



THE WEIZMANN INSTITUTE OF SCIENCE  
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building  
on Thursday, Jan 09, 2020  
at 12:15

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Beyond Accuracy: Neural Networks Show Similar Learning Dynamics Across  
Architectures

Abstract:

One of the unresolved questions in deep learning is the nature of the solutions that are being discovered. We investigated the collection of solutions reached by the same neural network (NN) architecture, with different random initialization of weights and random mini-batches. These solutions are shown to be rather similar -- more often than not, each train and test example is either classified correctly by all NN instances, or by none at all. Furthermore, all NNs seem to share the same learning dynamics, whereby initially the same train and test examples are correctly recognized by the learned model, followed by other examples that are learned in roughly the same order. When extending the investigation to heterogeneous collections of NN architectures, once again examples are seen to be learned in the same order irrespective of architecture, although the more powerful architecture may continue to learn and thus achieve higher accuracy. Finally, I will discuss cases where this pattern of similarity breaks down, which show that the reported similarity is not an artifact of optimization by gradient descent.