

Taiji Suzuki – Department of Mathematical Informatics, University of Tokyo

Estimation ability of deep learning with connection to sparse estimation in function space

We will talk about the learning ability of deep ReLU-neural network, in particular, in connection to sparsity in a functional space. The superior learning ability of deep models is essentially due to its ability to construct bases in an adaptive way to each target function. For this purpose, the non-convexity of the model is quite important. This point shares several similarities to the sparse learning methods such as L0 regularization and low rank matrix estimation. In this talk, we will show that the non-convexity of the model gives superior performance with connection to sparse estimation. In particular, we consider the Besov space and its some variants, and show deep learning can outperform any linear estimators on near non-convex functional spaces. Moreover, we will show that the low rank property of the internal layers can give better generalization error.