External Awards

CSS2019 Encouragement Award
Winner: Taishi Nishiyama and Atsutoshi Kumagai, NTT Secure Platform Laboratories; Akinori Fujino, NTT Communication Science Laboratories; Kazunori Kamiya, NTT Secure Platform Laboratories
Date: October 23, 2019
Organization: Information Processing Society of Japan (IPSJ)

For "pAUC Maximization Method for Malware Detection."
Published as: T. Nishiyama, A. Kumagai, A. Fujino, and K. Kamiya, "pAUC Maximization Method for Malware Detection," Computer Security Symposium 2019, Nagasaki, Japan, Oct. 2019.

SCIS Paper Award
Winner: Ibuki Mishina, NTT Secure Platform Laboratories
Date: January 28, 2020
Organization: The Institute of Electronics, Information and Communication Engineers (IEICE) Technical Committee on Information Security (ISEC)

For "Can the Logistic Regression in Secure Computation Really Be Used?".
Published as: I. Mishina, "Can the Logistic Regression in Secure Computation Really Be Used?", 2019 Symposium on Cryptography and Information Security, Shiga, Japan, Jan. 2019.

NDSS 2020 Distinguished Paper Award
Winner: Takuya Watanabe, NTT Secure Platform Laboratories/ Waseda University; Eitaro Shioji and Mitsuaki Akiyama, NTT Secure Platform Laboratories; Tatsuya Mori, Waseda University
Date: February 26, 2020
Organization: Internet Society (ISOC)

For "Melting Pot of Origins: Compromising the Intermediary Web Services that Rehost Websites."
Published as: T. Watanabe, E. Shioji, M. Akiyama, and T. Mori, "Melting Pot of Origins: Compromising the Intermediary Web Services that Rehost Websites," Proc. of the 27th Annual Network and Distributed System Security Symposium (NDSS 2020), San Diego, CA, USA, Feb. 2020.

Young Researcher's Award
Winner: Asuka Matsushita, NTT Network Innovation Laboratories
Date: March 19, 2020
Organization: IEICE

For "Nonlinear Response Compensation for Digital Coherent Optical Receiver."
Published as: A. Matsushita, M. Nakamura, S. Kuwahara, K. Horikoshi, S. Okamoto, and H. Nishizawa, "Nonlinear Response Compensation for Digital Coherent Optical Receiver," Proc. of the 2019 IEICE Society Conference, B-10-28, Osaka, Japan, Sept. 2019.

The Young Scientists' Prize, the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology
Winner: Dai Ikarashi, NTT Secure Platform Laboratories
Date: April 7, 2020
Organization: Ministry of Education, Culture, Sports, Science and Technology, Japan

For his research on privacy protection technology that balances data utilization and protection.

Distinguished Service Award
Winner: Haruka Eitoku, NTT Network Service Systems Laboratories
Date: May 14, 2020
Organization: The Telecommunication Technology Committee (TTC)

For his contribution to the formulation of the common interconnection interface for SIP (Session Initiation Protocol) domain name resolution using the domain name system in TTC and the corresponding standardization work in 3GPP.

Distinguished Service Award
Winner: Takeshi Seki, NTT Network Service Systems Laboratories
Date: May 14, 2020
Organization: TTC

For his contribution to the international standardization concerning equipment functions and protection/restoration of transport networks.

Distinguished Service Award
Winner: Kaoru Arai, NTT Network Service Systems Laboratories
Date: May 14, 2020
Organization: TTC

For his contribution to the international standardization concerning time- and frequency-synchronization technology for packet transport networks.

Best Paper Award
Winner: Daisuke Sato, Tatsushi Matsubayashi, Masato Fukuda, Kyota Tsutsumida, NTT Service Evolution Laboratories; Akira Nakayama, NTT Research and Development Planning Department; Hiroyuki Toda, NTT Service Evolution Laboratories
Date: May 23, 2020
Organization: The 12th Forum on Data Engineering and Information Management (DEIM2020)

For "Composite Spatio-temporal Prediction Model Using Residual Regression."
Published as: D. Sato, T. Matsubayashi, M. Fukuda, K. Tsutsumida, A. Nakayama, and H. Toda, "Composite Spatio-temporal Prediction Model Using Residual Regression," DEIM2020, Fukushima, Japan, Mar. 2020.

