

Conceptual Abstraction and Analogy in Artificial Intelligence

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Keynote Abstract

In 1955, John McCarthy and colleagues proposed an AI summer research project with the following aim: “An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves.” More than six decades later, all of these research topics remain open and actively investigated in the AI community. While AI has made dramatic progress over the last decade in areas such as vision, natural language processing, and robotics, current AI systems still almost entirely lack the ability to form humanlike concepts and abstractions.

Some cognitive scientists have proposed that analogy-making is a central mechanism for conceptual abstraction and understanding in humans. Douglas Hofstadter called analogy-making “the core of cognition”, and Hofstadter and co-author Emmanuel Sander noted, “Without concepts there can be no thought, and without analogies there can be no concepts.” In this talk I will reflect on the role played by analogy-making at all levels of intelligence, and on how analogy-making abilities will be central in developing AI systems with humanlike intelligence.