External Awards

CSS2017 Excellent Paper Award

Winner: Yuhei Kawakoya, Makoto Iwamura, Jun Miyoshi, NTT Secure Platform Laboratories
Date: October 24, 2017
Organization: The Computer Security Symposium (CSS) 2017, Information Processing Society of Japan Special Interest Group on Computer Security

For "Taint-assisted Forensics for IAT Reconstruction."
Published as: Y. Kawakoya, M. Iwamura, and J. Miyoshi, "Taint-assisted Forensics for IAT Reconstruction," Proc. of CSS2017, 2A3-3, Yamagata, Japan, Oct. 2017.

Nishina Memorial Prize

Winner: Hiroki Takesue, NTT Basic Research Laboratories
Date: November 10, 2017
Organization: Nishina Memorial Foundation

For the realization of large-scale coherent Ising machines.

IEEE Microwave Theory and Techniques Society Japan Young Engineer Award

Winner: Takuro Tajima, NTT Device Technology Laboratories
Date: November 30, 2017
Organization: IEEE (Institute of Electrical and Electronics Engineers) Microwave Theory and Techniques Society Japan Chapter

For "Compact THz LTCC Receiver Module for 300 GHz Wireless Communications."
Published as: T. Tajima, H. Song, and M. Yaita, "Compact THz LTCC Receiver Module for 300 GHz Wireless Communications," IEEE Microwave and Wireless Components Letters, Vol. 26, No. 4, pp. 291–293, Apr. 2016.

Best Paper

Winner: Bomin Mao, Zubair Fadlullah, Fengxiao Tang, and Nei Kato, Tohoku University; Osamu Akashi, Takeru Inoue, and Kimihiro Mizutani, NTT Network Innovation Laboratories
Date: December 5, 2017
Organization: IEEE Global Communications Conference (GLOBECOM) 2017

For "A Tensor Based Deep Learning Technique for Intelligent Packet Routing."
Published as: B. Mao, Z. Fadlullah, F. Tang, N. Kato, O. Akashi, T. Inoue, and K. Mizutani, "A Tensor Based Deep Learning Technique for Intelligent Packet Routing," Proc. of IEEE GLOBECOM 2017, Singapore, Dec. 2017.

Best Presentation Award

Winner: Yuko Ueno, Tetsuhiko Teshima, Calum Henderson, and Hiroshi Nakashima, NTT Basic Research Laboratories
Date: December 12, 2017
Organization: The 6th International Conference on BioSensors, BioElectronics, BioMedical Devices, BioMEMS/NEMS & Applications 2017 (Bio4Apps2017)

For "Three-Dimensional Protein Detection by Graphene Micro-roll Aptasensor."
Published as: Y. Ueno, T. Teshima, C. Henderson, and H. Nakashima, "Three-Dimensional Protein Detection by Graphene Micro-roll Aptasensor," Bio4Apps2017, Tokyo, Japan, Dec. 2017.

Papers Published in Technical Journals and Conference Proceedings

Behavioral Analysis of Kinetic Telepresence for Small Symmetric Group-to-group Meetings

K. Otsuka

IEEE Transactions on Multimedia, Vol. PP, No. 99, November 2017.

Nonverbal behavior analysis revealed the effect of MMSpace, a kinetic telepresence developed for social telepresence, on small symmetric group-to-group conversations. MMSpace consists of kinetic avatars, equipped with flat projection screen panels as faces, that can change their pose and position automatically to mirror the remote user's head motions. The advantage is the realistic kinetic expression of human head movements, which form gestures like nodding and indicate the focus of visual attention, through the use of four degree-of-freedom low-latency precision actuators. Another feature is the support of eye contact among remote participants, which is made possible by the avatars' kinetic pose changes and by adaptive camera selection for orienting the user's face toward the remote addressee. Its limitation is its room-scale infrastructure and restricted participant positions. The target was a symmetric 2×2 setting, and participants' nonverbal behaviors, including gaze directions and head gestures, were compared among three conditions: MMSpace with/without physical motions and face-to-face settings. There was a significant

difference between the conditions in terms of the duration of glance/mutual glances, total gaze transition time, amount of head gesturing, and co-occurrences of head gestures in the remote participants. The results indicate that the avatar's physical motion can elicit longer (mutual) glances with a shorter total transition time and more (co-) occurrences of head gestures, and it makes MMSpace-based conversations closer, in terms of these nonverbal statistics, to face-to-face ones compared with those of a static version of MMSpace without physical motion.

