Exploring the Imposition of Synaptic Precision Restrictions for Evolutionary Synthesis of Deep Neural Networks

Submission ID 3000114

Submission Type Poster

Topic Artificial Intelligence

Status Submitted

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SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary A key contributing factor to incredible success of deep neural networks has been the significant rise on massively parallel computing devices allowing researchers to greatly increase the size and depth of deep neural networks, leading to significant improvements in modeling accuracy. Although deeper, larger, or complex deep neural networks have shown considerable promise, the computational complexity of such networks is a major barrier to utilization in resource-starved scenarios. We explore the synaptogenesis of deep neural networks in the formation of efficient deep neural network architectures within a evolutionary deep intelligence framework, where a probabilistic generative modeling strategy is introduced to stochastically synthesize increasingly efficient yet effective offspring deep neural networks over generations, mimicking evolutionary processes such as heredity, random mutation, and natural selection in a probabilistic manner. In this study, we primarily explore the imposition of synaptic precision restrictions and its impact on the evolutionary synthesis of deep neural networks to synthesize more efficient network architectures tailored for resource-starved scenarios. Experimental results show significant improvements in synaptic efficiency and inference speed while preserving modeling accuracy.

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Keywords

Keywords
Evolutionary Synthesis
Deep Neural Networks
Synaptic Precision