External Awards

Industrial Distinguished Leader
Winner: Shingo Tsukada, NTT Basic Research Laboratories
Date: September 25, 2021
Organization: Asia-Pacific Signal and Information Processing Association (APSIPA)

For nanofiber-electroconductive textile "hitoe" for electrocardiogram monitoring and cardiac pacemaker electrodes.

Distinguished Lecturer
Winner: Hiroshi Sawada, NTT Communication Science Laboratories
Date: November 21, 2021
Organization: The Institute of Electrical and Electronics Engineers (IEEE) Signal Processing Society

He has been selected to serve as an IEEE Signal Processing Society Distinguished Lecturer for the term 1 January 2022 through 31 December 2023.

Best Paper Award
Winners: Kazuki Yamamura, NTT Social Informatics Laboratories; Yuntao Wang, Eiichiro Fujisaki, JAIST
Date: December 3, 2021
Organization: The 24th Annual International Conference on Information Security and Cryptology (ICISC 2021)

For "Improved Lattice Enumeration Algorithms by Primal and Dual Reordering Methods."
Published as: K. Yamamura, Y. Wang, and E. Fujisaki, "Improved Lattice Enumeration Algorithms by Primal and Dual Reordering Methods," Proc. of ICISC 2021, Springer LNCS, to appear.

APSIPA Sadaoki Furui Prize Paper Award
Winners: Hiroshi Sawada, NTT Communication Science Laboratories; Nobutaka Ono, Tokyo Metropolitan University; Hirokazu Kameoka, NTT Communication Science Laboratories; Daichi Kitamura, National Institute of Technology, Kagawa College; Hiroshi Saruwatari, The University of Tokyo
Date: December 15, 2021
Organization: APSIPA

For "A Review of Blind Source Separation Methods: Two Converging Routes to ILRMA Originating from ICA and NMF."
Published as: H. Sawada, N. Ono, H. Kameoka, D. Kitamura, and H. Saruwatari, "A Review of Blind Source Separation Methods: Two Converging Routes to ILRMA Originating from ICA and NMF," APSIPA Transactions on Signal and Information Processing, Vol. 8, No. 1, e12, 2019.

IEEE Fellow
Winner: Shoko Araki, NTT Communication Science Laboratories
Date: January 1, 2022
Organization: IEEE

For contributions to blind source separation of noisy and reverberant speech signals.

Papers Published in Technical Journals and Conference Proceedings

Color Saturation Control by Modulating Spectral Power Distribution of Illumination Using Color Enhancement Factors
M. Tsuchida, A. Kimura, and N. Harada
Journal of Electronic Imaging, Vo. 30, No. 6, 063022, Dec. 2021. https://doi.org/10.1117/1.JEI.30.6.063022

Color enhancement factors are spectral components that modulate the spectral power distribution (SPD) of illumination for interactive color saturation control. They can enhance more than one target color simultaneously or independently while maintaining the current color appearance. However, the color enhancement factors obtained in our previous work depended on the lighting system. Moreover, the effects of color muting, such as decreasing saturation of the target color, were limited because the color enhancement factors were optimized to increase color saturation. We overcame these two issues and succeeded in implementing color enhancement factors that can both enhance and mute color saturation. First, we conducted detailed simulations of color saturation enhancement and muting to determine parameters for calculating the color enhancement factors (e.g., the center wavelength and full-width at half-maximum) and assessed their potentiality. The results showed that maximum variations of color muting became almost the same as those of color enhancement. We also found that SPDs of illumination for increasing and decreasing color saturation of red, green, and blue had three peaks, respectively, and that they appeared for enhancement and muting alternately. In addition, the color enhancement factors for enhancing and muting color saturation were roughly symmetric. We then performed experiments using a newly designed 12-color LED lighting system,

and the results showed color enhancing and muting effects. Finally, we demonstrated color restoration of discolored cultural heritage and coloring simulation of industrial products.

Multi-source Domain Generalization Using Domain Attributes for Recurrent Neural Network Language Models

N. Tawara, A. Ogawa, T. Iwata, H. Ashikawa, T. Kobayashi, and T. Ogawa

IEICE Transactions on Information and Systems, Vol. E105-D, No. 1, pp. 150–160, Jan. 2022.

Most conventional multi-source domain adaptation techniques for recurrent neural network language models (RNNLMs) are domain-centric. In these approaches, each domain is considered independently and this makes it difficult to apply the models to completely unseen target domains that are unobservable during training. Instead, our study exploits domain attributes, which represent common knowledge among such different domains as dialects, types of wordings, styles, and topics, to achieve domain generalization that can robustly represent unseen target domains by combining the domain attributes. To achieve attribute-based domain generalization system in language modeling, we introduce domain attribute-based experts to a multi-stream RNNLM called recurrent adaptive mixture model (RADMM) instead of domain-based experts. In the proposed system, a long short-term memory is independently trained on each domain attribute as an expert model. Then by integrating the outputs from all the experts in response to the context-dependent weight of the domain attributes of the current input, we predict the subsequent words in the unseen target domain and exploit the specific knowledge of each domain attribute. To demonstrate the effectiveness of our proposed domain attributes-centric language model, we experimentally compared the proposed model with conventional domain-centric language model by using texts taken from multiple domains including different writing styles, topics, dialects, and types of wordings. The experimental results demonstrated that lower perplexity can be achieved using domain attributes.

Physical Topology Optimization for Highly Reliable and Efficiently Wavelength-assignable Optical Networks

K. Higashimori, F. Inuzuka, and T. Ohara

Journal of Optical Communications and Networking, Vol. 14, No. 3, pp. 16–24, Mar. 2022.

Optical networks, such as wavelength-division multiplexing networks and elastic optical networks, require high reliability and efficient wavelength allocation. We propose a new physical topology optimization method that achieves both high reliability and efficient wavelength allocation. We compare the results of conventional algebraic connectivity optimization, which discusses physical topology optimization from the viewpoint of spectral graph theory, with those based on reliability optimization, which is important from the viewpoint of network operations. From the comparison analysis, it is shown that our proposed two-step degree bounded reliability-optimization model, which optimizes reliability with appropriate node degree constraints, leads to a physical topology that has high wavelength capacity without compromising reliability.