
Advancing image classification based on all-optical fourier convolutional neural networks

Yan Liu

*State Key Laboratory of Advanced Optical Communication Systems and
Networks, School of Physics and Astronomy
Shanghai Jiao Tong University
Shanghai, China
liu yan@sjtu.edu.cn*

Compared to traditional neural networks, optical neural networks demonstrate significant advantages in terms of information processing speed, energy efficiency, anti-interference capability, and scalability. Despite the rapid development of optical neural networks in recent years, most existing systems still face challenges such as complex structures, time-consuming training, and insufficient accuracy. This study fully leverages the coherence of optical systems and introduces an all-optical Fourier convolutional neural network based on the diffraction of complex image light fields. This novel approach not only simplifies the network architecture but also achieves rapid computation and high accuracy in image classification tasks. Our research not only opens new perspectives for the development of all-optical neural networks but also provides valuable insights into future high-performance, low-energy computing solutions.



Short Bio:

Yan Liu is a Ph.D. student at Shanghai Jiao Tong University. His research interests include optical neural networks and computation in optical signal processing.