

External Awards

Chairman's Award

Winner: Kazutaka Hara, Katsuhisa Taguchi, Tomohiro Taniguchi, Susumu Nishihara, Kota Asaka, Ken-Ichi Suzuki, Takeshi Arai, and Akihiro Otaka, NTT Access Network Service Systems Laboratories

Date: July 27, 2017

Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Technical Committee on Communication Systems

For “Characteristic Analysis of Optical Path Penalty for NG-PON2 Coexisting with Other Systems on Same ODN.”

Published as: K. Hara, K. Taguchi, T. Taniguchi, S. Nishihara, K. Asaka, K. Suzuki, T. Arai, and A. Otaka, “Characteristic Analysis of Optical Path Penalty for NG-PON2 Coexisting with Other Systems on Same ODN,” IEICE Tech. Rep., Vol. 116, No. 401, CS2016-75, pp. 65–70, Jan. 2017.

Encouraging Award

Winner: Ryota Shiina, Toshihito Fujiwara, Tomohiro Taniguchi, and Tomoki Sugawa, NTT Access Network Service Systems Laboratories

Date: July 27, 2017

Organization: IEICE Technical Committee on Communication Systems

For “Proposal of The Optical Video Distribution System Using Digitized-Radio-over-Fiber Transmission.”

As a wired rebroadcasting service, the RF (radio frequency) transmission system with HFC (hybrid fiber coaxial) or FTTH (fiber-to-the-home) has been widely used to transmit broadcasting signals via DTT (digital terrestrial television) broadcasting, BS (broadcasting satellite), and CS (communications satellite). Since the RF system conveys the broadcasting signals without any changes for modulation or signals, it enables customers to utilize existing coaxial cables which are used commonly in the customer premises environment. In addition, existing TV (television) sets are utilized as a receiver without an STB (set-top box). However, the RF transmission system has some problems such as an increase in CAPEX/OPEX due to the limitation of transmission distance and branches, since the system needs a dedicated network constructed only for analog transmission.

In this paper, we propose a novel digital video transmission system using DRoF (digitized radio over fiber) technology, which realizes the digital transmission of the RF-based broadcasting signals while retaining the existing input/output interface of the RF signals to/from the transmission network. This system also enables RF-based broadcasting signals to overlay on the existing digital communication system by sharing the network equipment. We also indicate the transmission rate calculated by an analytical model for the proposed system.

Published as: R. Shiina, T. Fujiwara, T. Taniguchi, and T. Sugawa, “Proposal of The Optical Video Distribution System Using Digitized-Radio-over-Fiber Transmission,” IEICE Tech. Rep., Vol. 116, No. 346, CS2016-52, pp. 39–43, Dec. 2016.

FIT Best Paper Award

Winner: Naoko Kosaka, Akira Koyama, Tsuneko Kura, and Koji Kishi, NTT Secure Platform Laboratories; Tadayoshi Maruyama and Koichi Takamatsu, 2017 Sapporo Asian Winter Games Organizing Committee

Date: December 1, 2017

Organization: Steering Committee of the 16th Forum on Information Technology (FIT2017)

For “Applicability Assessment of Integrated Emergency Management Support System, “KADAN” - Using for Management of Large-scale International Sports Tournaments -.”

Published as: N. Kosaka, A. Koyama, T. Kura, K. Kishi, T. Maruyama, and K. Takamatsu, “Applicability Assessment of Integrated Emergency Management Support System, “KADAN” - Using for Management of Large-scale International Sports Tournaments -,” Proc. of FIT2017, CO-010, Tokyo, Japan, Sept. 2017 (in Japanese).

Best Paper Award

Winner: Mehrdad Kiamari, University of Southern California; Chenwei Wang, DOCOMO Innovations, Inc.; Salman Avestimehr, University of Southern California

Date: December 8, 2017

Organization: The Institute of Electrical and Electronics Engineers (IEEE) Global Communications Conference (GLOBECOM) 2017

For “On Heterogeneous Coded Distributed Computing.”

