

情報科学研究科 重点プロジェクト

数学と諸分野の協働推進による
学際的・総合的な新領域研究の開拓

M A T H E M A T I C S × E X T E N S I V E S C I E N C E

第19回講演会 兼 第66回応用数学連携フォーラム 数理科学連携研究センター共催

日時

2018年1月10日(水) 15時00分～16時00分

会場

東北大学 情報科学研究科棟 大講義室

講演者

Braxton Osting (The University of Utah, USA)

タイトル

Geometric and Variational Methods for Clustering

概要

Clustering is the unsupervised learning task of finding similar groups of items within a dataset. One approach to clustering is to reformulate the problem as a weighted graph partitioning problem where the graph edge weights are derived from a similarity measure between items in the dataset. This graph partitioning problem can be formulated using a variety of geometric quantities, for example, the Cheeger cut and Laplace-Dirichlet eigenvalues. In this talk, I'll discuss the resulting methods, their semi-supervised extensions, variational relaxations, and interpretations in terms of random processes. I'll present some recent consistency results for geometric graphs, stating convergence of graph partitions to an appropriate continuum partition. I'll also describe numerical methods that can be used to find locally optimal partitions and present results demonstrating that such methods compare well with state-of-the-art approaches on a variety of graphs constructed from synthetic data, the MNIST handwritten digit dataset, and images. This general-audience colloquium will be complemented by three more mathematical lectures on the same topic.



<http://www.math.is.tohoku.ac.jp/~project/>