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From holographic RG to information flows

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I will give a brief overview of the holographic RG in the context of the AdS/CFT correspondence, considering both flows to IR fixed points as well as to confining dual field theories. I will highlight recent developments on relating information-theory concepts such as entanglement entropy to geometric objects in dual hyperbolic spaces. Moreover, I will present recent results on the analogy between the RG and deep neural networks, wherein subsequent layers of neurons are analogous to successive steps along the RG. In particular, we quantify the flow of information by explicitly computing the relative entropy or Kullback-Leibler divergence in both the one- and two-dimensional Ising models under decimation RG, as well as in a feedforward neural network as a function of depth. We observe qualitatively identical behavior characterized by the monotonic increase to a parameter-dependent asymptotic value.

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