

Automated Algorithm Design as Ensemble Techniques

Algorithm design is a challenging task requiring expertise both on algorithm development and problem domain to be targeted. Due to the presence of immensely large design spaces, the design challenge becomes harder to deal with and time consuming no matter what the expertise level is. Besides that, the designed algorithms are doomed to be sub-optimal so while an algorithm performs well on a certain set of instances from a problem domain, it performs poorly on other instances. One way of addressing this issue is to design meta-algorithms, under automated algorithm design, for delivering high-level algorithmic solutions through selection, configuration and generation operating either Offline, i.e. prior to an instance is being solved, or Online, i.e. while an instance is being solved. Various automated algorithm design approaches have been successfully applied to a wide range of combinatorial search problems from academia and real-world, such as timetabling, scheduling, routing, rostering, cutting and packing.

In terms of selection, the idea is to specify the best algorithm(s) for a given problem (~instance) so that the strengths of different algorithms have been combined rather than relying on a single algorithm. Regarding configuration, the goal is tuning or adaptively/dynamically controlling the parameters of an algorithm while generation is all about automatically producing algorithms from scratch based on predefined components.

The aim of this special session is to gather researchers studying automated algorithm design in the form of ensembles to share their research on the following non-exhaustive list of topics:

- algorithm portfolios
- meta-learning
- algorithm scheduling
- hyper-heuristics
- adaptive operator selection
- adaptive algorithm selection
- on-line learning
- data science for automated algorithm design

This special session will be organized in connection with the Task Force on Hyper-heuristics within the Technical Committee of Intelligent Systems and Applications at IEEE Computational Intelligence Society and the EURO working group on Data Science meets Optimization (DSO).

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