The Universities of York and Leeds present

Ninth
Knowledge Representation and Reasoning
Distinguished Lecturer

Bernhard Nebel

Professor Nebel's talk will be delivered from Freiburg to the Universities of York and Leeds simultaneously by video-conferencing and access-grid facilities. The talk is aimed at a general audience of computer scientists and the public is invited to attend at either venue.

How to Win the World Cup
Action Selection for Robotic Soccer

13:30, Wednesday 15 June 2005

Haycock Lecture Theater (Room CS/103)
Department of Computer Science
University of York

and

Informatics Conference Room (6.08)
with additional seating in the L8 Boardroom (8.01)
EC Stoner Building, School of Computing
University of Leeds

While soccer might not be considered as the best domain for applying Artificial Intelligence methods, it turns out to be a challenging and appealing domain. In this talk I will focus on the aspect of action selection techniques that we have applied in our robotic soccer team (which won the Robot World Cup Soccer Games three times) and in our autonomous football table.

We employed a technique called behavior networks for action selection in our robotic soccer team CS Freiburg. While this is a technique that works very well in practice, there are not many known results about their theoretical properties. In particular, there are no guarantees that a goal will be reached if it is reachable. We were able to show that under some conditions such guarantees can be given and that the topologies of the networks we used satisfy this condition. As a next step in trying to play

soccer against humans, we developed an autonomous football table, where human and machine can compete against each other directly. Here we used two different action selection strategies, namely a simple reactive scheme and a decision-theoretic method. It turns out that although the predictions made by the decision theoretic scheme are quite crude, it has nevertheless an advantage over the purely reactive method. Currently, we are working on using reinforcement learning techniques to advance the performance of the robot.

About the speaker: Bernhard Nebel is a Professor at the Albert-Ludwigs University in Freiburg, where he is head of the research group on the foundations of Artificial Intelligence. His prolific research output has made major contributions to the field of symbolic AI, especially in the areas of spatial and temporal knowledge representation and computational complexity. Further details of his many activities and publications can be found at www.informatik.uni-freiburg.de/~nebel/.

Professor Nebel has also achieved huge success as manager of the CS Freiburg Robotic Soccer team, three times world champions in the international RoboCup competition. See www.cs-freiburg.de for further information.

Recently he and his students have applied AI reasoning and Computer Vision techniques to develop a robotic table football opponent, which can beat 85% of human players. This is now available as a commercial product.

About the lecture series: This lecture series is sponsored and organised by the Department of Computer Science at the University of York and the School of Computing at the University of Leeds. Its purpose is to promote the strong research interests that both departments have in knowledge representation and reasoning. Further information can be found at www.cs.york.ac.uk/aig/seminars/dist.html.

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