Award from Chairman of the Council for Info-communications Promotion Month
Winner: Yoshinori Goto, NTT Network Technology Laboratories
Date: May 29, 2020
Organization: The Council for Info-communications Promotion Month, Ministry of Internal Affairs and Communications

For his contribution to the promotion of international standardization in the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T).

12th Special Activity Award

Winner: Katsuhiro Ajito, NTT Device Technology Laboratories
Date: June 4, 2020
Organization: The Institute of Electrical Engineers of Japan (IEEJ)

For his contribution to the activation of research activities through the SENSOR SYMPOSIUM on Sensors, Micromachines and Applied Systems and the improvement of IEEJ's business presence through collaboration with other academic societies and the local host communities. This award was given to the executive committee of the SENSOR SYMPOSIUM on Sensors, Micromachines and Applied Systems.

Best Late-Breaking Report Honorable Mention Video Award

Winner: Mitsuhiro Goto, Masanori Yokoyama, and Yumiko Matsuura, NTT Service Evolution Laboratories
Date: June 9, 2020
Organization: 15th Annual IEEE/ACM International Conference on Human-Robot Interaction (HRI 2020)

For "Impression Evaluation of Presentation by a Communication Robot in an Actual Exhibition."
Published as: M. Goto, M. Yokoyama, and Y. Matsuura, "Impression Evaluation of Presentation by a Communication Robot in an Actual Exhibition," Proc. of HRI 2020, pp. 218–220, Mar. 2020.

Technical Committee on Communication Quality Research Encouragement Award

Winner: Yuichiro Urata, Masanori Koike, and Kazuhisa Yamagishi, NTT Network Technology Laboratories
Date: July 16, 2020
Organization: IEICE Technical Committee on Communication Quality

For "An Applicability of ITU-T Recommendation P.1203 Model to VR Video Streaming."
Published as: Y. Urata, M. Koike, and K. Yamagishi, "An Applicability of ITU-T Recommendation P.1203 Model to VR Video Streaming," IEICE Tech. Rep., Vol. 119, No. 125, CQ2019-52, pp. 79–83, July 2019.

Papers Published in Technical Journals and Conference Proceedings

Effects of Rosin-powder Application on the Frictional Behavior Between a Finger Pad and Baseball

T. Yamaguchi, N. Yamakura, S. Murata, T. Fukuda, and D. Nasu
Frontiers in Sports and Active Living, Vol. 2, 30, April 2020.

Rosin powder, which is composed of magnesium carbonate powder and pine resin, is often used as a grip-enhancing agent in baseball pitching. However, the effect of rosin powder on friction at the baseball–human finger interface remains unclear. This study aimed to investigate the effect of rosin powder on the friction coefficient between a baseball and finger using sliding friction tests. Ten young adult males participated in this studyand were asked to slide the index finger of their dominant hand over the leather skin of a baseball adhered to the force sensor, which was not a real baseball pitching situation. Our findings suggest that rosin-powder application stabilizes friction under both dry and wet conditions, that is, there was less dependence of the friction coefficient on the normal force and less variation in the friction coefficient among individuals. For most participants, the friction coefficient was not necessarily increased by the presence of rosin powder at the finger pad–leather sheet interface under dry conditions. However, under wet conditions, rosin-powder application increased the friction coefficient compared with under the non-powdered condition in the large normal force condition, indicating the efficacy of rosin powder as a grip-enhancing agent.

Behavioral Measures in a Cognitive-motor Batting Task Explain Real Game Performance of Top Athletes

D. Nasu, M. Yamaguchi, A. Kobayashi, N. Saijo, M. Kashino, and T. Kimura
Frontiers in Sports and Active Living, Vol. 2, 55, May 2020.

