

Double Descent Phenomenon

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Overview

Our presentation will focus on four points which are:

- 1 Bias - Variance Tradeoff
- 2 Double Descent Phenomenon
- 3 Double descent phenomenon and model generalization
- 4 Conclusion



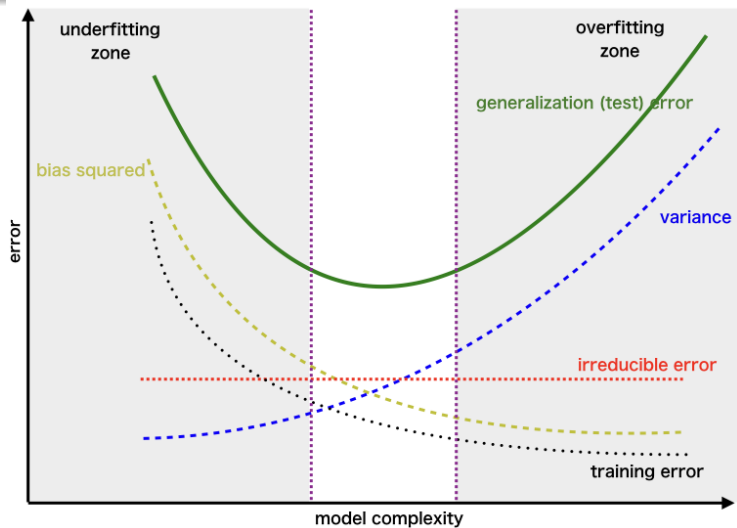


Figure: Bias-Variance Tradeoff.



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Double Descent

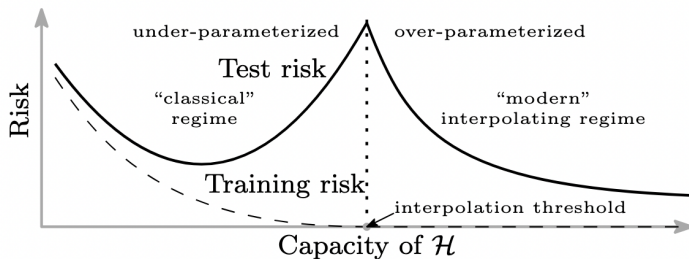


Figure: Double descent .



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Double Descent Phenomenon

The following are types of double descent

- Sample-wise Double Descent
- Model-wise Double Descent
- Epoch-Wise Double descent

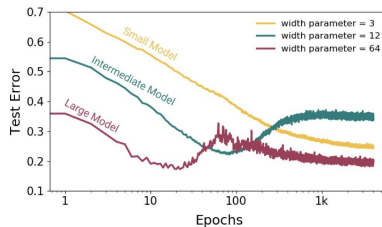


Figure: Epoch Wise



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Double descent phenomenon with models

Models in which double descent has been observed

- Linear regression
- Linear Discriminant Analysis
- Logistic regression

Models in which double descent is still under research

- Quadratic Discriminant Analysis (work on Linear Discriminant Analysis may be extended)
- Random forests
- Support Vector Machines
- Neural networks with nonlinear activation



Python

This is our Python code . [Click here to visit the notebook.](#)

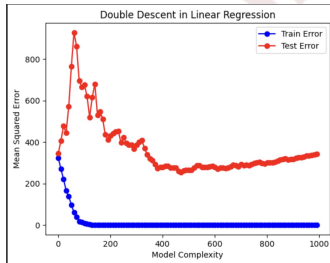


Figure: Linear Regression

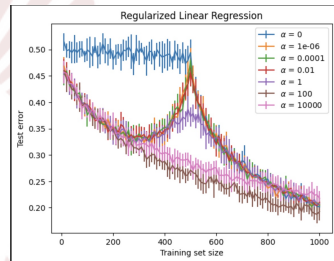


Figure: Linear Regression with L2 Regularizer



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Conclusion



**"We leave fully understanding the mechanisms behind
double descent as an important open question"**



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References

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- [2] Preetum Nakkiran et al. *Deep Double Descent: Where Bigger Models and More Data Hurt*. 2019. arXiv: 1912.02292 [cs.LG].
- [3] Rylan Schaeffer et al. *Double Descent Demystified: Identifying, Interpreting Ablating the Sources of a Deep Learning Puzzle*. 2023. arXiv: 2303.14151 [cs.LG].
- [4] *The Double Descent Phenomenon in Machine Learning*. Webots, https://math.gatech.edu/sites/default/files/images/reu2021_liao.pdf. Accessed April 2023.
- [5] *Double decent animated image*. Webots, [The logo of the African Institute for Mathematical Sciences \(AIMS\) Senegal, featuring a stylized circular emblem with radiating lines.](https://mlu-</div><div data-bbox=)