Spring 2020

RENSSELAER POLYTECHNIC INSTITUTE

DEPARTMENT OF MATHEMATICAL SCIENCES COLLOQUIUM

Regression of functions on low-dimensional manifolds by deep neural networks

Abstract: Many data in real-world applications lie in a high-dimensional space but are concentrated on or near a low-dimensional manifold. Our goal is to estimate functions on the manifold from finite samples of data. This talk focuses on an efficient approximation theory of deep ReLU networks for functions supported on low-dimensional manifolds. We construct a ReLU network for such function approximation where the size of the network grows exponentially with respect to the intrinsic dimension of the manifold. When the function is estimated from finite samples, we proved that the mean squared error for the function approximation converges as the training samples increases with a rate depending on the intrinsic dimension of the manifold instead of the ambient dimension of the space. These results demonstrate that deep neural networks are adaptive to low-dimensional geometric structures of data. This is a joint work with Minshuo Chen, Haoming Jiang, Tuo Zhao (Georgia Institute of Technology).

Wenjing Liao

Monday, March 16, 2020 4-5pm

Amos Eaton 216

Refreshments served 3:30-4pm Amos Eaton 4th Floor Lounge