

Risk bounds for deep learning Bos, J.M.

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Stellingen

Behorende bij het proefschrift

Risk bounds for deep learning

- 1. Even for simple classification models, interpolation gives rise to infinite Kullback-Leibler risk. (Lemma 2.2.1., Chapter 2)
- 2. The effective smoothness for compositional models provides a lower bound on the overall smoothness, but the two do not necessarily coincide. (Chapter 3)
- 3. The extra noise in the Forward Gradient update rule compared to standard gradient descent makes the convergence rate for the squared risk of Forward Gradient in the linear model a factor $d\log(d)$ worse than the convergence rate of standard gradient descent in the same settings. (Chapter 4)
- 4. The truncated Kullback-Leibler divergence with truncation level $B \geq 2$ can be lower bounded by twice the squared Hellinger distance and upper bounded by $2\exp(B/2) \times$ squared Hellinger distance. (Lemma 2.3.4., Chapter 2)
- 5. Lack of independence makes statistical theory considerably more complicated.
- 6. The chosen risk criterion might determine the difficulty of the statistical analysis.
- 7. Controlling the sparsity of the parameters is at least theoretically a good idea to regulate the entropy/variability of deep neural networks.
- 8. The abundance of graphical models in density modelling implies that assuming a compositional structure of the density is natural.
- 9. Just as with statistics, improper use by humans is the most dangerous factor in Artificial Intelligence.
- 10. Having to wait longer increases the satisfaction gained from skating on natural ice.

Thijs Bos Leiden, 19 juni 2024