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# Argumentation Mining: How Can a Machine Acquire World and Common Sense Knowledge?

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Argumentation mining regards an advanced form of human language understanding by the machine. This is a challenging task for a machine. When sufficient explicit discourse markers are present in the language utterances, the argumentation can be interpreted by the machine with an acceptable degree of accuracy. However, in many real settings, the task is much more difficult due to the lack or ambiguity of the discourse markers, and the fact that a substantial amount of knowledge needed for the correct recognition of the argumentation, its components and their relationships is not explicitly present in the text, but makes up the background knowledge that humans possess when interpreting language. The lecture focuses on how the machine can automatically acquire such knowledge.

In this lecture we consider argumentation mining from written text. First, we give an overview of the latest methods for human language understanding that map language to a formal knowledge representation that facilitates other tasks (for instance, a representation that is used to visualize the argumentation or that is easily shared in a decision or argumentation support system). Most current systems are trained on texts that are manually annotated. Then we go deeper into the new field of representation learning that nowadays is very much studied in computational linguistics. This field investigates methods for representing language as statistical concepts or as vectors, allowing straightforward methods of compositionality. The methods often use deep learning and its underlying neural network technologies to learn concepts from large text collections in an unsupervised way (i.e., without the need for manual annotations). We show how these methods can help the argumentation mining process, but also demonstrate that these methods are still insufficient to automatically acquire the necessary background knowledge and more specifically world and common sense knowledge. We propose a number of ways to improve the learning from textual, visual or database data, and discuss how we can integrate the learned knowledge in the argumentation mining process.

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