

Abstract:

We explore the capacity of neural ODEs for supervised learning from the perspective of simultaneous control. We consider the parameters as piecewise constant functions in time and construct them explicitly, allowing us to obtain suboptimal bounds on their complexity.

First, we focus on data classification by controlling clusters of points belonging to two classes. We estimate the number of neurons required to classify any training set of points that are randomly sampled from the uniform distribution. Subsequently, we analyze the interaction and interchangeability of the depth and width of the architecture for simultaneous control. Finally, we focus our study on the case of constant parameters, where the model is autonomous.