

Evolution under Length Constraints for Convolutional Neural Networks Architecture Design

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Abstract : In recent years, the convolutional neural networks (CNN) architectures designed by evolution algorithms have proven to be competitive with handcrafted architectures designed by experts. However, these algorithms need a lot of computational power, which is beyond the capabilities of most researchers and engineers. To overcome this problem, we propose an evolution architecture under length constraints. It consists of two algorithms: a search length strategy to find an optimal space and a search architecture strategy based on a genetic algorithm to find the best individual in the optimal space. Our algorithms drastically reduce resource costs and also keep good performance. On the Cifar-10 dataset, our framework presents outstanding performance with an error rate of 5.12% and only 4.6 GPU a day to converge to the optimal individual -22 GPU a day less than the lowest cost automatic evolutionary algorithm in the peer competition.

Keywords : CNN architecture, genetic algorithm, evolution algorithm, length constraints

Conference Title : ICECMLDM 2022 : International Conference on Evolutionary Computation, Machine Learning and Data Mining

Conference Location : Tokyo, Japan

Conference Dates : December 02-03, 2022