Excellent athletic performance in baseball and softball batting is achieved through the momentary cognitive-motor processes. However, in previous studies, cognitive and motor processes were investigated separately. In this study, we focused on the difference in the time of swing onset (a delta onset) during a batting task where 17 elite female softball batters hit balls randomly thrown at two different speeds by pitchers. The delta onset included both cognitive and motor processes because the batters needed to anticipate the ball speed and discriminate their swing motion according to the time-to-contact. Then, we investigated the relationship between the delta onset and batting outcomes of the batting task and the relationship between the experimental outcomes and actual batting performance (batting average) over a season.We used path analysis to clarify the structure of the cognitive-motor processes and consequent performance. We found that the batters who had a larger delta onset attained superior batting outcomes (i.e., higher exit velocity and lower miss ratio) in the batting task, and these experimental outcomes explained 67% of the batting average in real games. On the other hand, the cognitive scores (judgement accuracy and rapidity) obtained from a button pressing task, where batters responded to a ball by pressing a button instead of actually swinging, explained only 34% of the batting average.

Therefore, our model quantitatively describes the key cognitive-motor structure for athletes and can partially predict a batter's performance in real games. These findings suggest that it is important to employ both cognitive and motor processes in performing tasks, such as this batting task, to properly evaluate a batter's actual ability.

Classification of Viewing Abandonment Reasons for Adaptive Bitrate Streaming

S. Takahashi, K. Yamagishi, P. Lebreton, and J. Okamoto

The 12th International Conference on Quality of Multimedia Experience (QoMEX), May 2020 (online).

As adaptive bitrate streaming services have spread, it has become more important for video streaming providers to control video quality and prevent viewing abandonments. However, since viewing abandonments are caused not only by quality degradations but also by a lack of users' interest in contents, it will first be necessary to clarify how quality and/or content affect viewing abandonments. To investigate this, we conducted an adaptive bitrate streaming experiment and developed a viewing-abandonment-reason-classification model that classifies abandonment reasons into quality or content. Using training data, we developed four models (logistic regression, classification tree, random forests, and support vector machine) where feature variables related to application quality, users' operation behaviors, and the attributes of viewed contents were used as explanatory variables. These four models were validated by using validation data. From the results, the support vector machine model was considered to be the best since it obtained relatively good validation results and did not appear to be overtrained.

Discontinuous and Smooth Depth Completion with Binary Anisotropic Diffusion Tensor

Y. Yao, M. Roxas, R. Ishikawa, S. Ando, J. Shimamura, and T. Oishi

arXiv:2006.14374 [cs.CV], June 2020.

We propose an unsupervised real-time dense depth completion from a sparse depth map guided by a single image. Our method generates a smooth depth map while preserving discontinuity between different objects. Our key idea is a Binary Anisotropic Diffusion Tensor (B-ADT), which can completely eliminate the smoothness constraint at intended positions and directions by applying it to variational regularization. We also propose an Image-guided Nearest Neighbor Search (IGNNS) to derive a piecewise constant depth map, which is used for B-ADT derivation and in the data term of the variational energy. Our experiments show that our method can outperform previous unsupervised and semi-supervised depth completion methods in terms of accuracy. Moreover, since our resulting depth map preserves the discontinuity between objects, the result can be converted to a visually plausible point cloud. This is remarkable since previous methods generate unnatural surface-like artifacts between discontinuous objects.

User Evaluation of Expression and Representation of Privacy Policy's Content

S. Shinoda, F. Magata, A. Fujimura, S. Kubota, and N. Chiba

IPSJ Journal, Vol. 61, No. 6, pp, 1146–1174, June 2020.

