Topic ID: 250-IT-EN

Neuroevolution

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Abstract:

The recent rapid development of successful machine learning (deep learning) applications solving complex problems in areas like image classification, language processing or robotics, has also brought re-exploration of evolutionary algorithms (EAs) as an effective optimization technique for tasks with the high complexity of the objective function or inner structure of the solutions, hence for the automated creation of deep and sophisticated machine learning models. Modern and robust EAs strategies, due to their universality, can be used to solve emerging problems related to machine learning, like the finding of optimal hyper-parameters for the model, select the optimal previous models based on experiences and gained results, optimal features selection, or optimizing the convolution network structure used as a feature extractor for further processing/classifications. All tasks as mentioned above belong to the paradigm of automated machine learning (AutoML). Although well-established gradient-based optimization procedures represent good local search engines, the need for new intelligent learning algorithms puts pressure on the implementation of population-based EAs and their speed up, robustness and parallelization. Thus focus of the research will be on investigating the effective utilization of evolutionary algorithms in AutoML, like direct/undirect encoding of individuals, population structures, applicability in real problems, and more.

Literature:

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