

## Special Issue

# Advances in Information-Theoretic Methods for Representation Learning and Data Science

### Message from the Guest Editor

Information theory lies at the core of machine learning and data science. Concepts such as entropy, divergence, and mutual information provide a powerful framework for quantifying information content and relationships among variables.

In representation learning, these quantities help evaluate and guide feature extraction. In data science, they enable insight discovery with minimal assumptions.

Recent advances include new dependence measures for high-dimensional spaces, information-theoretic objectives for self-supervised and reinforcement learning, and regularization methods based on entropy and the information bottleneck. Emerging research also shows that measures like representation entropy correlate with model performance, offering new ways to understand foundation models.

### Topics of interest include:

- Novel estimators for entropy, divergence, and mutual information in high dimensions
- Information-theoretic analysis of representation learning
- Information theory for causal representation learning
- Information theory for interpretable models

We welcome contributions that advance the theory or application of information measures in learning and data science.

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### Guest Editor

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### Deadline for manuscript submissions

1 February 2027



## Entropy

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Impact Factor 2.0  
CiteScore 5.2  
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## About the Journal

### Message from the Editor-in-Chief

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.

*Entropy* is an online open access journal providing an advanced forum for the development and/or application of entropic and information-theoretic studies in a wide variety of applications. *Entropy* is inviting innovative and insightful contributions. Please consider *Entropy* as an exceptional home for your manuscript.

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### Editor-in-Chief

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