1st International Workshop on Similarity-Based Pattern Analysis and Recognition

SIMBAD 2011

28-30 September 2011
Venice, Italy

The First International Workshop on Similarity-Based Pattern Analysis and Recognition
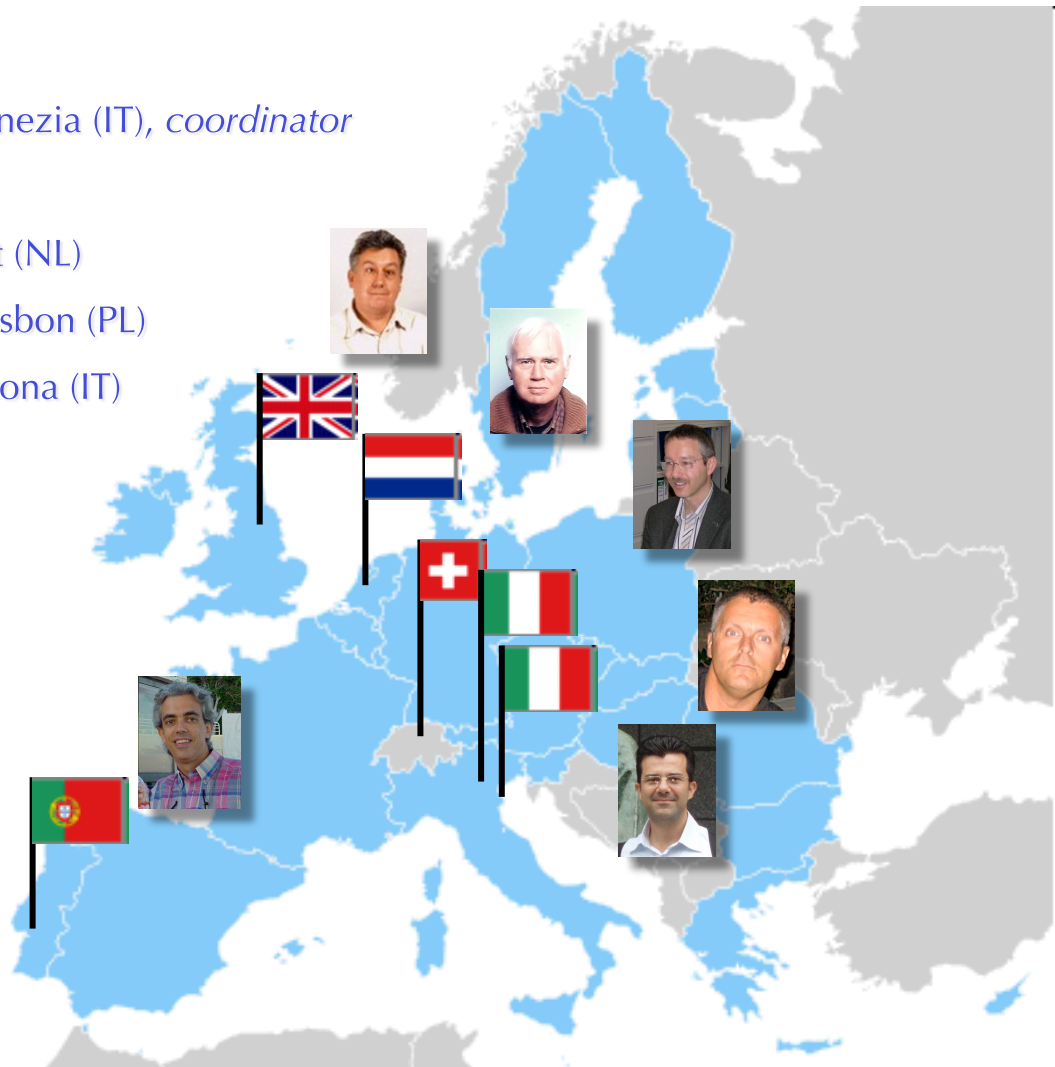
Venice, 28-30 September 2011

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)

http://simbad-fp7.eu

The Classical "Feature-based" Approach and Its Limitations

Traditional pattern recognition techniques are centered on the notion of **feature-vector,** 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

The SIMBAD Book

M. Pelillo (Ed.)
Similarity-Based Pattern Analysis and Recognition

The book will be published in Springer's Series **Advances in Computer Vision and Pattern Recognition** and is planned to appear in the **spring of 2012**.

