Feature Geometry and Applications in Deep Learning

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Deep neural networks (DNN) are understood and used as powerful function approximators. As a result, different metrics for the distance between functions, or equivalently, probability distributions, are often used as loss functions or regulators in the training of DNNs. Conceptually, since the functions of interest are almost always very high dimensional objects, it can be more insightful to address the problem with a Hilbert space structure, and use a geometric language, subspaces, projections, basis, etc, especially for multi-variate learning problems, Such a general approach can offer better insights to the information exchange in the learning process, and in many cases lead to more systematic ways to design the architecture and parameters for DNN-based learning algorithms. In this talk, we will present a few recent results in this direction.