IEEE Transactions on Neural Networks and Learning Systems (IEEE TNNLS)
Special Issue on *Information Theoretic Methods for the Generalization, Robustness and Interpretability of Machine Learning*

Call For Papers
In recent years, Information-Theoretic Learning (ITL) is exploiting the remarkable advantages of information-theoretic principles in solving various machine learning or deep learning problems. Despite the great success of deep neural networks (DNNs) in many artificial intelligence tasks, they still suffer from a few limitations, such as poor generalization behavior for out-of-distribution (OOD) data, vulnerability to adversarial examples, and the "black-box" nature of DNNs, which obscures understanding of their inner representations and decision-making process. Information theory has demonstrated great potential to solve above challenges. Notable examples include: 1) Information Bottleneck (IB) to explain the generalization behavior of DNNs or improve their adversarial robustness and OOD generalization; 2) incorporate information theory to learn causal representations, and optimize the value of information in abstract tasks such as the exploitation-exploration dilemma in reinforcement learning.

With the recent rapid development of advanced techniques on the intersection between information theory and machine learning, such as neural network-based mutual information estimators, causal representation learning, domain adaptation and generalization, this special issue welcome submission new perspectives, theories and algorithms of ITL to the challenging problems of machine learning on the central issues of generalization, robustness, and interpretability.

Scope of the Special Issue:
Topics of interest include but are not limited to:
- Estimation of information theoretic quantities from data
- Information theoretic learning principles and their implementations for the generalization and robustness of machine learning models
- Interpretation and explanation of machine learning models with information-theoretic methods
- Information theoretic methods for domain adaptation, out-of-domain generalization and relevant problems (such as robust transfer learning and lifelong learning)
- Information theoretic methods in generative models and causal representation learning
- Information theoretic methods for distributed machine learning
- Information theoretic methods for (deep) reinforcement learning
- Information theoretic methods for uncertainty quantification

Timeline:
Manuscript submission: 1st October 2022
Preliminary decision: 15th December 2022
Revisions due: 15th March 2023
Final decision: 15th May 2023

Guest Editors
- Badong Chen, Xi'an Jiaotong University, China
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Submission Instructions:
- Read the Information for Authors at http://cis.ieee.org/tnnls
- Submit your manuscript at the TNNLS webpage (http://mc.manuscriptcentral.com/tnnls) and follow the submission procedure. Include the following instructions in the header of the first page of your manuscript and cover letter: "Please submit the manuscript to the Special Issue on Information Theoretic Methods for the Generalization, Robustness and Interpretability of Machine Learning".