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Serving Diverse Interests in Our Community

Signal Processing for Finance

Perceptual Spatial Audio

High-Performance Depth Sensing

SP in Engineering Outreach

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FEATURES

ON THE COVER

This issue presents feature articles showcasing the significant and versatile roles that signal processing has been playing in quantitative finance, spatial audio, and visual depth sensing. The "SP Education" column presents systematic engineering outreach efforts at precollegiate levels, for which signal processing is a key building block in many projects engaging young students. The "Life Sciences" column presents velocity estimation in medical ultrasound images. The "From the Editor" column highlights an effort of "content ecosystem" that the magazine is exploring with other Society initiatives.

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Top Downloads in IEEE *Xplore*

Each "Reader's Choice" column focuses on a different publication of the IEEE Signal Processing Society (SPS). This month we are highlighting articles in *IEEE Signal Processing Letters*.

IEEE Signal Processing Letters is a monthly, archival publication designed to provide rapid dissemination of original, cutting-edge ideas and timely, significant contributions in signal, image, speech, language, and audio processing. Papers published in *IEEE Signal Processing Letters* can be presented within one year of their appearance in signal processing conferences such as the IEEE International Conference on Acoustics, Speech, and Signal Processing; IEEE Global Conference on Signal and Information Processing; and IEEE International Conference on Image Processing and also in several workshop organized by the SPS.

This issue's "Reader's Choice" column lists the top ten articles most downloaded for the past two years at the time of the print deadline. Your suggestions and comments are welcome and should be sent to Associate Editor Chungshui Zhang (zcs@mail.tsinghua.edu.cn).

A Universal Image Quality Index

Wang, Z.; Bovik, A.C.

In this paper, a new universal objective image quality index, which is easy to calculate and applicable to various image processing applications, is proposed. The proposed index is designed by modeling any image distortion as a combination of three factors: loss of correlation, luminance distortion, and contrast distortion.

March 2002

Reversible Image Data Hiding with Contrast Enhancement

Wu, H.-T.; Dugelay, J.-L.; Shi, Y.-Q.

This paper proposes a novel reversible data hiding (RDH) algorithm for digital images. The proposed algorithm enhances the contrast of a host image to improve its visual quality. The authors claimed that it was the first algorithm that achieved image contrast enhancement by RDH.

January 2015

On the Performance of Non-Orthogonal Multiple Access in 5G Systems with Randomly Deployed Users

Ding, Z.; Yang, Z.; Fan, P.; Poor, H.V.

In this letter, the performance of nonorthogonal multiple access (NOMA) is investigated in a cellular downlink scenario with randomly deployed users. The developed analytical results show that NOMA can achieve superior performance in terms of ergodic sum rates.

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However, the outage performance of NOMA depends critically on the choices of the users' targeted data rates and allocated power.

December 2014

Fairness for Non-Orthogonal Multiple Access in 5G Systems

Timotheou, S.; Krikidis, I.

The authors study nonorthogonal multiple access from a fairness standpoint and investigate power allocation techniques that ensure fairness for the downlink users under 1) instantaneous channel state information (CSI) at the transmitter and 2) average CSI. They have developed low-complexity polynomial algorithms for these nonconvex problems that yield the optimal solution in both cases considered.

October 2015

Robust Edge-Stop Functions for Edge-Based Active Contour Models in Medical Image Segmentation

Pratondo, A.; Chui, C.-K.; Ong, S.-H.

In this paper, authors propose a framework to construct a group of edge-stop functions (ESFs) for edge-based active contour models to segment objects with poorly defined boundaries. In this framework, which incorporates gradient information as well as probability scores from a standard classifier, the ESF can be constructed from any classification algorithm and applied to any edge-based model using a level set method.

February 2016

Discrete Anamorphic Transform for Image Compression

Asghari, M.H.; Jalali, B.

The authors introduce a physics-based transform that enables image compression by increasing the spatial coherency. They also present the stretched modulation distribution, a new density function that provides the recipe for the proposed image compression.

July 2014

An Adaptive Motion Model for Person Tracking with Instantaneous Head-Pose Features

Baxter, R.H.; Leach, M.J.V.; Mukherjee, S.S.; Robertson, N.M.

This letter presents novel behavior-based tracking of people in low resolution using instantaneous priors mediated by head pose. The authors extend the Kalman filter to adaptively combine motion information with an instantaneous prior belief about where the person will go based on where they are currently looking.

May 2015

Empirical Mode Decomposition as a Filter Bank

Flandrin, P.; Rilling, G.; Goncalves, P.

This paper reports on numerical experiments empirical mode decomposition (EMD) based on fractional Gaussian noise. In such a case, it turns out that EMD acts essentially as a dyadic filter bank resembling those involved in wavelet decompositions. It is also pointed out that the hierarchy of the extracted modes may be similarly exploited for getting access to the Hurst exponent.

February 2004

An Experimental Study on Speech Enhancement Based on Deep Neural Networks

Xu, Y.; Du, J.; Dai, L.-R.; Lee, C.-H.

This letter presents a regression-based speech enhancement framework using deep neural networks with a multiple-layer deep architecture. A series of pilot experiments were conducted under multicondition training with more than 100 h of simulated speech data, resulting in a good generalization capability even in mismatched testing conditions.

January 2014

Fast Matrix Inversion Updates for Massive MIMO Detection and Precoding

Rosário, F.; Monteiro, F.A.; Rodrigues, A.

In this letter, the authors propose an on-the-fly method to recompute the zero forcing filter when a user is added or removed from massive multiple-input, multiple-output system. They evaluate the recalculation of the inverse matrix after a new channel estimation is obtained for a given user. With fewer operations, the performance after an update also remains close to the initial one.

January 2016

SP