focus on robotic soccer and rescue robotics. He is author or editor of 9 books and over a hundred articles, was program chair of the IJCAI conference in 2001, and was awarded ECCAI fellowship in the same year. Information on the contents of this course was not yet available at the time of writing; see the ACAI-2007 website for more information.

### **Logic-based techniques for information integration**

*Marie-Christine Rousset* (University of Grenoble)

Marie-Christine Rousset is a Professor of Computer Science at the University of Grenoble, where she has moved recently from Paris-Sud University. She is an ECCAI fellow since 2005. Her areas of research are knowledge representation and information integration. In particular, she works on topics such as logic-based mediation between distributed data sources, query rewriting using views, automatic classification and clustering of semistructured data, peer-to-peer data sharing and distributed reasoning. In this course, Prof. Rousset will show how logic is particularly appropriate as a formal background with associated automatic

reasoning techniques for describing and querying heterogeneous pre-existing autonomous data sources.

### **Logic-based agents**

*Fariba Sadri* and *Robert Kowalski* (Imperial College, London)

Fariba Sadri is a senior lecturer in the Department of Computing at Imperial College London. Her main research interests lie within the area of knowledge representation and reasoning in artificial intelligence, in particular Logic-Based Multi-Agent Systems, Inter-Agent Communication, Abduction, Logic Programming for Knowledge Representation and Automated Reasoning, Negotiation and Non-monotonic and Default Reasoning. Bob Kowalski is an Emeritus Professor of Imperial College, where he held the chair of Computational Logic from 1982 to 1999. He is best known for his contributions to the development of logic programming, starting with the procedural interpretation of Horn clauses. He also developed the minimal model and the fixpoint semantics of Horn clauses with Maarten van Emden. With Marek Sergot, he developed both the event calculus and the application of logic programming to legal reasoning. With Fariba Sadri, he developed an agent model in which beliefs are represented by logic programs and goals are represented by integrity constraints. He has also worked on the application of argumentation applied to default reasoning with Phan Minh Dung and Francesca Toni. He was awarded ECCAI fellowship in 1999. In this course, Profs. Sadri and Kowalski explore the use of Logic as the thinking component of an agent's observation-thought-decision-action cycle. They introduce an agent logic that defines the role of goals and beliefs in proactive, reactive and pre-active thinking, and review a recent agent model called the KGP (Knowledge-Goal-Plan) model which has been developed during the EU SOCS (Societies of Computational Entities) project and which deals with dynamic environments where agents have to adapt and react to changes as well as pursue goals.

### **Description logics**

*Ulrike Sattler* (University of Manchester)

Ulrike Sattler is a member of the Information Management Group of the University of Manchester since 2003. Her research interests are in logics for knowledge representation and automated deduction. More specifically, she is interested in Description, Modal, and Dynamic Logics, the corresponding inference problems, their complexity, and decision procedures for these problems. Her course at ACAI will be on "Description Logics". Description Logics (DLs) are an important family of logic-based formalisms that have been developed for the representation of conceptual knowledge. Recently,

DLs have attracted increased interest since they form the logical basis of ontology languages such as OWL.

### **Logic-based knowledge representation and reasoning for the semantic web**

*Heiner Stuckenschmidt* (University of Mannheim)  
Heiner Stuckenschmidt is professor for knowledge representation and knowledge management at the University of Mannheim, Germany. His research group is working in the area of knowledge representation in distributed and heterogeneous environments such as the semantic web as well as on the application of semantic web technologies in scientific information systems. His course entitled “Logic-based knowledge representation and reasoning for the semantic web” will introduce the basic ideas of the semantic web in terms of machine-readable metadata and ontologies as a basis for exchanging information.

### **Constraint programming**

*Pascal Van Hentenryck* (Brown University)  
Pascal Van Hentenryck is a professor of computer science at Brown University. Before coming to Brown in 1990, he spent four years at the European Computer-Industry Research Center (ECRC). His research on CHIP, described in his 1989 MIT Press book *Constraint Satisfaction in Logic Programming*, is the foundation of all modern constraint programming systems. Prof. Van Hentenryck’s main research interests are in combinatorial optimization, decision making under uncertainty, and programming languages. He developed a number of influential systems in these areas, including the constraint logic programming language cc(FD). He authored five books on constraint programming and optimization, and over 150 scientific papers. He received numerous scientific awards, including the ACP Award for Research Excellence in Constraint Programming in 2006, and a Distinguished Paper award at IJCAI-2007. This course presents an overview of constraint programming, its applications, and recent developments. It highlights the declarative nature of constraint programming, covers its computational model and underlying algorithms, describes some real-life applications, and discusses a variety of topics at the research frontiers.

