The expressiveness of random dynamical systems

Martin Larsson*[1]

[1]ETH Zurich – Switzerland

Abstract

Deep neural networks perform exceedingly well on a variety of learning tasks, in particular in finance where they are quickly gaining importance. Training a deep neural network amounts to optimizing a nonlinear objective over a very large space of parameters. This would seem a hopeless task if an optimal or near-optimal solution were required. The fact that this can succeed suggests that the result is largely insensitive to the details of the optimization procedure, a perspective that is supported by empirical evidence. In this work we take a step toward a theoretical understanding of this phenomenon. In a simple model of deep neural networks as discretizations of controlled dynamical systems, we rigorously prove that any learning task can be accomplished even if a majority of the parameters are chosen at random.

*Speaker