The Venue

Ca' Dolfin

- Built in XVI century, architect unknown

- Sold to Cardinal Dolfin on November 24, 1621 (for 12000 "scudi")

- Purchased by milanese architect G. B. Brusa in 1876

- Then, Labia, Querini, etc.

- Purchased by Ca' Foscari University in 1955

- It used to host the Applied Math Department

The Main Hall

Ceiling by Niccolo' Bambini
(1710-1715)

Ten paintings by Tiepolo
(1726-1730)

The Hermitage, St. Petersburg

Dictatorship Offered to Cincinnatus
Tiepolo, Giovanni Battista.
Oil on canvas. 387x227 cm
Italy. Circa 1730

Triumph of Manius Curius Dentatus
Tiepolo, Giovanni Battista.
Oil on canvas. 550x322 cm
Italy. Circa 1730

Metropolitan Museum of Art, New York

The Triumph of Marius, 1729
Giovanni Battista Tiepolo
Oil on canvas; Irregular painted surface, 220 x 128 5/8
in. (558.8 x 326.7 cm)

The Capture of Carthage, 1725–29
Giovanni Battista Tiepolo
Oil on canvas; Irregular painted surface, 162 x 148 3/8
in. (411.5 x 376.9 cm)

Kunsthistorisches Museum, Vienna

Giovanni Battista Tiepolo
(Venice 1696-1770 Madrid)
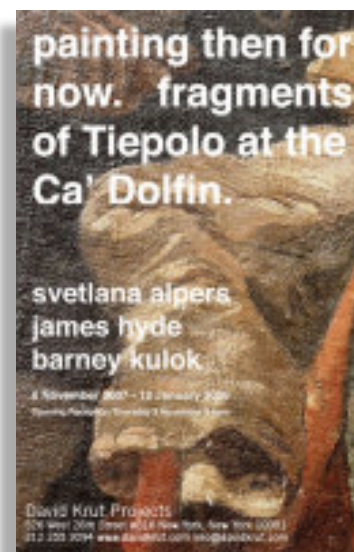The Death of the Consul Lucius Junius Brutus
c. 1728/30
Canvas

Books on Ca' Dolfin

The Ca' Dolfin Tiepolos
K. Christiansen
The Metropolitan Museum of Art Bulletin, 1998.

Painting Then For Now.
Fragments of Tiepolo at the Ca' Dolfin
S. Alpers, J.Hyde, and B. Kulok
David Krut Projects, 2007.

The Workshop

Wednesday, 28 September	Thursday, 29 September	Friday, 30 September

Wednesday, 28 September

9.15 **Welcome Address**

9.30 **Invited talk: What Makes Things Similar?**
Ulrike Hahn, Cardiff University, UK

10.30 **Coffee break**

Session 1: Dissimilarity Characterization and Analysis

11:00 On the Usefulness of Similarity based Projection Spaces for Transfer Learning
E. Morvant, A. Habrard, S. Ayache

11.30 Metric Anomaly Detection Via Asymmetric Risk Minimization
A. Kontorovich, D. Hendler, E. Menahem

12.00 One Shot Similarity Metric Learning for Action Recognition
O. Kliper-Gross, T. Hassner, L. Wolf

12.30 **Lunch**

Session 2: Generative Models of Similarity Data

14.00 Hybrid Generative-Discriminative Nucleus Classification of Renal Cell Carcinoma.
A. Ulas, P.J. Schüffler, M. Bicego, U. Castellani, V. Murino

14.30 Multi-task Regularization of Generative Similarity Models
L.Cazzanti, S.Feldman, M. Gupta, M. Gabbay

15.00 A Generative Dyadic Aspect Model for Evidence Accumulation Clustering
A. Lourenço, A. Fred, M. Figueiredo

15.30 **Coffee break**

Session 3: Applications

16.00 Combining Data Sources Nonlinearly for Cell Nucleus Classification of Renal Cell Carcinoma
M. Gönen, A. Ulas, P. J. Schüffler, U. Castellani, V. Murino

