Computational Learning Methods for Unsupervised Segmentation (CLeMUS)

Vietri sul Mare, Salerno, Italy, 12-14 September 2007
In conjunction with KES 2007: **11th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems**

Context
Many measurement procedures are intended to extract information on physical systems by exploiting spectral diversity. This implies that the system components must be identifiable from their emission spectra. The different imaged components do not need to be spatially separated: it can exist more than one component in a single resolution cell. This leads to generalized notions of "segmentation" and "classification", where the aim is not to find a partition of the image with each region assigned to a component (or "class"), but, rather, to assign to each class a percent occupation in each resolution cell. This problem may be further complicated when the spectral features of the individual classes are not known *a priori*, thus leading to a need for blind processing. Similar problems can arise with other "multichannel" data sets, coming from multiple points of view, time delays, polarization states, etc., instead of frequency diversity. This leads to a generalized notion of "channel", including any possible kind of diversity exploited to form a multidimensional data set. In view of an integrated exploitation of etherogeneous (often critical) data, this is an important task for multimedia techniques.
The scope of this kind of analysis is being widened continuously, well beyond the original concerns of multispectral and hyperspectral data analysis. Among the applications where this type of approach has recently been proposed, there are astrophysical image processing, remote-sensed image analysis, digital analysis of documents and artworks, computational biology, security.
Several approaches have been attempted to solve this problem in different applications, often relying on statistics to overcome the lack of specific information. Specific techniques derive from principal component analysis, independent component analysis, dependent component analysis, generalized Kalman filtering, particle filtering, Monte Carlo Markov chains, other Bayesian approaches.

Scope
This special session is organized by the EU Network of Excellence on Multimedia Understanding through Semantics, Computation and Learning (MUSCLE), e-team on unsupervised segmentation and classification of multichannel data, under the auspices of the Italian National Research Council, interdepartmental project "Security". It is intended to gather researchers applying statistical signal processing to unsupervised segmentation and classification in different fields. The aim is to favor a cross-fertilization among ideas coming from the specificities of different areas of application. It is hoped that a discussion among specialists in different applications can both help a better insight into the methods and show ways to exploit similar techniques in solving new problems.

Call for papers
Papers no longer than 8 pages (LNCS/LNAI format, available in the KES website) are welcome on the topics listed below. Perspective authors are invited to submit their contributions no later than 20/03/2007, via the online KES submission procedure, specifying Invited Session IS60 . Acceptance will be notified within 15/04/2007.
The camera-ready version of the accepted papers should be uploaded within 1st May 2007. All the accepted papers will be published in the Springer-Verlag *Lecture Notes in Artificial Intelligence* series.

Applications
1) Astrophysical imaging
2) Multispectral and Hyperspectral remote sensing
3) Document image processing
4) Computational biology
5) Medical imaging
6) Security (face recognition...)
7) Others

Methods
1) Principal component analysis
2) Independent component analysis
3) Dependent component analysis
4) Bayesian approaches
5) Neural networks

Session chairs

Emanuele Salerno, Consiglio Nazionale delle Ricerche, Pisa, Italy (emanuele.salerno@isti.cnr.it)

Simon Wilson, Trinity College, Dublin, Ireland (swilson@tcd.ie)