

Special Issue on Machine Learning for Signal Processing

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Machine learning is devoted to the design of methods and algorithms able to learn from empirical data. This approach is especially important in signal and image processing, where sets of sensors, usually large and heterogeneous, provide large amounts of data, usually noisy and corrupted with various sources of interference. From a methodological point of view, machine learning is concerned with multi-dimensional and statistical signal processing, especially with problems such as detection, estimation, and optimization. In addition to classical supervised or unsupervised learning, reinforcement learning and semi-supervised learning, machine learning methods include Bayesian modeling, Markov models, support vector machines, and kernel methods. It spans a broad area of applications, such as adaptive filtering, pattern recognition, scene analysis in computer vision, data mining, robot control, data fusion, blind and semi-blind source separation, sparse component analysis, brain-computer interfaces, hyperspectral images, and cognitive radio.

This special issue has been designed following the IEEE international workshop Machine Learning for Signal Processing which was held in Grenoble (France) in September 2009. The papers have been extended and re-reviewed. In addition to theoretical contributions in signal detection, pattern recognition and classification, blind source separation, learning theory, Bayesian learning and modeling, and to applied contributions in speech and audio processing, biomedical application and communications,

we have featured three Special Sessions, one on Brain-computer Interfaces, the second on Machine Learning in Remote Sensing Data Processing, and the third one on Learning in Markov Models.

The 19 papers of this special issue reflect the current trends in Machine Learning.



Jocelyn Chanussot received the M.Sc. degree in electrical engineering from the Grenoble Institute of Technology (Grenoble INP), Grenoble, France, in 1995, and the Ph.D. degree from Savoie University, Annecy, France, in 1998. In 1999, he was with the Geography Imagery Perception Laboratory for the Delegation Generale de l'Armement (DGA - French National Defense Department). Since 1999, he has been with Grenoble INP, where he was an Assistant Professor from 1999 to 2005, an Associate Professor from 2005 to 2007, and is currently a Professor of signal and image processing. He is currently conducting his research at the Grenoble Images Speech Signals and Automatics Laboratory (GIPSA-Lab). His research interests include image analysis, multicomponent image processing, nonlinear filtering, and data fusion in remote sensing. Dr. Chanussot is the founding President of IEEE Geoscience and Remote Sensing French chapter (2007-2010) which received the 2010 IEEE GRS-S Chapter Excellence Award "for excellence as a Geoscience and Remote Sensing Society chapter demonstrated by exemplary activities during 2009". He was a member of the IEEE Geoscience and Remote Sensing AdCom (2009–2010), in charge of

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membership development. He was the General Chair of the first IEEE GRSS Workshop on Hyperspectral Image and Signal Processing, Evolution in Remote sensing (WHISPERS). He is the Chair (2009–2011) and was the Cochair of the GRS Data Fusion Technical Committee (2005–2008). He was a member of the Machine Learning for Signal Processing Technical Committee of the IEEE Signal Processing Society (2006–2008) and the Program Chair of the IEEE International Workshop on Machine Learning for Signal Processing, (2009). He was an Associate Editor for the IEEE Geoscience and Remote Sensing Letters (2005–2007) and for Pattern Recognition (2006–2008). Since 2007, he is an Associate Editor for the IEEE Transactions on Geoscience and Remote Sensing. Since 2011, he is the Editor-in-Chief of the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. He is a Senior Member of the IEEE (2004).



Christian Jutten received the PhD degree in 1981 and the Docteur ès Sciences degree in 1987 from the Institut National Polytechnique of

Grenoble (France). He taught as associate professor in the Electrical Engineering Department from 1982 to 1989. He was visiting professor in Swiss Federal Polytechnic Institute in Lausanne in 1989, before to become full professor in University Joseph Fourier of Grenoble, more precisely in the sciences and technologies department: Polytech'Grenoble. He has been associate director of the Grenoble images, speech, signal and control laboratory (GIPSA, 300 people) and head of the Department Images-Signal (DIS) of this laboratory, from 2007 to 2010. For 25 years, his research interests are blind source separation, independent component analysis and learning in neural networks, including theoretical aspects (separability, source separation in nonlinear mixtures) applications in signal processing (biomedical, seismic, speech) and data analysis. He is author or co-author of more than 65 papers in international journals, 4 books, 19 invited papers and 150 communications in international conferences. He has been associate editor of IEEE Trans. on Circuits and Systems (1994–95), and co-organizer the 1st International Conference on Blind Signal Separation and Independent Component Analysis (Aussois, France, January 1999). He has been a scientific advisor for signal and images processing at the French Ministry of Research from 1996 to 1998 and for the French National Research Center from 2003 to 2006. He has been associate editor of IEEE Trans. CAS from 1992 to 1994. He is a member of the technical committee "Blind signal Processing" of the IEEE CAS society and of the technical committee "Machine Learning for signal Processing" of the IEEE SP society. He is a reviewer of main international journals (IEEE Trans. on Signal Processing, IEEE Signal Processing Letters, IEEE Trans. on Neural Networks, Signal Processing, Neural Computation, Neurocomputing, etc.) and conferences in signal processing and neural networks (ICASSP, ISCASS, EUSIPCO, IJCNN, ICA, ESANN, IWANN, etc.). He received the EURASIP best paper award in 1992 and Medal Blondel in 1997 from SEE (French Electrical Engineering society) for his contributions in source separation and independent component analysis, and has been elevated as a Fellow IEEE and a senior Member of Institut Universitaire de France in 2008.