Theatre, Perception, Symbol

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“Es ist nichts theatralisch, was nicht für die Augen symbolisch wäre/Nothing is theatrical that is not symbolic for the eyes” Johann Wolfgang von Goethe remarked in his maxims and reflexions. What does he mean by that? Formally, these lines describe the relationship between the theatre stage, on which actors can perform, and the audience watching the performance. The semantic interpretation of the performance, and the beauty, is in the eye of the beholder.

When I began to study computational linguistics and artificial intelligence in the mid-nineties, I liked such sayings, like this one: computational linguistics deals with computer programs for parsing language and artificial intelligence deals with the rest of the physical robots we will interact with in the future. A theatre researcher, however, might add to Goethe’s words that not only the staging itself, but the usage of specific linguistic or visual metaphors, i.e., the

semantic elements of the theatre language, allows us to analyse the intention and function of the theatrical act and how these acts are actually perceived by the audience.

I would like to ask how Goethe’s words could be interpreted by the artificial intelligence community. I am certain that the start of the discussion would focus neither on the theatre performance, nor the perception with an artificial eye as sensory input device. For some good reasons, it would probably start with symbolism and symbolic AI as the branch of artificial intelligence research that concerns itself with attempting to explicitly represent knowledge in a declarative form. As observed by many researchers, the difficulties lie in the translation of implicit or procedural knowledge using symbols. Luckily, breakthroughs in knowledge representation and acquisition, deductive inferences, natural language processing, and machine learning allowed for the integration of these techniques in new and interesting ways to adequately manipulate symbols.

Today, many AI schools regard (symbolic) natural language processing, related dialogue systems, and human computer interaction tasks as elaborate AI fields. The annual meeting of the intelligent interfaces community (IUI, see the conference report in this special issue) also relies on psychology, cognitive science, and perception to make the interaction between computers and people smarter. Only recently has much research funding gone towards symbolic knowledge representation research, i.e., the semantic web, in combination with multimodal dialogue-based interaction. The national research projects SmartWeb (BMBF) and THESEUS (BMW) will bring forward procedural symbolic domain knowledge in terms of ontological representations on a large scale. Not surprisingly, German efforts towards semantic web technologies for the Web 3.0, including our own work on composing web services by utilising

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multimodal interaction combining speech and multi-touch input on advanced smartphones, did not remain unanswered by the international competitors. AI magazine's fall 2010 issue on question answering focused on harnessing Cyc, the progress toward a digital Aristotle, and IBM's Watson system to make propaganda for new Turing Test deviations in terms of Jeopardy games. That's impressive particularly because they succeeded in completing a demonstration where implicit factual knowledge could be extracted and acquired from large text collections automatically. This brings us back to the theatre performance and the perception with a sensory input device. I would say the perception beyond the mere facts conveyed in the message is interesting, too. And as an AI researcher I would say that even more interesting research lies in AI for human computing which aims at making computing devices and smart environments social partners of the humans interacting with these devices (on the theatre stage for example) or inhabiting these environments. This means that sensing humans and understanding their behaviour is a core issue in the research on human computing. I find my AI definition not so bad: it can be extended to the idea that physical social robots to be successful, to provide help in daily activities, will have to have emotions.

Based on my collected impressions, it is my great pleasure to introduce this KI's issue on Emotion Computing which I think starts with the observation that humans are social beings, and understands that emotive processes are on top of, e.g., a question answering game—for intelligent human-like behaviour of agents. The guest editor Dirk Reichardt himself has conducted research in the fields of applying computer science methods to user emotion recognition, its modelling, and the sociological aspects of emotional computing. This issue's selection of scientific contributions has been made concerning emotion recognition, emotion modelling, the generation of emotional user interfaces and dialogue systems as well as anthropomorphic communication agents. More precisely, the six technical contributions go into detail in empathy-based emotional alignment, designing emotions, evaluating emotion units, assessing the interest in speech, and the neuro-scientific view on the role of emotions, respectively.

Thus, "Es ist nichts theatralisch, was nicht für die Augen symbolisch wäre", can be interpreted in the way that emotive symbols, the semantic elements of our theatre language, play an essential role in perception, especially the perception of (theatrical and histrionic) human expression, which governs human decision-making. My hope is that this will bring forward a great number of AI applications which are based upon emotional aspects of computing and confesses their major effects on cognitive processing.

I hope you will enjoy reading this issue and we welcome your feedback for ongoing discussions on the KI website.

Planned Main Topics

1 25 Years of AI and the KI Journal

The scientific journal "Künstliche Intelligenz" (KI) has been published since 1987. Copies of the predecessor, "KI-Rundbrief", were made by universities and research departments in the form of a manuscript and handed out. In this anniversary edition, we will look back on various aspects of the past 25 years of AI and the KI Journal. Furthermore, we would also like to touch on the near and remote future of AI and the KI journal.

If you are interested in contributing a paper, please contact the guest editor as soon as possible. Contributions of all kinds are welcome to the past and future of AI and the KI journal.

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2 AI Languages

In the past, mainly Prolog and Lisp were considered as the most important representatives of artificial intelligence programming languages. However, in the meantime, the range of such languages has been extended by the development of new areas of interest within AI. Existing languages have been extended, e.g. by constraints, and there are developments of multi-paradigm languages which support more than one programming paradigm and style with the aim of an efficient modelling and problem solving. But, furthermore, there are new directions of research and application, like languages of the Semantic Web, languages for planning and agent-oriented programming.

This special issue includes technical papers, reports on current research projects, interviews, summaries of doctoral theses, book reviews and others with focus on current developments and perspectives of languages in the area of AI. Topics of interest include but are not limited to:

- Classical and new paradigms of AI programming
- Functional-logic, constraint-based, and further multi-paradigm languages

- Inductive programming
- Languages of the Semantic Web
- Domain specific languages which support programming of AI-specific applications, e.g., planning applications and agent-oriented programming

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

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3 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 welcome:

- Psychology and cognitive sciences
- Evaluation techniques
- Advanced visualisation and interaction metaphors
- Application projects

Interested authors are requested to contact the guest editor:

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4 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 modelling 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 modelling 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 modelling 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:

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