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EDITORIAL

Editorial

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Dear Reader,

The recent boom of ML and AI have sparked strong convictions regarding the capabilities of artificial systems. The superiority of artificial systems seems obvious. And it is true that they have by far surpassed the human ability on many levels: they beat us at chess and Go, can navigate and drive cars, handle complex machines, compute action plans, identify complex patterns and generally process big data like only few experts are able to do. It seems that while AI and ML have not yet entered all fields, in principle there is no field left where artificial systems could not beat an average human. If this is true, then there is nothing to learn for AI from the human mind anymore, human cognition is useless for improving AI or machine learning systems. But this is a misconception—there are domains that demonstrate that even young humans can outperform any artificial system. An important example of such a capability is what is typically described in a persons' Theory of Mind—a human's ability to represent and reason about another human's state of mind. This has even been demonstrated in some animals, such as monkeys, that show trust to or even deceive other monkeys. Both, trust and deception require an internal representation of the others mental state. But internal symbolic representation and understanding are skills of diverse biological species and are important for many forms of social interactions, but are not yet part of state-of-the-art AI systems. Another domain that has recently gained strong interest is the field of common sense reasoning which aims to capture a human's concepts of intuitive physics, intuitive biology, or intuitive psychology. Common sense reasoning has been sometimes defined in the literature as reasoning processes which even a 7-year young child can perform with success, e.g., "Sam got straight C's in high school math and has not thought for a moment about math in the 20 years since. Infer that Sam is not to ask about a calculus problem (http://commonsensereasoning.org/problem_page.html#evidence). Such problems, while technically easy to formalize with the necessary background knowledge, have so far defied attempts to be solved automatically by AI or ML approaches without specific knowledge. A similar class lies in different challenges including the Winograd Challenge. While at a first look such problems seem to be simple (for humans) and are intuitively expected to be a trivial task for AI and ML systems, any attempts have not yet shown strong progress. Recently, DARPA has made a call to systematically research common sense reasoning. What is interesting, though, is that one part of the research aims at developmental and cognitive psychology and the question of how humans build concepts and learn common sense. While cognitive psychology is interested in human reasoning, the field has not yet focused on this topic. And, so we can expect that AI will need many other sciences to reach a general level of cognition that humans can more or less naturally employ. But, what *makes* the human mind so special? The human mind may create logical errors and might not be able to compute large mathematical problems, but it is able to easily switch between different domains, draw analogies, generate heuristics on the fly, gain insights into difficult problems, and after all, it is still the human mind that develops all AI and ML systems. We are looking for exciting new times in AI and ML that turn back to a point already Alan Turing was fascinated by: the human mind.

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