

Editorial

Signals: A Multidisciplinary Journal of Signal Processing Research

Santiago Marco ^{1,2} 

¹ Department of Electronics and Biomedical Engineering, University of Barcelona, Martí I Franqués 1, 08028 Barcelona, Spain; santiago.marco@ub.edu

² Signal and Information Processing in Sensor Systems, Institute for Bioengineering of Catalonia, The Barcelona Institute of Science and Technology, Baldiri Rexac 10-12, 08028 Barcelona, Spain

Being the new editor-in-chief of *Signals* is a great honour and a daunting task. I aspire to elevate *Signals* as a reputable venue for original and innovative submissions in signal processing and its emerging domains.

I would like to say a few words about my background. I studied physics at the University of Barcelona in the 1980s. My first contact with signal processing was in the context of what could be today described as a master's thesis. At that time, and together with my advisor (Prof. Josep Samitier), we developed a linear deconvolution method for multiexponential transients that was able to estimate continuous distributions of amplitudes and time constants of the decay [1]. Then, my research steered towards silicon pressure sensors during my PhD. In my postdoc (early 1990s) at the University of Rome Tor Vergata, I had the opportunity to become acquainted with signal processing and pattern recognition techniques (including multilayer perceptrons and Self-Organizing Maps) applied to chemical sensor arrays under the supervision of Prof. Corrado Di Natale. When I returned to the University of Barcelona, I was commissioned to prepare a basic course on signal processing for electronic engineers. When preparing for this course, I discovered the books of Allan V. Oppenheim [2], and they had a large impact on me. The theory of discrete linear systems was beautiful, complete, and provided a very solid background to my previous ideas on signal processing. From there, I went deeper into the theory of random signals, and I was again impacted by the works of Norbert Wiener regarding the identification of non-linear systems [3]. From that point onwards, my full academic career revolved around sensors, signal processing and machine learning [4]. After my sabbatical year in AIRBUS—Munich working on Ion Mobility Spectrometry, my interest also tilted towards the application of signal processing in chemical instrumentation, an area that is certainly not mainstream in the signal processing field [5]. To me, it is very interesting to realize that similar techniques have been developed independently in different application domains. For instance, non-negative matrix factorization (NMF) [6] was previously developed for chemical instruments under the name of Multi-Curve Resolution (MCR) [7]. We can also recall the relationship between Principal Component Analysis and the Karhunen Loeve Transform [8].

Signal processing is a mature field that is transversal across many disciplines. Today, we can find applications of signal processing in audio, music and speech processing, data compression, radar and sonar, biomedical signals, seismology, vibration analysis, telecommunications, control systems, autonomous robotics, multisensor systems, fault detection, identification and correction, spectrometry and spectroscopy, and many more areas.

In the last decade, machine learning and deep learning techniques have revolutionized signal processing tasks with their impressive results and versatility. However, these techniques are not flawless and can fail miserably when applied outside the training domain. Therefore, we need to pay attention to validation methods that go beyond in-dataset cross-validation and investigate transfer learning approaches. Moreover, we need to pursue



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interpretable machine-learning methods that avoid black-box solutions. Nevertheless, we should not neglect the solid foundations of statistical signal processing in the face of the allure and power of machine learning.

Some additional areas of growing interest are signal processing on graphs [9], compressed sensing [10], tensorial signal processing [11], and fractional signal processing [12,13].

Signals aims to become a leading publication platform in various research fields that use signal processing. *Signals* will distinguish itself from other journals with a long history of high-quality submissions by embracing multidisciplinary perspectives and approaches.

To achieve this goal, we need the help of authors, reviewers, associate editors and the MDPI editorial team. Special Issues on signal processing topics are welcome, but pure machine learning papers not related to signals should go to other journals that focus on machine learning theory and applications. I urge the community to conduct excellent signal processing research, with careful attention to empirical or theoretical details and clear graphs, visuals, and summary tables. Only high-quality submissions in relevant areas for research and industry will make *Signals* a top-ranked journal.

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