Call for Papers
Signal Processing Magazine Special Issue on
Explainability in Data Science:
Interpretability, Reproducibility, and Replicability

The growing importance of the closely-related fields of data science, machine learning, and signal processing highlights the fact that data-driven solutions are playing an increasing role in practical problems across many domains. With the shift away from traditional and model-driven approaches, we start to recognize the importance of explainability of our solutions. Explainability is critical not only for the simple reason that one would like to have confidence over the solutions, but also because one would like to produce further insights from the solutions. This includes interpretability and completeness so that one can not only "audit" them, but also ask appropriate questions to probe for insights beyond the initial solution.

Interpretability, i.e., ability to attach a physical meaning to the solution, along with reproducibility, and replicability are three key aspects of explainability. Following the definitions by the National Academies of Sciences, Engineering, and Medicine, reproducibility refers to obtaining consistent results using the same data and code—i.e., method,—as the original study, and replicability is obtaining consistent results across studies aimed at answering the same scientific question using new data or other computational methods.

This special issue emphasizes
- the broad view of explainability in data science, which not only addresses neural networks but also many other data-driven solutions including, but not limited to, graphical and kernel methods, matrix and tensor factorizations, learning models and methods for multiple application domains;
- the relationship of these methods and their varying degrees of explainability within and across application domains;
- all three topics under the broad umbrella of explainability: interpretability, (computational) reproducibility, and replicability;
- the need to respect history as the discussions on explainability, reproducibility, replicability, validation, and generalization are closely related and are not new but have been explored before.

We invite overviews in explainability that address multiple aspects of interpretability, reproducibility, and replicability including the closely-related concepts of robustness, validation and generalization across
- an array of data-driven methods in machine learning and signal processing, and
- application areas including audio, speech, and language processing, multi-sensor processing and data fusion, image and video processing, computer vision, computational imaging, communications, medical image analysis, bio-imaging, biomedical signal processing, autonomous systems, smart cities, and natural sciences among others.

Papers that provide comparative studies, best practices to obtain insights through explainability, and a critical view of the state-of-the-art are especially welcome.

White papers are required, and full articles will be invited based on the review of white papers. The white paper format is up to 4 pages in length, including the proposed title, motivation and significance of the topic, an outline of the proposed paper, and representative references. An author list with contact information and short bios should also be included.

Submitted articles must be of tutorial/overview/survey nature, written in an accessible style to a broad audience, and have a significant relevance to the scope of the Special Issue. Submissions must not have been published or be under review elsewhere, and must be made online through the ScholarOne Manuscript system. For submission guidelines, please see the Information for Authors page.

Schedule
White paper due: March 22, 2021
Invitation notification: April 26, 2021
Manuscript due: July 5, 2021
First review to authors: September 6, 2021
Revision due: November 8, 2021
Acceptance notification: January 11, 2022
Final package due: February 1, 2022

Guest Editors
Tülay Adalı, University of Maryland, Baltimore County, Baltimore, MD, USA
Rodrigo Capobianco Guido, São Paulo State University, SP, Brazil
Tin Kam Ho, IBM Watson Health, Yorktown Heights, NY, USA
Klaus-Robert Müller, TU Berlin, Germany and Korea University, Seoul, South Korea
Stephen Strother, Baycrest Hospital and University of Toronto, ON, Canada