Generating Three-dimensional Shapes by Using Texture Synthesis

M. Sawayama, M. Okabe, S. Nishida, and Y. Dobashi

The Japanese Journal of Psychonomic Science, Vol. 36, No. 1, pp. 56–65, December 2017.

This research note reviews experimental methods to elucidate the visual processing underlying material perception, and considers how to generate experimental stimuli of three-dimensional shapes for the experiments. For generation of a computer graphics image of a three-dimensional object, it has been widely known that its shape features can affect the material appearance of the object. However, it has not been established how to systematically control the shape features to investigate the effect. Here we suggest utilizing texture synthesis algorithms. Specifically, we used a height map of a three-dimensional object as a source image and synthesized a novel height map by using a texture synthesis algorithm. We tested three algorithms to generate the height maps; i) synthesis based on image statistics, ii) example-based synthesis, and iii) synthesis using a convolutional neural network. We discuss how effective the texture synthesis algorithms are to investigate the effect of the shape features on the material perception.

32-core Erbium/Ytterbium-doped Multicore Fiber Amplifier for Next Generation Space-division Multiplexed Transmission System

S. Jain, C. Castro, Y. Jung, J. Hayes, R. Sandoghchi, T. Mizuno, Y. Sasaki, Y. Amma, Y. Miyamoto, M. Bohn, K. Pulverer, M. Nooruzzaman, T. Morioka, S. Alam, and D. J. Richardson

Optics Express, Vol. 25, No. 26, pp. 32887–32896, December 2017.

We present a high-core-count 32-core multicore erbium/ytterbium-doped fiber amplifier (32c-MC-EYDFA) in a cladding pumped configuration. A side pumping technique is employed for ease of pump coupling in this monolithic all-fiber amplifier. A minimum gain of >17 dB and an average noise figure (NF) of 6.5 dB is obtained over all cores in the wavelength range 1534 nm–1561 nm for −4 dBm input signal power. The core-to-core variation for both amplifier gain and NF is measured to be <2 dB. The 32c-MC-EYDFA was then tested in a repeatered multicore fiber loop system, and transmission over distances >1850 km was successfully demonstrated. We also compare the total power consumption of our MC-EYDFAs with that of 32 conventional single core erbium doped fiber amplifiers to illustrate the potential power saving benefits.

Modular Representation of Layered Neural Networks

C. Watanabe, K. Hiramatsu, and K. Kashino

Neural Networks, Vol. 97, pp. 62–73, January 2018.

Layered neural networks have greatly improved the performance of various applications including image processing, speech recognition, natural language processing, and bioinformatics. However, it is still difficult to discover or interpret knowledge from the inference provided by a layered neural network, since its internal representation has many nonlinear and complex parameters embedded in hierarchical layers. Therefore, it becomes important to establish a new methodology by which layered neural networks can be understood.

In this paper, we propose a new method for extracting a global and simplified structure from a layered neural network. Based on network analysis, the proposed method detects communities or clusters of units with similar connection patterns. We show its effectiveness by applying it to three use cases: (1) network decomposition: it can decompose a trained neural network into multiple small independent networks, thus dividing the problem and reducing the computation time; (2) training assessment: the appropriateness of a trained result with a given hyper parameter or randomly chosen initial parameters can be evaluated by using a modularity index; and (3) data analysis: in practical data, it reveals the community structure in the input, hidden, and output layers, which serves as a clue for discovering knowledge from a trained neural network.
