Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

Thursday, 24 October 2024, 16:30
Lipschitz-Saal (LWK 1.016)

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On the equivalence of Hopfield Networks and Boltzmann Machines

The theory of spin models, originally developed to explain magnetic phenomena, has since found wide-ranging interdisciplinary applications, including in artificial intelligence. One key example is the Hopfield model, which simulates an artificial associative memory, with its thermodynamics closely mirroring those of a foundational model in statistical learning: the Restricted Boltzmann Machine (RBM). In this seminar, based on joint work with Elena Agliari, I will briefly introduce the Hopfield model and show its formal equivalence to a hybrid model, combining discrete and analog components, that represents a three-layer trained RBM.
Once this equivalence is established, insights from the Hopfield model are used to explore the retrieval capabilities of a trained RBM.