

Photonic Neural Network and Reservoir Computing: Overview and Recent Progress

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Abstract

As the demand for artificial intelligence (AI) continues to grow, concerns about the increasing energy consumption associated with AI processing have become a societal issue. To address this challenge, the physical implementation of certain AI functions using photonic technologies is considered as a promising approach for reducing energy use. Various methods have been explored for developing AI systems with photonic components. To date, successful demonstrations of different neural network models, such as deep learning and convolutional neural networks, have been reported [1–3]. Among these, the photonic implementation of reservoir computing (RC) has attracted particular attention because of its simpler architecture compared to other models, as well as its relative ease of integration into photonic systems [4–6]. Furthermore, using photonic integrated circuits, such as silicon photonics, to realize RC is expected to facilitate the development of compact, high-speed, and low-power AI hardware. In this presentation, we will provide an overview of photonic neural networks and RC, including recent advances and our latest progress in these areas.

References

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