Corroborating results for three-regime model on different datasets

We confirm the three-regime model applies to two different datasets, namely SVHN (Netzer et al., 2011) and CIFAR-100. For both datasets, we use PreResNet-20. See Figure 14 and 15.

Here are more details of the two experiments. We tune the following hyperparameters to vary the magnitude of temperature parameters and load parameters:

- Using number of training epochs as temperature. The model is trained with 7 epochs: 30, 50, 70, 90, 110, 130, 150.
- Using model density as load. The model is pruned to 8 different densities: 5%, 6%, 7%, 8%, 10%, 20%, 40%, 80%.

We train the full model with one random seed and retrain each pruned model with three random seeds.

First, we show the results on SVHN. See Figure 14, which shows similar plots to Figure 2 in the main paper. We observe that:

- Figure 1c: LMC forms a sharp transition from a negative value (dark blue region) to zero (white region), which distinguishes Regime I (lower left corner) from Regime II/III.
- Figure 1d: In the region with non-zero LMC, CKA changes smoothly in a way that is aligned with test error

Next, we show the results on CIFAR-100 in Figure 15, which is similar to Figure 14.
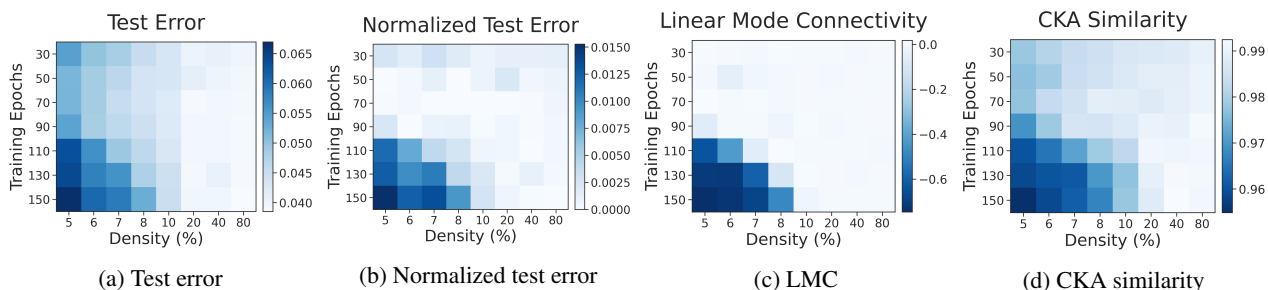

(a) Test error   (b) Normalized test error   (c) LMC   (d) CKA similarity

Figure 14. Partitioning the 2D model density—training epoch diagram into three regimes. Models are trained with PreResNet-20 on SVHN.

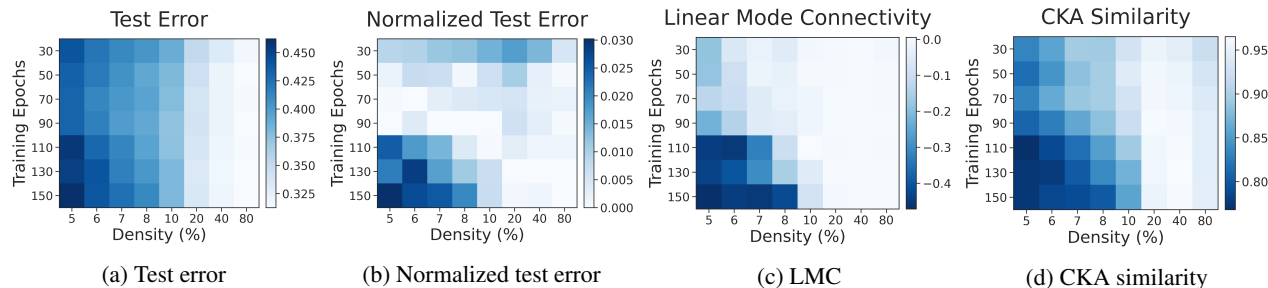(a) Test error   (b) Normalized test error   (c) LMC   (d) CKA similarity

Figure 15. Partitioning the 2D model density—training epoch diagram into three regimes. Models are trained with PreResNet-20 on CIFAR100.

References

Netzer, Y., Wang, T., Coates, A., Bissacco, A., Wu, B., and Ng, A. Y. Reading digits in natural images with unsupervised feature learning. In *NIPS Workshop on Deep Learning and Unsupervised Feature Learning 2011*, 2011.