TTIC 31230, Fundamentals of Deep Learning

David McAllester, Winter 2020

Double Descent

Double Descent

Reconciling modern machine learning practice and the bias-variance tradeoff

Mikhail Belkin, Daniel Hsu, Siyuan Ma, Soumik Mandal, arXiv December 2018.

Deep Double Descent: Where Bigger Models and More Data Hurt

Preetum Nakkiran, Gal Kaplun, Yamini Bansal, Tristan Yang, Boaz Barak, Ilya Sutskever, ICLR 2020

Classical Regime: Bias-Variance Tradeoff O.5 O.4 UB Descent Modern Regime: Larger Model is Better Critical Regime Test Train Interpolation Threshold

Deep Double Descent: Where Bigger Models and More Data Hurt

30

ResNet18 width parameter

40

50

60

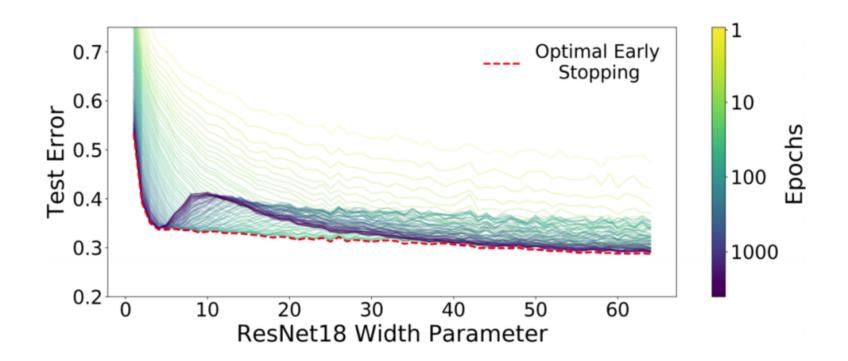
0.0

10

20

Preetum Nakkiran, Gal Kaplun, Yamini Bansal, Tristan Yang, Boaz Barak, Ilya Sutskever, ICLR 2020

Double Descent



Summary

There is never harm in doing early stopping — one should always do early stopping.

Regularization is any modification to the training algorithm motivated by reducing the training-validation gap.

While regularization modifications to training can be inspired by theory, the theory is weak.

Regularization proposals should be evaluated empirically.

\mathbf{END}