

## A quarter-century of *The Knowledge Engineering Review*: Introduction to the Special Issue

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We introduce the Special Issue of the journal created to celebrate 25 years of continuous publication.

With this issue *The Knowledge Engineering Review* commences its 26th year of publication. To mark a quarter-century of continuous publication, we decided to devote an issue of the journal to several non-technical papers exploring the past, the present, and the future of knowledge engineering, intelligent systems, and artificial intelligence.

We begin the special issue with a paper commissioned from Professor John Fox of Oxford University, who was the initiator and the Founding Editor of the journal in 1984 (Fox, 2011). His article discusses the nature of knowledge engineering and how the challenges facing the discipline have changed over the last quarter-century. To add flesh to his discussion, Fox compares the topics of papers published in the journal in the first 6 years of its existence with the papers published in the most recent 6 years. This comparison reveals some very interesting differences and trends, possibly indicative of changes in emphases over the period.

In addition to the invitation to Professor Fox, we invited the members of the journal Editorial Advisory Board to submit short papers on topics of interest to them, related to knowledge engineering, intelligent systems, and artificial intelligence. We asked contributors to write about their chosen topic in terms of the changes seen over the past 25 years and/or in terms of future trends and challenges. The result of our invitation is a diverse collection of papers, spanning the full range of topics of importance to contemporary intelligent systems. Collectively, these papers provide a snapshot of the concerns of researchers in knowledge engineering in 2010. We have published the papers in this issue in alphabetical order by surname of their first author.

The first paper, by John Anderson, Jacky Baltes and Chi Tai Cheng, discusses robotics competitions in artificial intelligence (AI; Anderson *et al.*, 2011). Competitions have become a common means of undertaking research in computer science and AI, typically requiring entrants to share their contributions (e.g. their program code) with the research community after each annual tournament. Thus, such tournaments are a form of crowd-sourcing of research *avant la lettre*, and their value, effectiveness, and popularity as research-supporting institutions are likely to see them becoming increasingly utilized.

The next paper in the collection, by Patrick Brézillion, presents a personal testimony based on the author's involvement in the design and deployment of intelligent systems over the past 25 years (Brézillion, 2011). The author draws on experiences developing applications across many domains—for example, transport, energy, medicine, and software development—experiences from which he infers some general lessons about knowledge engineering, particularly in practice.

The information explosion we have all seen over the last several decades has led to considerable attention being paid to methods for data mining and analysis. The third paper in the collection, by Frans Coenen, is a brief review of the history and future trends of research and applications in data mining (Coenen, 2011). As more different *types* of objects are stored digitally—first numbers,

then text, now images, videos, and sounds—new challenges arise for data miners in storing, analyzing, and retrieving these objects.

Taking seriously our invitation to consider the future of machine intelligence, Rogier van Eijk, in the next paper, explores what it would mean for AI to be based on a non-western and non-material notion of intelligence—that arising from a traditional Indian medical system, the Ayurveda (van Eijk, 2011). Given how much analytical traction theoretical computer scientists have been able to achieve with a metaphor for computation based merely on a film projector (the Turing Machine model), it would not be surprising if other, more sophisticated metaphors may also generate profound insights for the conception, analysis, and engineering of intelligent systems.

One of the key developments in knowledge representation and engineering over the last two decades has been the development of theories of argumentation, that is, of theories and frameworks able to deal sensibly with conflicting information, preferences, and goals. The next paper, by Marcelo Falappa, Alejandro Garcia, Gabriele Kern-Isberner, and Guillermo Simari, considers the relationships between argumentation and belief revision (Falappa *et al.*, 2011). As the authors demonstrate, this relationship has evolved and continues to do so.

Aspects of knowledge representation are also relevant to the next paper, by Yolanda Gil, which discusses how the Semantic Web has altered research in knowledge acquisition (Gil, 2011). Distributing knowledge acquisition across many users raises issues of trust and provenance of crowd-sourced information, and of conflict and inconsistency of data, and these issues create significant research and deployment challenges for the field.

By contrast, Andrea Omicini and Mirko Viroli, in the next paper, review models and languages for coordination (Omicini & Viroli, 2011). Drawing inspiration both from human models and from interactions in nature, researchers in this area have made considerable progress in understanding, modeling, and engineering systems for coordinated actions. The motivation for many of the early researchers in this area was to support parallel computation; the knowledge gained and the frameworks developed, however, have turned out to be useful for understanding and engineering distributed systems and self-organizing societies.

The final paper, by Iyad Rahwan and Kate Larson, looks at coordination in multi-party interactions involving resource allocation and preference aggregation (Rahwan & Larson, 2011). The design of mechanisms for these interactions, long the subject of study in economics and in political science, respectively, has recently become of great interest in computer science, especially as human economic and other activities shift online. Rahwan and Larson explore the relationships between mechanism design and formal logic, particularly in the design of logical inference procedures when knowledge is shared among multiple participants.

We thank the authors for their contributions, and the anonymous reviewers for their work in assessing and reviewing these papers. We believe that the diversity of topics, approaches, and methods evidenced by this collection of papers demonstrates the healthy state of research and applications of contemporary knowledge-based and intelligent systems. We hope that you enjoy reading this special issue as much as we did, and we look forward eagerly to the next 25 years of publication.

## References

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