16.30 Supervised Segmentation of Fiber Tracts
E. Olivetti, P. Avesani

17.00 Exploiting Dissimilarity Representations for Person Re-Identification
R. Satta, G. Fumera, F. Roli

Thursday, 29 September

9.30 **Invited talk: Support Constraints Machines**
Marco Gori, University of Siena, Italy

10.30 **Coffee break**

Session 4: Clustering and Dissimilarity Data

11.00 Multiple-Instance Learning with Instance Selection via Dominant Sets
A. Erdem, E. Erdem

11.30 Min-Sum Clustering of Protein Sequences with Limited Distance Information
K. Voevodski, M. Balcan, H. Röglin, S. Teng, Y. Xia

12.00 Model-based Clustering of Inhomogeneous Paired Comparison Data
L. M. Busse, J. M. Buhmann

12.30 **Lunch**

14.00 Bag Dissimilarities for Multiple Instance Learning
D. Tax, M. Loog, R. Duin, V. Cheplygina, W. Lee

14.30 **Poster Spotlights**

Poster Session: 15.00 - 17.30

Mutual Information Criteria for Feature Selection
Z. Zhang, E.R. Hancock

On a Non-Monotonicity Effect of Similarity Measures
B. Moser, G. Stübl, J. Bouchot

A Study of Embedding Methods under the Evidence Accumulation Framework
H. Aidos, A. Fred

Section-wise Similarities for Clustering and Outlier Detection of Subjective Sequential Data
O. S. Siordia, I. Martín De Diego, C. Conde, E. Cabello

A Study of the Influence of Shape for Classifying Small Spectral Data Sets
D. Porro-Muñoz, R. P.W. Duin, M. Orozco-Alzate, I. Talavera

Impact of the Initialization in Tree-Based Fast Similarity Search Techniques
A. Serrano, L. Mico, J. Oncina

Feature Point Matching Using a Hermitian Property Matrix
M. Haseeb, E.R. Hancock

Learning Good Edit Similarities with Generalization Guarantees
A. Bellet

Friday, 30 September

9.30 **Invited talk: Limitations of Kernel and Multiple Kernel Learning**
John Shawe-Taylor, University College London, UK

