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Neural network, spin glasses and random matrices

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Neural networks have been extremely successful when applied to machine learning problems, like computer vision, speech processing and media generation. Mathematically, training a neural network is achieved by optimising a loss function. For large neural networks this is a substantially complex problem. In a landmark paper, Choromanska et al. (2015) argued that training loss surfaces of large networks can be modelled by spherical multi-spin glasses. In this talk we present recent results about the loss surfaces of neural networks and generative adversarial networks using supersymmetric techniques from random matrix theory. Our results shed light on the strengths of spin glass models for neural networks. This is work in collaboration with Nicholas Baskerville, Jonathan Keating and Joseph Najnudel.

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