Space for Opinions

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Dear readers,

Scientific insight is not linear. But what are the driving factors of your own research that accelerate your insights? Insights follow a complex process—they require an oscillation between theoretical reflection, generally in terms of a model or a theory, and contemplation of the empirical evidence, in an optimal

case leading to a specification or extension of your theoretical bases.

But what if there is accumulating evidence that your underlying model no longer holds? Often it is difficult for us to see this, as it requires from us to take a different frame of mind, to step away from our typical interpretation frame. Also, it needs a lot of evidence in order to form an understandable pattern. Thus, it needs the combined effort of a scientific community to identify that—often implicit—assumptions hinder progress and, even more difficult, to find a way out.

This process is an important driving force in science that requires specific forms of communication. When problems with a dominating paradigm are accumulating and have caused already a certain number of members of the community to collaboratively think about alternatives,

communication can follow traditional lines, i.e. a scientific publication in form of a position or discussion paper. In this journal this would be a *Technical Contribution*.

Before this stage, discussions among different researchers with different perspectives and access to different kinds of methods and data are necessary to find better ways of formulating and generalizing the underlying critical factors. This can be a difficult but highly productive and insightful process that needs to be framed in a discourse format that makes the purpose of this discussion clear. In this journal we therefore offer the category *Discussion*, which optimally features opposing perspectives. Often, scientists are reluctant to offer too pronounced opinions because they are, by definition, attackable. Yet, such opinions are very valuable as they will advance the common understanding of certain problematic issues. We therefore strongly encourage submissions to the Discussion section.

One very important market place of opinions are conferences. Conferences are hubs of scientific exchange, where apart from their objectively evaluated research results, people communicate their insights. Sometimes, also insights that have not yet reached sufficient maturity for publication are communicated, albeit in a more informal fashion; in an oral presentation one may dare to mention one's suspicions of the underlying model's problematic aspects upon request, in a paper one might not want to, because there is just not enough evidence and foundation from the results. Thus, conferences contain—and possibly produce—information that goes beyond what is reported in the papers. However, there are barely non-transient formats that allow to capture such impressions. In this journal we offer the category *Conference Reports*. In a Conference Report you have the freedom to give your subjective version of the—possibly underlying—opinions encountered in the presentations and the non-informal discussions. Also, you are

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encouraged to provide any kind of evaluation you deem insightful: were there really new approaches or rather small deltas with well-known methods? Have new challenges been identified? Conference Reports are places of possibly quite subjective evaluations of conferences, and therefore highly valuable to the whole community.

Therefore, if you are intrigued by certain and recurring shortcomings of a dominating paradigm, or if you feel there are converging threads of discussion at a conference, take the time and use one of the above categories to express your observations—this journal provides you with the space for your opinion!

Best wishes and enjoy reading this issue of KI,
Britta Wrede

1 Forthcoming Special Issues

1.1 Smart Environments

Smart Environments aim to provide installations that support and enhance the abilities of humans in their regular life and possibly improve the environments themselves too, e.g., in terms of energy efficiency. Smart Environments are based on complex and distributed technical systems but they bear more challenges than the seamless composition of its components addressed in current research in technical disciplines. Setting technical challenges aside, providing intuitive interfaces to a system hidden in the environment and identifying means that allow the system automatically to provide suitable assistance for a wide range of every-day tasks involves several research questions.

Smart Environments are best described as an active field of research spanning several disciplines, but particularly related to Artificial Intelligence and Human–Machine interaction. Since all applications penetrate our daily life with sensors, privacy becomes a central issue, too. This special issue aims at presenting a survey of the manifold AI-related research currently being performed, along with presentations of the projects and labs in which new ideas are conceived. Among the various disciplines involved, this issue addresses AI-related aspects and the interplay of AI and human-machine interaction, in particular AI techniques fostering new kinds of interaction, shedding some light onto questions such as:

- How can a ubiquitous system communicate its state of believe to a human?
- How can Smart Environments quickly comprehend a situation and user needs?
- How can a system adapt to users and how adaptive should it be?

- Which forms of knowledge representation help to form a shared mental model of system and user?
- How can user acceptance be measured efficiently and reliably?
- What are social and ethical implications of Smart Environments?
- Which are the most pressing use cases? What are their specific requirements?

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1.2 Semantic Interpretation of Multi-Modal Human-Behaviour Data

This special issue of the KI journal focusses on and emphasises general methods and tools for activity and event-based semantic interpretation of multi-modal sensory data relevant to a range of application domains and problem contexts where interpreting human behaviour is central. The overall motivation and driving theme of the special issue pertains to AI-based methods and tools that may serve a foundational purpose toward the high-level semantic interpretation of large-scale, dynamic, multi-modal sensory data, or data streams. Data-sources that may be envisaged include

- Visuo-spatial imagery
- Movement and interaction data
- Neurophysiological and other human behaviour data

Proposed foundational methods will, for instance, present the development of human-centred technologies and cognitive interaction systems aimed at assistance and empowerment, e.g. in everyday life and professional problem solving and creativity. This call particularly emphasises systematically formalised integrative AI methods and tools (e.g., combining reasoning and learning) that enable declarative modelling, reasoning and query answering, relational learning, embodied grounding and simulation etc. Broadly, the role of declarative abstraction, knowledge representation and reasoning, and neural-symbolic learning and inference from multi-modal sensory data is highly welcome. For details, please refer to the full Call for Papers at <http://hcc.uni-bremen.de/calls/SpecialIssue-KI.pdf>, or contact one of the guest editors:

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1.3 Algorithmic Challenges and Opportunities of Big Data

Computer systems pervade all parts of human activity and acquire, process, and exchange data at a rapidly increasing pace. As a consequence, we live in a big data world where information is accumulating at an exponential rate and complexity, and often the real problem has shifted from collecting enough data to dealing with its impetuous growth and abundance when going through it to mine relevant or pertinent information. In fact, we often face poor scale-up behaviour from algorithms that have been designed based on models of computation that are no longer realistic for big data. This implies challenges like algorithmic exploitation of parallelism (multicores, GPUs, parallel and distributed systems, etc.), handling external and outsourced memory as well as memory-hierarchies (clouds, distributed storage systems, hard-disks, flash-memory, etc.), dealing with large scale dynamic data updates and streams, compressing and processing compressed data, approximation and online processing respectively mining under resource constraints, increasing the robustness of computations

(e.g., concerning data faults, inaccuracies, or attacks) or reducing the consumption of energy by algorithmic measures and learning. Only then big data will truly open up unprecedented opportunities for both scientific discoveries and commercial exploitation in Artificial Intelligence, Geoscience, Social Web, Finance, e-Commerce, Health Care, Environment and Climate, Physics and Astronomy, Chemistry, Agriculture, Life Sciences and Digital Libraries, among other domains.

The aim of the special issue is to collect overview articles on important state-of-the-art algorithmic foundations and applications, as well as articles on emerging trends for the future of big data.

If you are interested in contributing to this special issue, please contact one of the guest editors before the submission deadline of March 1st, 2017:

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