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Statistical physics of learning (revisited)

Heuristic tools from statistical physics, in particular the replica method, have been used in the past to locate the phase transitions and compute the optimal learning and generalisation errors in many machine learning tasks. This field is currently witnessing an impressive revival. In this talk, we provide a rigorous justification of these approaches for high-dimensional generalized linear models — used in signal processing, statistical inference, machine learning, communication theory and other fields— and discuss computational to statistical gaps where the learning is possible, but computationally hard.