Categorisations: AI

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Dear readers,

This year we are commemorating 50 years of the German society on Informatics as well as concluding an eventful German science year on Artificial Intelligence. Within the project “KI50: Künstliche Intelligenz in Deutschland—gestern, heute, morgen” the 10 most influential persons in German AI history as well as 10 important AI technologies were selected. The selection of the 10 AI newcomers is under way. Check it out on <https://ki50.de>.

When Watson beat its human opponents in 2011 in the game of Jeopardy it was seen as a great leap forward for the whole field of AI. This event accompanied and aided the rise of deep learning as a methodology and sparked renewed interest in machine learning approaches for many different fields. Watson’s victory was possible due to a combination of deep learning mechanisms based on a large number of databases and lots of computing power. Watson looks for meaningful patterns in databases that had been optimised and tweaked for best performance. Within the specific gaming situation of Jeopardy natural language processing and interpretation played a key role. The learning and pattern recognition mechanisms were subsequently used to select scenes from a movie in order to produce a movie trailer successful in eliciting fear (2016) in humans. A further step was made by hooking up sensors—a connection to the real world of a bus (Olli 2017)—for autonomous driving. Problems uncovered, drawbacks and setbacks aside, I like the progression from games (the next issue of *Künstliche Intelligenz* is on AI in Games), via identifying factors that elicit emotions, towards imperfect sensory input, thus solving specific but very diverse challenges with each step, trying out and being successful at using the same methodology in different situations.

The original intention of artificial intelligence was to copy a human’s intelligence—now the intention seems to be to do better than humans (at least in gaming). Or, in a slightly different interpretation, the intention might be to show the boundaries of a human’s intelligence in order to provide an AI entity as complementary to a human. Thus, producing teams of humans and AI to solve problems a human by herself cannot.

The current issue deals with reintegrating AI and robotics: robot systems that use AI to perform complex tasks in realistic environments. Watson is no robot, it is a supercomputer. But the wide variety of tasks Watson had to solve suggests (at least to a lay person) that implanting Watson into a robot could lead to an integrated system able to perform complex tasks. Is this really true?

Make up your own mind and delve into the current issue on reintegrating AI and robots.

Sabine Timpf

1 Forthcoming Special Issues

1.1 Challenges in Interactive Machine Learning

Guest Editors: Stefano Teso (KU Leuven, Belgium) and Oliver Hinz (Goethe University Frankfurt, Germany)

Machine learning is revolutionizing our ability to leverage data and tackle challenging applications such as natural language and image understanding, recommender systems, fraud detection, and medical diagnosis. Interactive learning supports these advances by casting learning as a dialogue between a model and one or more users, who may play the role of teachers, targets, and judges of the model being learned, and who can also learn as being part of the teaching?learning loop.

Designing successful interactive learning schemes requires to solve a number of key challenges:

- minimizing the cognitive cost for the user while optimizing query informativeness,

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- devising effective interaction protocols based on different types of queries (membership, ranking, search, explanation, etc.),
- producing optimal questions by explicitly and efficiently capturing the uncertainty of the model,
- distributing the load of query answering across multiple teachers with heterogeneous abilities,
- designing or estimating realistic models of user behavior, increasing tolerance to noise and actively guiding the user toward providing better and more robust supervision, and, more generally,
- automatically discovering the user's expertise level and adapting the interaction accordingly. Such an interaction is likely to help make such systems more transparent and the results more explainable.

This special issue aims at surveying established research in interactive learning, as well as recent advances on algorithms, models and effective process design around humans in the loop. If you are interested in contributing (technical reports, system descriptions, project reports, survey articles, discussions and dissertation abstracts) to this special issue, please contact one of the guest editors before the submission deadline.

1.2 Special Issue on Ontologies and Data Management

Guest editors: Thomas Schneider (University of Bremen, Germany) and Mantas Simkus (TU Wien, Austria)

This special issue focuses on the theory and practice of applying ontologies in data management (ODM), which is a research topic of significant interest in Knowledge Representation and Reasoning (KRR) and Database Theory. Modern data-centric software systems need to handle data that is often heterogeneous, sensitive, very large, and even incomplete or inconsistent. Moreover, it often has very complex structures. Thus, the development of proper tools

and techniques to handle this complexity is a pressing task. Ontologies in combination with automated reasoning are acknowledged as a promising tool to address some of these challenges, and thus are receiving significant attention both among researchers and industry. For instance, the prominent data integration paradigm called ontology-based data access (OBDA) suggests the use of ontologies to provide a conceptual view of a problem domain, where various possibly heterogeneous data sources can be linked to the same ontology using mappings, enabling users to pose queries using the ontology vocabulary. For query answering in OBDA, automated reasoning is used to compile information from the sources, possibly employing the domain knowledge in the ontology to infer new information.

The special issue welcomes contributions on all aspects of ontologies and data management, including but not limited to:

- Query answering: standard semantics, bag semantics, inconsistency-tolerant semantics
- Further inference tasks in the presence of data: learning, materialization, non-monotonic reasoning
- Decidability and complexity analyses
- Ontology languages and extensions: description logics (DLs), rule-based languages, first-order logic
- Combinations of ontology languages with other formalisms such as temporal logic, probabilities, action formalisms
- Applications related to ODM
- Systems and tools related to ODM

The KI Journal, published and indexed by Springer, supports a variety of formats including technical articles, project descriptions, survey articles, discussions, dissertation abstracts, conference reports, and book reviews.

Interested authors are encouraged to contact the guest editors at their earliest convenience.