### **Student poster session**

Attending students will have the opportunity to present their own work at the summer school during a poster session. Students willing to take part in this poster session are invited to submit a two page abstract, which will be reviewed for relevance and interest to the summerschool’s target audience.

### **SOCIAL PROGRAMME**

An exciting social programme is included in the summer school. Full details are not yet available, but it will include a welcome drink, a party, and a daytrip to one of Flanders’ nicest touristic locations.

### **LOCATION**

“*Ages old, yet refreshingly young*”. Leuven hosts the oldest university of the Low Countries. Its 15<sup>th</sup> century Town Hall and University Hall, its Great Beguinage (UNESCO World Cultural Heritage), and many other buildings bear witness of the city’s splendid past. Today, Leuven is a charming small town with a young and lively atmosphere: during the academic year, 50% of its inhabitants are students, and in summer dozens of events attract visitors from everywhere. In the old center, restaurants and pubs adorn the streets.

Leuven is very easily reachable: it is at 15 minutes by train from Brussels Airport, which has direct flights to many airports all over Europe. With direct train connections to Brussels, Antwerp, Ghent, Liege and Bruges, and excellent connections to Paris, London, Amsterdam, and Cologne (all within 2 to 3 hours away), it is also the perfect location for both Belgian and European tourism.

### **FINANCIAL ASPECTS**

#### **Cost of participation**

Thanks to our sponsors, the registration cost for this two-week event is expected to be around 350 euro, including the complete social programme. Accommodation will be available for 29 euro per night (single room with shared facilities, including breakfast). Student restaurants offer warm dishes for 2.4 to 4.5 euro. In addition to all this, some financial support will be available in the form of grants.

#### **Grants**

ECCAI offers a limited number of grants (400 euro each) to students who are members of their national AI society; see <http://www.eccai.org>. Students presenting a poster may have priority when allocating grants. SIKS may provide additional support to its members (pending confirmation).

#### **Sponsors**

Besides the financial sponsoring from SIKS and ECCAI, the organizers gratefully acknowledge the financial support from the FWO-Vlaanderen, through the scientific research networks “Declaratieve Methoden in de Informatica” and “Machine learning for data mining and its applications”.

#### IMPORTANT DATES

Poster abstract deadline: May 15, 2007  
Notification: May 22, 2007  
Early registration deadline: May 31, 2007

#### FURTHER INFORMATION

See the ACAI-07 Homepage:  
<http://www.cs.kuleuven.be/~dtai/acai/> or contact  
[acai2007@cs.kuleuven.be](mailto:acai2007@cs.kuleuven.be).

### Call for Papers 4<sup>th</sup> IFIP Conference on Artificial Intelligence Applications & Innovations (AIAI 2007)

September 19-21, 2007  
Athens, Greece  
<http://www.ait.gr/aiai2007/>

The general focus of the AIAI conference is to provide insights on how Artificial Intelligence can be implemented in real world applications; papers describing advanced prototypes, systems, tools and techniques and general survey papers indicating future directions are also encouraged. Acceptance will be based on quality, originality and the practical value of the work. Both full research papers and professional work-in-progress reports are welcome.

This conference is co-organized by the Athens Information Technology (AIT) Institute and the Department of Information and Communications Systems Engineering of the University of Aegean.

#### IMPORTANT DATES

Submission of full paper: May 11, 2007  
Notification of acceptance: June 15, 2007  
Submission of  
final camera-ready paper: July 6, 2007

Topics and areas of interest include, but are not limited to:

- Theoretical Advances: reasoning methods, machine learning, data fusion, expert systems and fuzzy logic.
- Knowledge Engineering: data mining and information retrieval, decision support systems, intelligent information systems for modeling and decision making in politics, crisis management and finance, knowledge management for e-learning and enterprise portals, ontologies and semantic web.
- Signal Processing Techniques for Knowledge Extraction: speech and natural language interfaces, computer vision, human-machine

interaction / presence, learning and adaptive systems, pattern recognition.

- Multimedia and Artificial Intelligence: multimedia computing, multimedia ontologies and smart graphics.
- Trends in Computing: accessibility and computers, profiling and personalization, affective computing, distributed AI systems and architectures, grid-based computing, autonomous and ubiquitous computing, agent and multi-agent systems.
- Artificial Intelligence Applications: e-business /commerce, e-health, e-learning, engineering, finance, telecommunications, transportation, medical informatics and biomedical.
- Other: social impact and ethical issues of AI, evaluation of AI systems, robotics and virtual reality.

