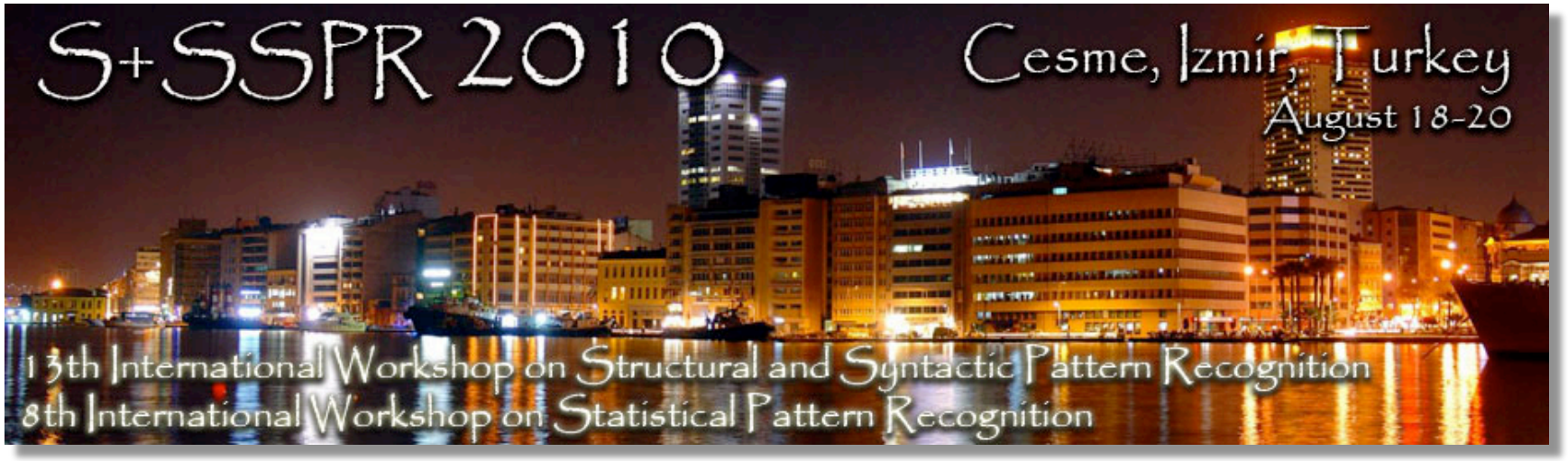

SSPR 2010 Special Session

SIMILARITY-BASED PATTERN RECOGNITION: CHALLENGES AND PROSPECTS

SIMBAD

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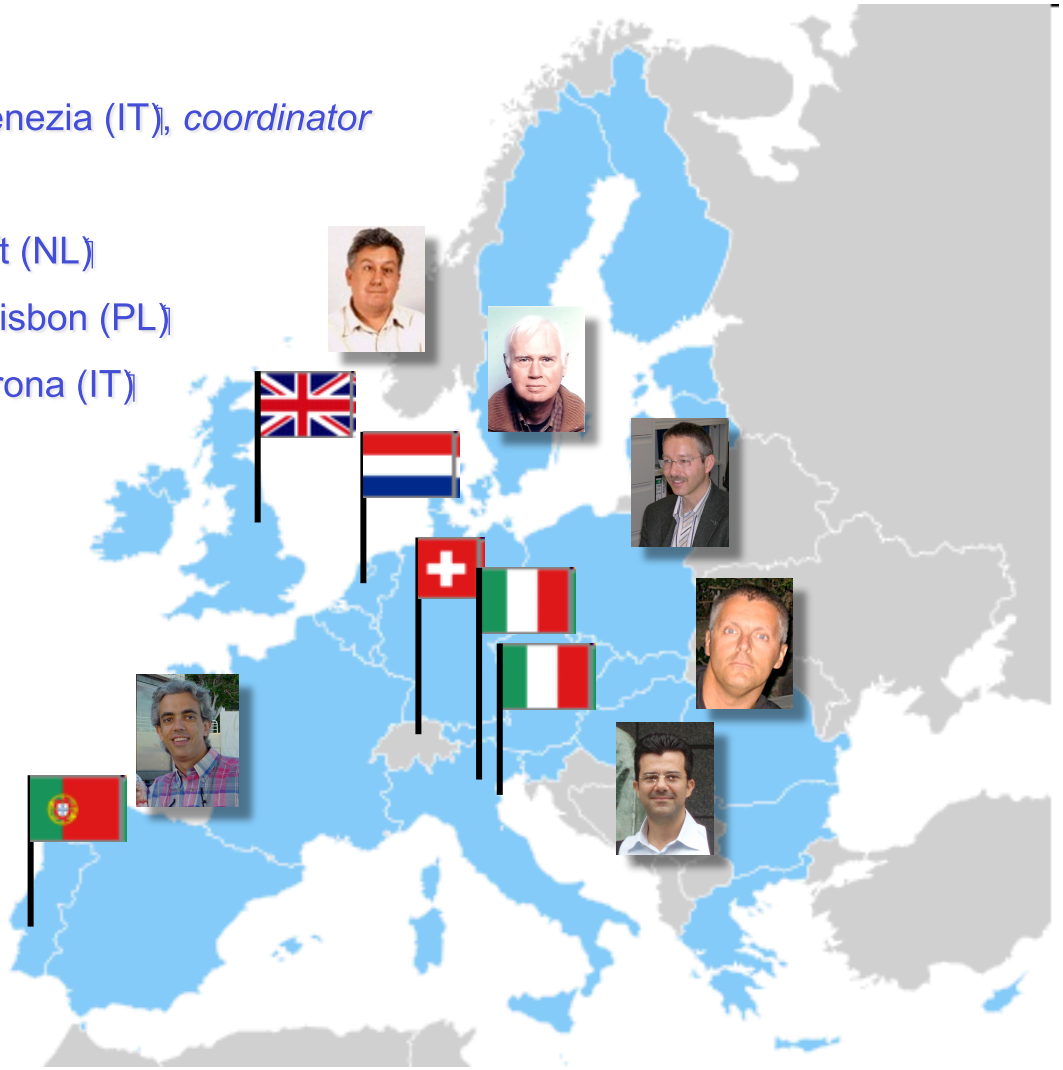
The SIMBAD FP7 Project

