

# BIO-INSPIRED AND EVOLUTIONARY COMPUTATION METHODS FOR UNSUPERVISED LEARNING

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This special session will be devoted to the study of new bio-inspired and evolutionary-based algorithms which have been applied into open, dynamic and complex problems where the application of unsupervised learning algorithms can provide new insights in these kind of domains. The special session will be particularly focused on the practical application of bio-inspired methods (evolutionary strategies, swarm intelligence methods, or nature-based approaches amongst others) and their application to unsupervised algorithms as Clustering (K-means, Hierarchical clustering, etc.), Grouping, Hidden Markov Models, or Latent variable models (EM algorithm, method of moments, ...) approaches to mention only some few. The application to real and complex scenarios, as community finding in very large social networks, data analysis in wireless sensor networks, real applications in industry and engineering, automatic and semi-automatic malware detection, energy, and so many others, will be welcomed. Therefore, the main goals of this special session will be two-fold: On the one hand, to look for new algorithms and techniques proposals based on Bio-inspired and EC, which have been successfully combined with other unsupervised approaches. On the other hand, to look for new application domains, and real problems, where the application of Bio-inspired and EC combined with unsupervised methods have demonstrated an outstanding performance against other traditional approaches.

## Topics

- Theoretical models for Bio-inspired (evolutionary strategies, swarm intelligence algorithms, nature-based methods) approaches to unsupervised algorithms (grouping, clustering, HMM, Latent-based, etc.).
- Application of Evolutionary and Bio-inspired methods in Grouping and Clustering.
- Application of Evolutionary and Bio-inspired methods in HMM-based approaches.
- Application of Evolutionary and Bio-inspired methods for Latent-based models (factor analysis, PCA, ICA, mixture of gaussians, etc.)



- Hybridization and Application of Swarm Intelligence (ACO, PSO, etc.) methods in grouping, graph-based, clustering, HMM, statistical and other unsupervised learning algorithms.
- Bio-inspired and Evolutionary Computation strategies for Unsupervised Learning methods focused on semantic applications such as automatic summarization, recommender systems, topic identification, etc.
- Bio-inspired and EC Computation methods for Unsupervised Learning in real problems: social-based mining, counter-terrorism, energy, wireless sensor networks, malware detection and classification, videogames, unmanned systems, physics, biology, genomics, e-business/e-commerce, e-learning, e-health, e-science, e-government, crisis management, etc.
- Practical application of Unsupervised learning algorithms, based on Bio-inspired and Evolutionary Computation methods, in hot society and industry topics as: counter-terrorism, energy, climate, etc.