Special Issue

Information-Theoretic Methods in Deep Learning: Theory and Applications

Message from the Guest Editors

In recent years, researchers have revealed that Information theoretic learning (ITL) provides a powerful paradigm for analyzing neural networks by shedding light on the layered structure, generalization capabilities and learning dynamics. For example, the information bottleneck theory has demonstrated great potential to solve critical problems in deep learning, including understanding and analyzing black-box neural networks, and serving as an optimization criterion for training deep neural networks. Divergence estimation is another approach with a broad range of applications including domain shift detection, domain adaptation, generative modeling, and model regularization.

With the development of ITL theory, we believe that ITL can provide new perspectives, theories, and algorithms to the challenging problems of deep learning. Therefore, this Special Issue aims at reporting the latest developments on ITL methods and their applications.

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The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

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