Q&A: How to make AI systems learn better

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Cognitive Technologies

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Metalearning

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Artificial intelligence systems are smart. They can recognize patterns better than humans, for example. Yet humans are still very much needed. How can you better steer those AI systems? LIACS lecturer Jan van Rijn wrote a book about this together with a number of colleagues. We asked him a few questions.

What is in the book and for whom is it intended?

This book is about the different aspects of metalearning. Metalearning means learning about the learning process, it supports computer experts to better manage the learning process of AI systems. The book is intended to give colleagues in the field a unified view of current techniques in the field of metalearning. Because it is freely accessible, it is also used as teaching material in masters courses.

What problem does metalearning solve?

Van Rijn: Artificial intelligence systems are better at recognizing patterns than humans. A number of conditions must then be met. For example, there must be sufficient data of good quality and you must choose a good model type.

Well-known model types in the data science field include neural networks, decision trees and so-called Gaussian processes (a model type from mathematics, ed.). These models can recognize patterns in data. The model-types have different parameters that control the learning process. All those parameters must be chosen correctly. When this condition is met, it often produces excellent performance, but when it is not, the performance of AI systems is disappointing. Therefore, human

expertise remains important, to guide the learning process of those systems.

What solution has been found to this problem?

You then look at previous learning processes, and whether you can transfer lessons from them to future learning processes. For example, you can support the human expert in selecting a model type or fine-tuning the above-mentioned parameters.

What else can metalearning be used for?

For example, when there is little data available. In some cases you can transfer data from one domain to a domain where there is little data available. This can be very useful for medical applications, for example, where there is often a lack of data.

  More information: Metalearning—Applications to Automated Machine Learning and Data Mining: link.springer.com/book/10.1007/978-3-030-67024-5

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