Recently, many online services are being provided for digital devices. Service providers collect a lot of users' personal data through these online services and process them for various purposes. They provide a privacy policy to give users opportunities to access the information about their data processing. However, in most cases, the privacy policy is too long and contains too many legal terms for the average user to understand. As the best way to express and represent a privacy policy's content remains unclear, some service providers have trouble designing one, and some intend to hide their privacy policies. For both protecting user privacy and promoting service providers' business, it is important to reveal how users react to expression and representation of privacy policy. To investigate this, we conducted a focus group interview and web survey then evaluated some privacy policy expressions and representations.

Polylog-overhead Highly Fault-tolerant Measurement-based Quantum Computation: All-Gaussian Implementation with Gottesman-Kitaev-Preskill Code

H. Yamasaki, K. Fukui, Y. Takeuchi, S. Tani, and M. Koashi

arXiv:2006.05416 [quant-ph], June 2020.

Scalability of flying photonic quantum systems in generating quantum entanglement offers a potential for implementing large-scale fault-tolerant quantum computation, especially by means of measurement-based quantum computation (MBQC). However, existing protocols for MBQC inevitably impose a polynomial overhead cost in implementing quantum computation due to geometrical constraints of entanglement structures used in the protocols, and the polynomial overhead potentially cancels out useful polynomial speedups in quantum computation. To implement quantum computation without this cancellation, we construct a protocol for photonic MBQC that achieves as low as poly-logarithmic overhead, by introducing an entanglement structure for low-overhead qubit permutation. Based on this protocol, we design a fault-tolerant photonic MBQC protocol that can be performed by experimentally tractable homodyne detection and Gaussian entangling operations combined with the Gottesman-Kitaev-Preskill (GKP) quantum error-correcting code, which we concatenate with the 7-qubit code. Our fault-tolerant protocol achieves the threshold 7.8 dB in terms of the squeezing level of the GKP code, outperforming 8.3 dB of the best existing protocol for fault-tolerant quantum computation with the GKP surface code. Thus, bridging a gap between theoretical progress on MBQC and photonic experiments towards implementing MBQC, our results open a new way towards realization of a large class of quantum speedups including those polynomial.

Efficiently Generating Ground States Is Hard for Postselected Quantum Computation

Y. Takeuchi, Y. Takahashi, and S. Tani

arXiv:2006.12125 [quant-ph], June 2020.

Although quantum computing is expected to outperform universal classical computing, an unconditional proof of this assertion seems to be hard because an unconditional separation between BQP and BPP implies P≠PSPACE. Because of this, the quantum-computational-supremacy approach has been actively studied; it shows that if the output probability distributions from a family of quantum circuits can be efficiently simulated in classical polynomial time, then the polynomial hierarchy collapses to its second or third level. Since it is widely believed that the polynomial hierarchy does not collapse, this approach shows one kind of quantum advantage under a plausible assumption. On the other hand, the limitations of universal quantum computing are also actively studied. For example, it is believed to be impossible to generate ground states of any local Hamiltonians in quantum polynomial time. In this paper, we give evidence for this

impossibility by applying an argument used in the quantum-computational-supremacy approach. More precisely, we show that if ground states of any 3-local Hamiltonians can be approximately generated in quantum polynomial time with postselection, then the counting hierarchy collapses to its first level. Our evidence is superior to the existing findings in the sense that we reduce the impossibility to an unlikely relation between classical complexity classes. Furthermore, our argument can be used to give evidence that at least one 3-local Hamiltonian exists such that its ground state cannot be represented by a polynomial number of bits, which may be related to a gap between QMA and QCMA.

Polylog-overhead Fault-tolerant Measurement-based Quantum Computation by Homodyne Detection

H. Yamasaki, K. Fukui, Y. Takeuchi, S. Tani, and M. Koashi

15th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC2020), June 2020 (online).

We have proposed a novel quantum state that can be used as a universal resource of measurement-based quantum computat ion (MBQC). By utilizing this state, we can perform quantum computing more efficiently than before. We have also analyzed the fault-tolerance of our MBQC method and confirmed that our method has a higher error-correcting threshold value than existing ones by numerical calculations.