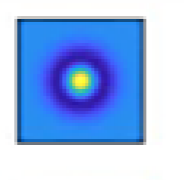
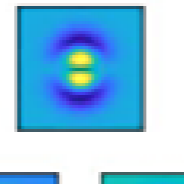
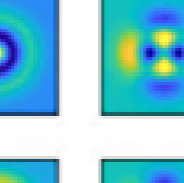
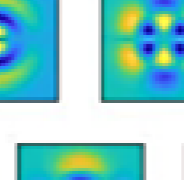
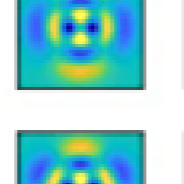
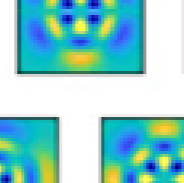
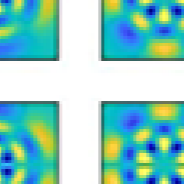
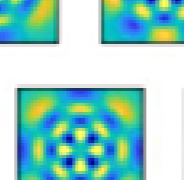



Optical deep learning with nonlinear multimode signals

Yuval Tamir, Hamootal Daudi, Moti Fridman

A deep learning network requires high-performance computer systems for complex problems with millions of parameters. We suggest an optical-based deep learning system based on nonlinear interaction in a multimode fibers resonator. The input signal power and modes as a function of time serve as the input to the network and after each cycle two pump waves couple the different modes in the signals and generate an idler. The power and modes of the pumps as a function of time serve as the network parameters. Details of our system and preliminary results will be presented in the talk.

| Group number | LP modes | Simulated LP modes |
|--------------|---|---|
| 3 | LP_{01} |  |
| 4 | LP_{11} |  |
| 5 | LP_{02}, LP_{21} |  |
| 6 | LP_{12}, LP_{31} |  |
| 7 | $LP_{03}, LP_{22}, LP_{41}$ |  |
| 8 | $LP_{13}, LP_{32}, LP_{51}$ |  |
| 9 | $LP_{04}, LP_{23}, LP_{42}, LP_{61}$ |  |
| 10 | $LP_{14}, LP_{33}, LP_{52}, LP_{71}$ |  |
| 11 | $LP_{05}, LP_{24}, LP_{43}, LP_{62}, LP_{81}$ |  |