10.30 **Coffee break**

Session 5: Graphs and Relational Models

11.00 Supervised Learning of Graph Structure
A. Torsello, L. Rossi

11.30 An Information Theoretic Approach to Learning Generative Graph Prototypes
L. Han, E.R. Hancock, R. Wilson

12.00 Graph Characterization via Backtrackless paths
F. Aziz, R.Wilson, E. R. Hancock

Videolectures Coverage

videolectures.net

exchange ideas & share knowledge

The Social Dinner
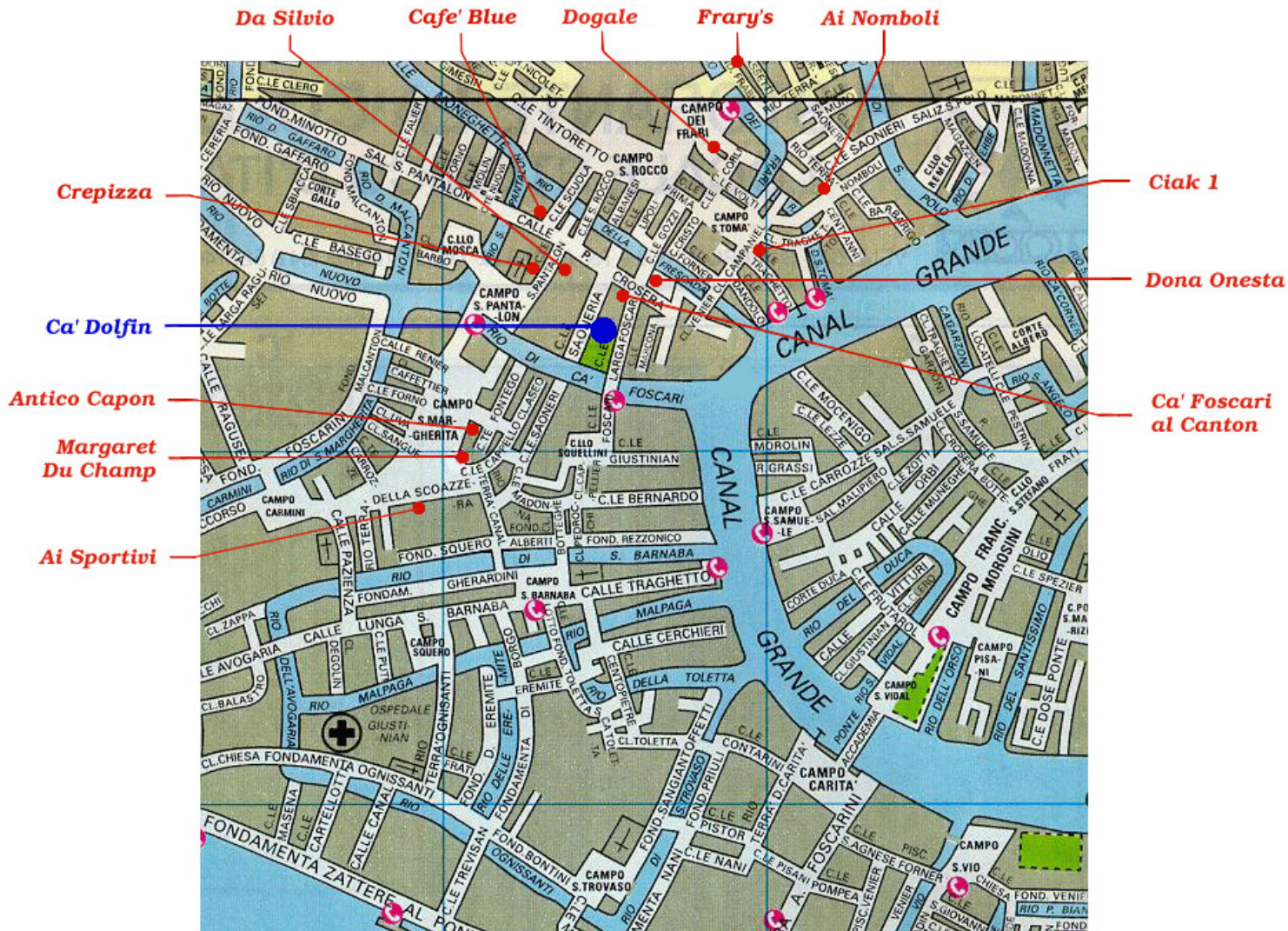## Thursday, 8:00 pm

Restaurant La Caravella
San Marco 2398, via XXII Marzo

Lunches

Wi-Fi?

Ask Samuel Rota Bulò →

Thanks to the PC Members

Maria-Florina Balcan, *Georgia Institute of Technology, USA*
Manuele Bicego, *University of Verona, Italy*
Joachim Buhmann, *ETH Zurich, Switzerland*
Horst Bunke, *University of Bern, Switzerland*
Tiberio Caetano, *NICTA, Australia*
Umberto Castellani, *University of Verona, Italy*
Luca Cazzanti, *University of Washington, Seattle, USA*
Nicolò Cesa-Bianchi, *University of Milan, Italy*
Robert Duin, *Delft University of Technology, The Netherlands*
Francisco Escolano, *University of Alicante, Spain*
Mario Figueiredo, *Technical University of Lisbon, Portugal*
Ana Fred, *Technical University of Lisbon, Portugal*
Bernard Haasdonk, *University of Stuttgart, Germany*
Edwin Hancock, *University of York, UK*
Anil Jain, *Michigan State University, USA*
Robert Krauthgamer, *Weizmann Institute of Science, Israel*
Marco Loog, *Delft University of Technology, The Netherlands*
Vittorio Murino, *University of Verona, Italy*
Elzbieta Pekalska, *University of Manchester, UK*
Marcello Pelillo, *University of Venice, Italy*
Massimiliano Pontil, *University College London, UK*
Antonio Robles-Kelly, *NICTA, Australia*
Volker Roth, *University of Basel, Switzerland*
Amnon Shashua, *The Hebrew University of Jerusalem, Israel*
Andrea Torsello, *University of Venice, Italy*
Richard Wilson, *University of York, UK*

Thanks to the Invited Speakers

Marco Gori

Ulrike Hahn

John Shawe-Taylor

Thanks to the
Local Organization Committee

Samuel

Nicola

Luca

Teresa

Thanks to Our Supporters

Università Ca' Foscari
Venezia