Beyond Features: Similarity-Based Pattern Analysis and Recognition

1. Università Ca' Foscari di Venezia (IT), *coordinator*
2. University of York (UK)
3. Technische Universität Delft (NL)
4. Insituto Superior Técnico, Lisbon (PL)
5. Università degli Studi di Verona (IT)
6. ETH Zürich (CH)



Pattern Recognition and Hume's Similarity Principle

« I have found that such an object has always been attended with such an effect, and I foresee, that other objects, which are, in appearance, similar, will be attended with similar effects. »

David Hume

An Enquiry Concerning Human Understanding

(1748)

The Classical "Feature-based" Approach and Its Limitations

Traditional pattern recognition techniques are centered on the notion of **feature,** i.e. they *derive similarities from vector representations*.

But, there are variuos application domains where either it is not possible to find satisfactory features or they are inefficient for learning purposes.

This is typically the case, e.g.,

- when experts cannot define features in a straightforward way
- when data are high dimensional
- when features consist of both numerical and categorical variables,
- in the presence of missing or inhomogeneous data
- when objects are described in terms of structural properties, such as parts and relations between parts, as is the case in shape recognition

Beyond features?

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 the Euclidean and/or metric properties undermines the very foundations of traditional pattern recognition theories and algorithms!

Objectives of SIMBAD

SIMBAD aims at bringing to full maturation a paradigm shift that is currently just emerging within the pattern recognition and machine learning domains, where researchers are becoming increasingly aware of the importance of similarity information *per se*, as opposed to the classical feature-based approach.

The whole project will revolve around two main themes, which basically correspond to the two fundamental questions that arise when abandoning the realm of vectorial representations, namely:

- How can one ***obtain*** suitable similarity information from object 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?

The structure of SIMBAD

1. **Deriving similarities for non-vectorial data**
   - -- *Structural (generative/compression) kernels*
   - -- *Learning and combining similarities*

2. **Learning and classification with non-(geo)metric similarities**
   - -- *Foundations of non (geo)metric similarities*
   - -- *Imposing geometricity on non-geometric similarities (embedding)*
   - -- *Learning with non-(geo)metric similarities (game theory)*

3. **Biomedical applications**
   - -- *Analysis of tissue micro-array (TMA) images of renal cell carcinoma*
   - -- *Analysis of brain magnetic resonance (MR) scans for the diagnosis of mental illness*

For more information:

http://simbad-fp7.eu

Journal Special Issue:
Learning in Non-(geo)metric Spaces

JMLR (?)

Tentative Schedule:

Proposal submission:	Next few days…
Call for Papers issued.	End of Summer 2010
Submission deadline:	October 2010
1st reviews:	March 2011
Revised papers:	July 2011
2nd reviews/decisions:	October 2011
Publication:	Early 2012

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The SIMBAD Workshop Series

The first edition of the workshop (***SIMBAD 2011***) will take place in Italy, in the (late) spring of 2011, at the end of the project (in conjuction with the final SIMBAD meeting).

Format:
- a few invited talks
- contributed oral/poster presentation
- panel discussion

Call for Papers issued early in summer 2010.

Lecture Notes in Computer Science
LNCS LNAI LNBI

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PASCAL2
Pattern Analysis, Statistical Modelling and Computational Learning

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SIMBAD

Schedule

09:10 – 09:30	**L. Han, R. Wilson, and E. R. Hancock** *Generative Models for Relational Structures*
09:30 – 09:50	**M. Loog et al.** *Dissimilarity-based Classification of MRIs for Early Diagnosis of Dementia*
09:50 – 10:10	**F. Escolano, E. R. Hancock, and M. A. Lozano** *Graph Similarity, I-Divergences and Entropic Manifold Alignment*
10:10 – 10:30	*Coffee break*
10:30 – 10:50	**A. Carli, M. Bicego, S. Baldo, and V. Murino** *Nonlinear Mappings for Generative Kernels on Latent Variable Models*
10:50 – 11:10	**D. R. Kisku** *Complexity Analysis of Multi-View Face Recognition System*
11:10 – 11:30	**A. Torsello** *A Game-Theoretic Approach to Robust Inlier Selection*
11:30 – 12:30	**Panel discussion** Panelists: *N. Ahuja, H.Bunke, E. Estrada, J. Kittler, and F. Porikli* Moderator*: E. R. Hancock*