



# 44th IEEE International Conference on Acoustics, Speech and Signal Processing

## ICASSP 2019

May 12-17, 2019 – Brighton, United Kingdom

An ICASSP 2019 Special Session on

## LEARNING METHODS IN COMPLEX AND HYPERCOMPLEX DOMAINS

### TECHNICAL SCOPE

Traditional signal processing and machine learning applications rely on the use of learning methods in the real- and complex-valued domains. However, modern technologies have fueled an ever-increasing number of emerging applications in which signals relies on unconventional algebraic structures (e.g., non-commutative). In this context, advanced complex- and hypercomplex-valued signal processing encompasses many of these challenging areas. In the complex domain, the augmented statistics have been found to be very effective in different methods of machine learning and nonlinear signal processing. However, processing signals in hypercomplex domains enables us to exploit some different properties, albeit raising challenges in designing and implementing new and more effective learning algorithms. More generally, learning in the hypercomplex domain allows us to process multidimensional data as a single entity rather than modelling as a multichannel entity, hence preserving the integrity of the data. In that direction, quaternions have attracted attention in the signal processing and machine learning communities for their capability of dealing with 3D and 4D models.

The aim of this special session is to bring together leading researchers in the fields of signal processing and machine learning and provide advances on learning methods in complex and hypercomplex domains that can empower science and technology for humankind.

### TOPICS OF INTEREST

- Advanced Complex-Valued Learning Methods
- Complex-Valued Nonlinear Adaptive Filters
- Clifford and Geometric Algebras for Adaptive Filtering and Signal Processing
- Hypercomplex Machine Learning
- Complex- and Quaternion-Valued Neural Networks
- Complex- and Hypercomplex-Valued Activation Functions
- Sparse Representations in the Hypercomplex Domain
- Complex and Hypercomplex Learning over Graphs and Networks
- Algorithms for Hypercomplex Optimization
- Advances in Image Processing using Quaternions
- Audio Processing in the Hypercomplex Domain
- Emerging Fields of Applications in the Hypercomplex Domain

### PAPER SUBMISSION

Five-page papers must be submitted through ICASSP 2019 submission system, taking care to select the track related to this special session. All the submissions will go through peer review. More details on paper submission can be found on [ICASSP 2019 Paper Submission](#). The deadline for paper submission is **October 29, 2018**.

### ORGANIZERS

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