Artificial Intelligence at the Gates of Dawn?

Thomas Eiter[1]

Abstract

In recent years, there have been significant achievements in different areas of Artificial
Intelligence (AI) which made it to the headlines. After Deep Blue was the first computer
program winning against a ruling world champion of chess in 1997, which was a
milestone in the history of AI, the Mars Rover missions started in the early 2000s for
which intelligent autonomous planning and control is instrumental. The DARPA
challenges in 2004 and 2005 have stimulated intensive research on autonomous vehicles,
and due to efforts by global players like Apple and Google in cooperation with car
industry, encountering such vehicles on the road appears to be realistic in the near future.
On another end, IBM's Watson victory over Jeopardy champions in 2011, and the most
recent defeat of top Go players in 2015 and 2016 by Alpha-Go, a computer program by
Google's DeepMind company, are further milestones in the history of AI, which are
based on novel use of search and deep learning techniques.

Fueled by this and many success stories in other application areas, e.g. in speech
recognition and robotics, there is a hype about Artificial Intelligence these days. A lot is
written in the press, and concerns about emerging super-intelligence have been uttered
by prominent people, in fear of the "technological singularity" that the intellectual power
of machines will surpass the one of humans, which they see as a threat to humanity. Less
apocalyptic yet still serious are worries about the effects of AI on employment. Whether
AI will end jobs has been raised in a number of articles and has been discussed by
leading economists and AI researchers at the World Economic Forum.

This talk reviews some of the issues above and emphasizes that despite the recent
achievements and advances in the state of the art, there is still a number of issues that,
from a cognitive perspective, are not resolved yet, among them understanding of the
mind, deeper real world reasoning, natural language understanding, philosophical
aspects, and ethical or emotional aspects, to mention a few.

Specifically, we will look at recent results, trends and issues in knowledge representation
and reasoning, with a focus on declarative problem solving. Arguably deep and complex
reasoning is a key feature of intelligence, but current capabilities, let alone for super-
intelligence, are still limited. Nonetheless, advances in computational logic have led to
technology such as description logics, constraint programming, SAT/SMT and Answer
Set Programming that offers tools for solving important problems in a range of

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[1] Technische Universität Wien, Institute of Information Systems, eiter@kr.tuwien.ac.at

applications, where logic-based reasoning is at the core, with more to come.

Thomas Eiter *is Professor of Knowledge-Based Systems in the Faculty of Informatics at Technische Universität Wien, Austria, since 1998. He worked in different fields of Computer Science and Artificial Intelligence, but his main area is knowledge representation and reasoning, where he has been active since the 1990s and published extensively.*

His current interests are declarative problem solving and computational reasoning methods.

Eiter has been serving on many editorial boards, steering bodies, and program committees (e.g. chairing KI 2001 and KR 2014). He is an EurAI (formerly ECCAI) Fellow (2006) and a Corresponding Member of the Austrian Academy of Sciences (2007).