

# Highlights From the Machine Learning for Signal Processing Technical Committee

The huge success of this wave of artificial intelligence (AI) has primarily been driven by machine learning, which provides the essential tools for analyzing signals and data that are ubiquitously available today. The Machine Learning for Signal Processing Technical Committee (MLSP TC), one of the 13 TCs in the IEEE Signal Processing Society (SPS), has its mission in promoting activities in the MLSP, such as through organizing the machine learning (ML) track at ICASSP and running the annual MLSP workshops among others.

The TC has a long history that goes back to 1991, initially under the name of the Neural Network TC. In recent years, MLSP-related scientific activities and the MLSP community itself have been growing rapidly and becoming very popular. For example, there are as many as 28 regular sessions on the ML track at ICASSP 2020, the annual flagship conference in signal processing organized by the SPS. This makes the ML track one of the largest at the conference.

At ICASSP 2020, the ML track received 533 submissions in addition to submissions to several special sessions in this area. Topicwise, we observe

- Deep learning techniques and applications of ML are the two topics that received the most submissions, accounting for 53% of the total number of submissions.
- Pattern recognition and classification and learning theory and algorithms

form the second bucket, amounting to 20% of the total number of submissions.

- Applications in music and audio processing, learning from multimodal data, sequential learning, and subspace and manifold learning together amounted to 14% of the total number of submissions.

This largely reflects the hot technical topics, represented as the Editors Information Classification Scheme in the MLSP TC. Furthermore, the top topics are expected to remain strong in the future.

In general, the scope of the MLSP covers ML and nonlinear signal processing methodologies targeting both longstanding and emergent signal processing applications of a broad range. This spans new theoretical frameworks and emerging paradigms for statistical signal processing and application devel-

opments. Methods to highlight are deep learning, manifold learning, dictionary learning, tensor-based methods, kernel-based methods, matrix factorization, multimodal learning, graph neural networks, federated learning, and distributed machine learning. A wide range of signals is investigated, including audio, speech, music, image, multimodal, industrial, wireless communications, and biomedical signals.

Figure 1 illustrates the number of paper submissions to the ML track of ICASSP in the past 10 years. The number of submissions has increased every year for the last five years, and the trend is likely to continue. The significant growth in the last few years is correlated with the booming activities in deep learning and AI.

The other major activity organized by the TC is the annual workshop on the MLSP, with its homepage at

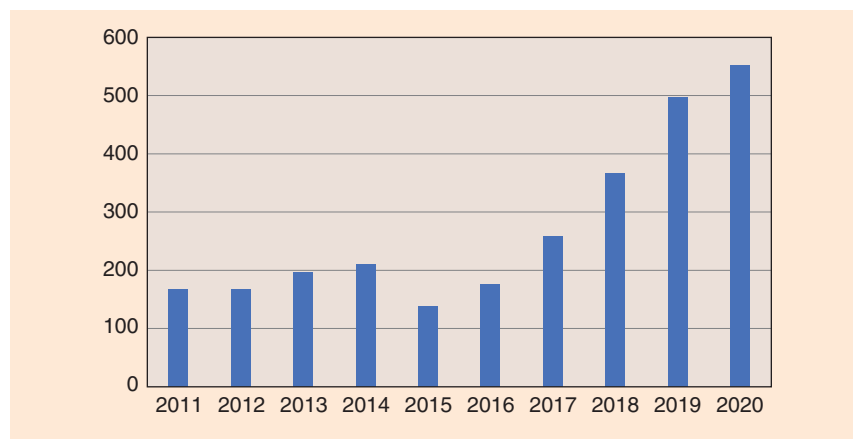


FIGURE 1. ICASSP ML paper submissions.

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**Table 1. MLSP workshops.**

Year	Location	Chairs	Accepted Papers	Attendees
2019	Pittsburgh, Pennsylvania	Murat Akcakaya	98	179
2018	Aalborg, Denmark	Zheng-Hua Tan	76	143
2017	Tokyo, Japan	Tomoko Matsu and Jen-Tzung Chien	91	175
2016	Vietri sul Mare, Salerno, Italy	Francesco A.N. Palmieri	103	118
2015	Boston, Massachusetts	Deniz Erdoğmuş	73	94
2014	Reims, France	Mamadou Mboup	85	105
2013	Southampton, United Kingdom	Saeid Sanei and Paris Smaragdis	90	90
2012	Santander, Spain	Ignacio Santamaría, Jerónimo Arenas-García, and Gustavo Camps-Valls	104	120
2011	Beijing, China	Tieniu Tan and Shigeru Katagiri	96	83

shops. We always welcome new members with annual member elections taking place in October. The goal of the TC is to have diversity in representation and participation from both industry and academia. For further information about the TC, please visit <https://signalprocessingsociety.org/community-involvement/machine-learning-signal-processing/members>.

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**FIGURE 2.** MLSP 2018 in Aalborg, Denmark, September 2018.

<https://ieeemlsp.cc>. Table 1 lists the workshops held in the past several years. Due to the COVID-19 pandemic, MLSP 2020 will be a virtual conference that can only be attended online. MLSP 2021 is planned to take place in Gold Coast, Australia, with Karim Seghouane and Dong Xu as the general chairs. Innovation has always been a key element in the organization process. For example, MLSP 2018 (Figure 2) introduced an

industrial keynote talk of a TED-talk style, which was well received.

The TC currently consists of 37 members. Further, the TC has both associate and affiliate members, who are non-voting members but can get actively involved in the TC's activities, such as being a member of the numerous subcommittees listed on the TC page and being volunteers for paper reviews for ICASSP ML track and MLSP work-