#### THE CONFERENCE GENERAL CHAIRS

Max Bramer, University of Portsmouth, UK; Ilias Maglogiannis, University of Aegean, Greece; Aristodemos Pnevmatikakis, Athens Information Technology, Greece; Lazaros Polymenakos, Athens Information Technology, Greece.

### Call for Papers 19th Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2007)

November 5-6, 2007  
Utrecht University, Utrecht  
<http://www.cs.uu.nl/bnaic2007>

The BNAIC 2007 will be held at the Academieggebouw of Utrecht University, the Netherlands, and is organized under the auspices of the Belgian-Dutch Association for Artificial Intelligence (BNVKI) and the Dutch Research School for Information and Knowledge Systems (SIKS). The conference aims at presenting an overview of state-of-the art research in artificial intelligence in Belgium and The Netherlands.

#### TOPICS

For all submission types, possible topics of submissions include, but are not limited to: multi-agent systems; intelligent agents; robotics; logic in AI; games; search; verification and validation; logic programming; knowledge-based systems; knowledge representation; knowledge management; ontologies; machine learning; optimisation; evolutionary algorithms; neural networks; knowledge discovery and data mining; natural language processing; cognitive modelling; speech recognition; handwriting recognition; applications; AI in law, music & art; other.

## SUBMISSIONS

Submissions of the following three types are invited:

### Type A: *Regular Papers*

Papers presenting new original work. Submitted papers should not exceed a length of 8 pages. These papers will be reviewed on overall quality and relevance. A-Papers can be accepted for either oral or poster presentation. All accepted papers will be fully published in the proceedings.

### Type B: *Compressed Contributions*

Papers that have been accepted after June 1, 2006 for AI-related refereed conferences or journals can be resubmitted and will be accepted as compressed contributions. Authors are invited to submit the officially published version (without page restriction) together with a one or two-page abstract. B-Papers will be accepted for either oral or poster presentation. The abstract of the paper will be published in the proceedings. Every author may submit at most one B-paper of which they are the corresponding author, and only if they do not submit any A-paper as corresponding author. Note that a separate author registration is required for each B-type contribution.

### Type C: *Demonstrations & Applications*

Proposals for demonstrations will be evaluated based on submitted demonstration summaries (in English) stating the following: the purpose of the system to be demonstrated, its user groups, the organisation or project for which it is developed, the developers, and the technology used. In addition, the system requirements and the duration (not exceeding 30 minutes) should be mentioned. Especially researchers from industry are encouraged to submit papers presenting their applications and experiences. The maximum size of demonstration summaries is 2 pages.

Papers and demonstration summaries should be submitted electronically. More details can be found at the BNAIC 2007 website (<http://www.cs.uu.nl/bnaic2007>). Submissions should be accompanied by a message stating the submission type (A, B, or C) and an abstract of the paper in plain text. Proper receipt of submissions will be acknowledged by e-mail. The deadline for submissions is June 25, 2007. Submission implies willingness of at least one author to register for BNAIC and present the paper. For each paper, a separate author registration is required. Authors keep the copyright of their submissions. The BNAIC Proceedings are published under ISSN series number 1568-7805.

## IMPORTANT DATES

Deadline for submissions June 25, 2007  
Notification of acceptance August 27, 2007  
Deadline for camera-ready papers September 17, 2007  
BNAIC 2007 conference November 5-6, 2007

## CONFERENCES, SYMPOSIA WORKSHOPS

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

### MARCH 28-29, 2007

7th Dutch-Belgian Information Retrieval Workshop (DIR 2007), Katholieke Universiteit Leuven, Leuven, Belgium.  
<http://law.kuleuven.be/icri/liir/dir2007/>

### APRIL 17-18, 2007

NIOC 2007 Conference: Het perspectief op lange termijn, Amsterdam, The Netherlands.  
<http://www.nioc.nl>

### MAY 13-16, 2007

ISCRAM 2007: 4<sup>th</sup> 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 22, 2007

1<sup>st</sup> NSVKI Student Conference, Radboud University, Nijmegen, The Netherlands.  
<http://www.nsvki.nl/sc>

### 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 19<sup>th</sup> Belgian-Dutch Conference on Artificial Intelligence, Utrecht, The Netherlands.  
<http://www.cs.uu.nl/bnaic2007>

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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.

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