We consider the recently proposed Coded Distributed Computing (CDC) framework that leverages carefully designed redundant computations to enable coding opportunities that substantially reduce the communication load of distributed computing. We generalize this framework to heterogeneous systems where different nodes in the computing cluster can have different storage (or processing) capabilities. We provide the information-theoretically optimal data set placement and coded data shuffling scheme that minimizes the communication load in a cluster with 3 nodes. For clusters with $K > 3$ nodes, we provide an algorithm description to generalize our coding ideas to larger networks.

Published as: M. Kiamari, C. Wang, and S. Avestimehr, “On Heterogeneous Coded Distributed Computing,” Proc. of IEEE GLOBECOM 2017, Singapore, Dec. 2017.

IEEE Fellow

Winner: Akira Fujiwara, NTT Basic Research Laboratories

Date: January 1, 2018

Organization: IEEE

For contributions to silicon single-electron devices.

Best Paper Award

Winner: Shun Tobiyama, Yukiko Yamaguchi, Hirokazu Hasegawa, and Hajime Shimada, Nagoya University; Mitsunori Akiyama and Takeshi Yagi, NTT Secure Platform Laboratories

Date: January 10, 2018

Organization: The 32nd International Conference on Information Networking (ICOIN 2018)

For “A Method for Estimating Process Maliciousness with Seq2Seq Model.”

Published as: S. Tobiyama, Y. Yamaguchi, H. Hasegawa, H. Shimada, M. Akiyama, and T. Yagi, “A Method for Estimating Process Maliciousness with Seq2Seq Model,” Proc. of ICOIN 2018, pp. 255–260, Chiang Mai, Thailand, Jan. 2018.

Papers Published in Technical Journals and Conference Proceedings

Parsing Expression Grammars with Unordered Choices

N. Chida and K. Kuramitsu

Journal of Information Processing, Vol. 25, pp. 975–982, December 2017.

Parsing expression grammars (PEGs) were formalized by Ford in 2004, and have several pragmatic operators (such as ordered choice and unlimited lookahead) for better expressing modern programming language syntax. In addition, PEGs can be parsed in a linear time by using recursive-descent parsing and memorization. In this way, PEGs have a lot of positive aspects. On the other hand, it is known that ordered choices defy intuition. They may cause bugs. This is due to a priority of an ordered choice. To avoid this, unordered choices are required. In this paper, we define a parsing expression grammar with unordered choices (PEGwUC), an extension of a PEG with unordered choices. By the extension, it is expected that a PEGwUC includes both a PEG and a context-free grammar (CFG), and this allows us to write a grammar more intuitively. Furthermore, we show an algorithm for parsing a PEGwUC. The algorithm runs in a linear time when a PEGwUC does not include unordered choice and in a cubic time in worst-case running time.

Auditory Surprise Model Based on Pattern Retrieval from the Past Observation

M. Yoneya, H.-I. Liao, S. Furukawa, and M. Kashino
Neuroscience, January 2018.

The sensory cortex may adapt to predictable events, focusing instead on unexpected events or surprise stimuli. Previous studies modeled the auditory surprise using the joint probability of an incoming stimulus and the recent short stimulus history. However, such an approach is not applicable to describe a long-term pattern change in auditory sequences, since the joint probability is incomputable due to data sparsity when the window size of the stimulus history increases. Additionally, “predictive uncertainty” should be considered to prevent overestimation of surprise, since a violation of expectation would not evoke a large surprise when the prediction is made with a sparse observation. Here, we propose a novel auditory surprise model that can detect a deviant sound embedded in long-term pattern changes. Instead of calculating the joint probability, our model uses the similarity-based pattern retrieval from past observation to predict the future behavior of auditory sequences. The predictive uncertainty was expressed as the variance of the prediction distribution, which is inversely correlated with the similarity between the selected past patterns and the recent history. Our model is applicable to any auditory input since it requires neither exact pattern matching nor any conversion of auditory signals into symbolic forms. We conducted two experiments to test the applicability of our model. In experiment 1, we showed that the model could predict the reaction time for detecting the disappearance of tone pips. In experiment 2, we showed that the model could predict a pupil size change after the pattern transition in auditory sequences.
