

AutoML - Benefits, Reality, Future

Koen van der Blom¹

¹Sorbonne Université, CNRS, LIP6, France, koen.vdblom@lip6.fr

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With the increasing adoption of machine learning (ML) for many practical applications there is a need for techniques to make adoption more efficient. This is the gap that automated machine learning (AutoML), and more generally automated artificial intelligence (AutoAI), aims to fill. The key goal of AutoML is to automate (parts of) the machine learning pipeline. Some of the most prominent and well-developed components from the AutoML toolbox include meta-algorithms, such as, automated algorithm selection (AAS) and configuration (AAC). Both of these techniques have shown substantial benefits in many areas of computer science, including mixed-integer programming (MIP) and Boolean satisfiability (SAT).

One of the most highlighted benefits of AAS and AAC (and more generally AutoML and AutoAI) is the possible performance improvement that can be gained over hand-designed systems. Orthogonal to this, two other benefits can help democratise ML and AI. Automating ML (and other AI processes) reduces the required human effort and, by abstracting away the underlying ML components, decreases the required expertise to start using ML.

In practice, however, AutoML is not as widely adopted as one might expect based on the potential benefits [1]. Adoption seems to be inhibited by issues such as the usability of AutoML frameworks, insufficient expertise in AutoML, and the required computational costs.

As a first step towards increasing the adoption of AutoML, we aim to improve the access to and understandability of meta-algorithms, such as AAS and AAC. To this end, we introduce the Sparkle platform [2]. Starting with computer scientist not actively involved in the development of meta-algorithms, Sparkle aims to make meta-algorithms accessible and understandable to progressively wider audiences. To achieve this, Sparkle implements a command line interface of self-explanatory commands to simplify correct use of AAS and AAC, and produces detailed reports including results, the experimental setup, and references. Beyond the scope of Sparkle, many other AutoML techniques support different parts of the ML pipeline. To truly democratise ML, these too, have to be advanced to make them broadly accessible and understandable.

References

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