

IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS

Special Issue on

Learning in Non-(geo)metric Spaces

Traditional machine learning and pattern recognition techniques are intimately linked to the notion of “feature space.” Adopting this view, each object is described in terms of a vector of numerical attributes and is therefore mapped to a point in a Euclidean (geometric) vector space so that the distances between the points reflect the observed (dis)similarities between the respective objects. This kind of representation is attractive because geometric spaces offer powerful analytical as well as computational tools that are simply not available in other representations. However, the geometric approach suffers from a major intrinsic limitation which concerns the representational power of vectorial, feature-based descriptions. In fact, there are numerous application domains where either it is not possible to find satisfactory features or they are inefficient for learning purposes. By departing from vector-space representations one is confronted with the challenging problem of dealing with (dis)similarities that do not necessarily possess the Euclidean behavior or not even obey the requirements of a metric. The lack of “(geo)metric” (i.e., geometric and/or metric) properties undermines the very foundations of traditional machine learning theories and algorithms, and poses totally new theoretical/computational questions and challenges that the research community is currently trying to address. The goal of the special issue is to consolidate research efforts in this area by soliciting and publishing high-quality papers which, together, will present a clear picture of the state of the art.

SCOPE OF THE SPECIAL ISSUE

We will encourage submissions of papers addressing theoretical, algorithmic, and practical issues related to the two fundamental questions that arise when abandoning the realm of vectorial, feature-based representations, namely:

- how can one obtain suitable similarity information from data representations that are more powerful than, or simply different from, the vectorial?
- how can one use similarity information in order to perform learning and classification tasks?

Accordingly, topics of interest include (but are not limited to):

- Embedding and embeddability
- Graph spectra and spectral geometry
- Indefinite and structural kernels
- Game-theoretic models of pattern recognition and learning
- Characterization of non-(geo)metric behavior
- Foundational issues
- Measures of (geo)metric violations
- Learning and combining similarities
- Multiple-instance learning
- Applications

We aim at covering a wide range of problems and perspectives, from supervised to unsupervised learning, from generative to discriminative models, and from theoretical issues to real-world applications.

IMPORTANT DATES

October 1, 2013 – Deadline for manuscript submission

April 1, 2014 – Notification to authors

July 1, 2014 – Deadline for submission of revised manuscripts

October 1, 2014 – Final decision

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SUBMISSION INSTRUCTIONS

1. Read the information for authors at: <http://cis.ieee.org/publications.html>

2. Submit the manuscript by **October 1, 2013** at the TNNLS webpage (<http://mc.manuscriptcentral.com/tnnls>) and follow the submission procedure. Please, clearly indicate on the first page of the manuscript and in the cover letter that the manuscript has been submitted to the special issue on *Learning in non-(geo)metric spaces*. Send also an e-mail to M. Pelillo (pelillo@dsi.unive.it) with subject “TNNLS special issue submission” to notify the editors of your submission.