KI und Informatik

Ute Schmid

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Liebe Leserinnen, liebe Leser,
ist das nicht jedem von uns schon so ergangen: Man spricht mit Kollegen aus Bereichen der Informatik, die häufig als „Kern-Informatik“ bezeichnet werden, also Kollegen, die zu Datenbanken, Compilerbau, Computergraphik, Betriebssysteme und so weiter arbeiten, und man bekommt zu hören: „KI? Das hat doch noch nie funktioniert!“ oder „KI? Gibt es das überhaupt noch?“ Oder es kann passieren, dass man mit Kollegen aus Gebieten, die man eigentlich selbst zur KI rechnen würde, wie zum Beispiel Mustererkennung oder Automatische Deduktion, spricht und merkt, dass diese einen völlig anderen Hintergrund haben als man selbst. Dazu kommt, dass in vielen Arbeitsfeldern ausserhalb der KI häufig KI-Methoden eingesetzt werden – zum Beispiel Wissensmodellierung betrieben wird oder Lernansätze integriert werden – ohne dass ein Bezug zur KI erkannt und hergestellt wird.

Erfahrungen dieser Art stoßen mich immer wieder auf die alte Frage des Verhältnisses von KI zur Informatik. Hier-

zu hat sicher jeder von uns seine Meinung. Ich denke, ich stehe nicht allein mit meiner Position, dass KI zum einen Teil der Informatik und zum anderen Teil der Kognitions-wissenschaft ist. Als Teil der Informatik ist KI Ingenieurs- und Formalwissenschaft. KI Forschung arbeitet daran, Algorithmen für Problembereiche zu entwickeln, in denen der Mensch bislang Computersystemen überlegen ist. Als Teil der Kognitions-wissenschaft ist KI aber auch Erfahrungswissenschaft und versucht durch Formalisierung und Implementierung menschlicher Informationsverarbeitungsprozesse einen Beitrag zum Erkenntniszuwachs über die Grundlagen menschlichen Denkens und Handelns zu leisten.

Dass die meisten KI-Forscher eine klare Perspektive auf die Ziele, Methoden und Kernkompetenzen ihrer Disziplin haben, dass sich aber die Außenwahrnehmung der KI innerhalb der Informatik von dieser Perspektive stark unterscheidet ist nicht neu und hat sicher viele Ursachen. Möglicherweise haben wir vor allem ein Kommunikationsproblem.

Im Alltag von Forschung und Lehre ist meistens kein Platz für grundsätzliche Fragen, wie die nach der Beziehung von KI und Informatik. Dass aber viele von uns das Bedürfnis haben, ab und zu das eigene Tun und die eigene Disziplin zu hinterfragen sah man an dem großen Zuspruch zur Panel-Diskussion *Science and AI* mit Bernhard Nebel, Ingo Timm, Franz Baader und Ulrich Frank, die im Rahmen des gemeinsamen *Doctoral Consortiums* von KI-11 und MATES-11 an der TU Berlin stattfand.

Die KI-11 wurde dieses Jahr ja gemeinsam mit der Jahrestagung der Gesellschaft für Informatik veranstaltet. Ich habe einen sehr positiven Eindruck aus Berlin mitgenommen. Die KI war nach meinem Eindruck durchaus sichtbar und es gab auch einigen Austausch zwischen Teilnehmern der GI-Jahrestagung und der KI sowie der MATES. Vielleicht fördern häufigere Ko-Lokationen von GI-Jahrestagung und KI Jahrestagung einen verstärkten Austausch zwischen der KI und dem Rest der Informatikwelt.

U. Schmid (✉)
Cognitive Systems, Faculty Information Systems and Applied
Computer Science, University of Bamberg, Bamberg,
Deutschland
e-mail: ute.schmid@uni-bamberg.de

Dass KI ein Teil der Informatik ist und prägend auf die gesamte Disziplin wirken kann hat kaum einer so überzeugend gezeigt wie John McCarthy, der im Oktober 2011 im Alter von 84 Jahren verstarb – einen Nachruf auf John McCarthy von Jörg Siekmann finden Sie in diesem Heft. McCarthy hat 1956 den Begriff *Artificial Intelligence* geprägt und AI definiert als “*the science and engineering of making intelligent machines*”. McCarthy hat aber als Erfinder von LISP auch zu einem Kernbereich der Informatik – der Entwicklung höherer Programmiersprachen – maßgeblich beigetragen. Konzepte wie abstrakte Syntax, *garbage collection* und dynamische Typisierung gehen auf seine Arbeiten zurück.

