GA-based Training-Free NAS Algorithm with Hybrid Score Function

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2023

1 Abstract

In the last few years, Artificial Neural Network (ANN) has been used in a variety of fields, i.e., image classification, speech recognition, and Natural Language Processing.

Most of the architectures of ANN are hand-designed by experts, consuming lots of time and resource. This problem induce the researches of Neural Architecture Search (NAS) algorithm, providing an automated, fast, and accurate approach to build a good architecture of ANN.

However, the NAS algorithms in the past were time-consuming, which were caused by the fact that, during the searching, a candidate of architectures must be trained to know how the performance of this architecture. Thus, plenty of training-free NAS algorithm are developed in recent years. By using training-free score function to evaluate an architecture, there's no requirement for training architectures anymore. Compare with training-required NAS algorithms, training-free NAS algorithms tend to be faster and consuming less resource.

Neverthesless, the low correlation between single Training-Free Score Function and the performance of an architecture limits the performance of training-free NAS algorithms. To mitigate this problem, we propose a genetic-based training-free NAS algorithm with hybrid training-free score function, which combines three highly heterogeneous training-free score functions to evaluate an architecture. To evaluate the performance of the proposed algorithm, we compared it with several NAS algorithms, including weight-sharing methods, non-weight-sharing methods, and neural architecture search without training (NASWOT). We expect develope a faster and more accurate training-free NAS algorithm.

References