Dass ein Heft der KI, das nur wenige Monate nach dem Tod von John McCarthy erscheint, gerade das Thema „KI Sprachen“ zum Schwerpunkt macht, ist mehr als passend, um McCarthy’s großartiges Lebenswerk zu würdigen. Ich freue mich, dass in diesem Heft ein Schnitt-Thema zwischen Informatik und Künstlicher Intelligenz – nämlich die Frage nach der Entwicklung ausdrucksstarker und effizienter Programmiersprachen – im Fokus steht und wünsche Ihnen viel Spass beim Lesen!

Planned Main Topics

1 Human-Computer Interaction (HCI)

Humans play a central role in almost all computer applications. This natural phenomenon has many interesting research-oriented implications such as to tailor concepts and developments for the intended user groups, carry out extensive user studies and evaluations before and during the design, and implement interactive, visual applications. Appropriate interaction design concepts, a central component of the HCI research area, need to be incorporated in such studies. These interaction design concepts consider the visual representations and the interaction metaphors that drive such systems. It is important to note that these representations are not only to be understood as the final output of results at the end of a long process chain; in addition, they function as a continuous interactive monitoring instrument which has to accompany the entire chain. Hence, the main goal of HCI research is to overcome the barrier between man and machine by offering the user the most intuitive interaction with the system.

As part of the special topic “Human-Computer Interaction (HCI)”, scientific contributions in the following areas are very welcomed:

- Psychology and cognitive sciences

- Evaluation techniques
- Advanced visualization and interaction metaphors
- Application projects

Interested authors are requested to contact the guest editor:

Prof. Dr. Achim Ebert
Computer Graphics and HCI
Department of Computer Science
University of Kaiserslautern PO-Box 3049
D-67653 Kaiserslautern
ebert@cs.uni-kl.de

2 Spatiotemporal Modeling and Analysis

Spatiotemporal data describe phenomena and movements of objects as they take place over time and space. Due to the availability of affordable monitoring technologies (e.g., sensor nodes, GPS, RFID) and the enormous amounts of data produced by them, AI research on the analysis and modeling of spatiotemporal data has enormously grown in importance over the last decade. Novel applications, from activity recognition to route prediction, have posed new challenges for both the modeling paradigms and analysis algorithms, along with specific questions such as the handling of noise and missing data, real-time evaluation in possibly distributed systems, complexity reduction for interactive analysis, displaying of results, and the protection of sensitive, private information.

This special issue of the *Künstliche Intelligenz* journal presents a forum for articles on current research activities and developments of spatiotemporal modeling and data analysis. The topics of interest include but are not limited to: algorithms and models for spatiotemporal data, sensor networks and distributed systems, agent-based simulation of moving objects, visual analytics, and privacy preserving data mining and analysis methods.

In addition to technical research papers, this special issue will accept project and dissertation reports as well as discussion and market reports in order to provide a comprehensive overview of current activities in this area.

Interested authors are asked to contact the guest editors of this issue as soon as possible:

Christine Körner
Fraunhofer IAIS
Schloss Birlinghoven
53754 Sankt Augustin
christine.koerner@iais.fraunhofer.de

Prof. Dr. Stefan Wrobel
Fraunhofer IAIS und Univ. Bonn
Schloss Birlinghoven

53754 Sankt Augustin
stefan.wrobel@iais.fraunhofer.de

Dr. Michael May
Fraunhofer IAIS
Schloss Birlinghoven
53754 Sankt Augustin
michael.may@iais.fraunhofer.de

3 Neural Learning Paradigms

The capability of the human brain constitutes an ever fascinating topic, and a major goal of Artificial Intelligence is to mimic these capabilities. Unlike ‘classical AI’, Neural Computation directly uses learning paradigms inspired by human brains to arrive at intelligent behavior. Its great success story dates back more than 20 years with the introduction of efficient brain-inspired learning algorithms such as back-propagation, Hopfield-networks, or self-organizing principles. Since then, Neural Computation became a well established research area, and numerous brain-inspired techniques offer standard learning algorithms in today’s digital data processing. In parts, Neural Learning Paradigms are already so commonplace that they are considered just another method of statistical data analysis. Modern information science is about to change this situation: an ever increasing complexity of data and learning tasks poses new challenges on the learning paradigms such as efficiency, flexibility, and robustness (when dealing with large data volumes), and scaffolding, self-organization, and emergence of structures (when dealing with complex learning scenarios).

This special issue includes technical papers, reports on current research projects, interviews, book reviews, and other contributions with a focus on current developments and challenges in Neural Learning Paradigms.

Topics of interest include but are not limited to:

- neural learning paradigms for complex data structures and structure inference
- self-organizing principles
- sparse coding and compressed sensing
- reservoir computing
- deep learning
- neural inspired learning techniques for brain computer interfaces
- autonomous learning systems
- challenging applications of neural learning paradigms

Interested authors should contact the guest editor as soon as possible:

Prof. Dr. Barbara Hammer
CITEC centre of excellence
Bielefeld University
D-33594 Bielefeld
bhammer@techfak.uni-bielefeld.de

4 Social Media

Social Media has led to radical paradigm shifts in the ways we communicate, collaborate, consume, and create information. Technology allows virtually anyone to disseminate information to a global audience almost instantaneously. Information published by peers in the form of Tweets, blog posts, or Web documents through online social networking services has proliferated on an unprecedented scale, contributing to an exponentially growing data deluge. A new level of connectedness among peers adds new ways for the consumption of (traditional) media. We are witnessing new forms of collaboration, including the phenomenon of an emergent ‘collective intelligence’. This intelligence of crowds can be harnessed in myriad ways, ranging from outsourcing simple, repetitive tasks on Amazon Mechanical Turk, to solving complex challenges such as proving a mathematical theorem creatively and collaboratively. This call for papers welcomes contributions showing: (1) How to make sense of Social Media data, i.e. how to condense, distill, or integrate highly decentralized and dispersed data resulting from human communication, including sensor-collected data to a meaningful entity or information service, or (2) How Social Media contributes to innovation, collaboration, and collective intelligence. We invite papers covering all aspects of Social Media analysis including Social Media in Business (especially for Marketing, Innovation, and Collaboration), Entertainment (especially Social News, Social Music Services, Social TV, and Social Network Games), as well as Art (e.g. City Installations).

Applications of Social Media in art may be understood as a playing field for translating highly decentralized ‘social data’ into centralized forms of artful expression, thus furthering our intuitive understanding of these complex emergent phenomena. The list of topics mentioned below is neither exhaustive nor exclusive. Insightful artifacts and methods as well as analytical, conceptual, empirical, and theoretical approaches (using any kind of research method, including experiments, primary data from social media logs, case studies, simulations, surveys, and so on) are within the scope.

- Information/Web mining (e.g. opinion mining)
- Prognosis (e.g. trend and hot topic identification)
- Collective Intelligence
- Crowdsourcing
- Swarm Creativity, Collaborative Innovation Networks
- (Dynamic) Social Media Monitoring
- Sentiment, Natural Language Processing
- Social Media within and for Smart Cities, Smart Traffic, Smart Energy
- Social Networks for the collaboration of large communities
- User behavior, social interaction

- Social Network Analysis (SNA), semantic network analysis
- Social search engines and aggregators
- Social network games
- Personalization and adaptation to user preference
- Trust, reputation, social control, privacy
- Information reliability, Web spam, content authenticity (e.g., detecting ‘astroturfing’)

For inquiries and submissions please contact:

Prof. Dr. Detlef Schoder
University of Cologne (Koeln)
Department of Information Systems and Information Management
Pohligstrasse 1
D-50969 Cologne/Germany
schoder@wim.unikoeeln.de

5 Symbol Grounding

In robotics and intelligent systems, there is a growing trend to include high level semantic knowledge for enabling better reasoning and increased functionality. One of the most important aspects in integrating is the problem of intrinsically linking the symbols used by a cognitive agent to their corresponding meanings through grounding language in perception and action. This is widely known as the “Symbol Grounding Problem (SGP)” defined by Harnad in 1990, where a linguistic symbol representing a meaning, needs to be grounded in the perceived world. For cognitive agents and robots, a subset of symbol grounding is the anchoring problem which focuses on the connection between symbols and physical object while interacting in the environment. In a multi-robot system, this problem is more challenging as symbols have not only to be grounded, but commonly shared in order to facilitate the exchange of information. This is

called the social grounding problem. This also raises questions with respect to human-robot dialog modeling, where symbols and their references need to be communicated and how the social grounding between robots can be made transparent to a human interaction partner.

This special issue includes technical papers, reports on current research projects, interviews, book reviews and others with focus on current developments and challenges in Symbol Grounding in intelligent systems.

Topics of interest include but are not limited to:

- Symbol Grounding in intelligent systems
- Social Symbol grounding
- Anchoring symbols to sensor data from physical objects
- Symbol Grounding applied to language acquisition
- Symbol Grounding in robotics and intelligent systems
- AI applications of Symbol Grounding
- Knowledge representation and reasoning for robotics and intelligent systems
- Dialog modeling and Symbol Grounding

Interested authors should contact one of the guest editors to discuss a possible contribution:

Prof. Silvia Coradeschi
AASS, Örebro University
SE70182 Örebro, Sweden
silvia.coradeschi@oru.se

Docent Amy Loutfi
AASS, Örebro University
SE70182 Örebro, Sweden
amy.loutfi@oru.se

Dr.-Ing. Britta Wrede
CoR-Lab/Applied Informatics
Bielefeld University
bwrede@techfak.uni-bielefeld.de