Tomohiko Nakamura

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Research Interests

Signal-processing-inspired deep learning, audio and music signal processing, and machine learning

Job

Senior Researcher **Apr. 2023–Present**
The National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Project Research Associate **Sept. 2019–Mar. 2023**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Researcher **Apr. 2016–Aug. 2019**
Intelligent Systems Laboratory, SECOM, Japan.

Research Fellow (DC2) **Apr. 2015–Mar. 2016**
Japan Society for the Promotion of Science (JSPS), Japan.

Education

Ph.D. degree in Information Science and Technology **Mar. 2016**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Master's degree in Information Science and Technology **Mar. 2013**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.

Bachelor's degree in Engineering **Mar. 2011**
Faculty of Engineering, The University of Tokyo, Japan.

Teaching

Applied Gaussian Process and Machine Learning **6, Dec. 2021**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.
I lecture about machine learning techniques for music information processing (in Japanese).

Advanced Signal Processing **23, June 2020 and 21, June 2022**
Graduate School of Information Science and Technology, The University of Tokyo, Japan.
I lecture about music information processing (in Japanese).

Student Experiment **Apr. 2020–Mar. 2023**
Department of Mathematical engineering and information physics, The University of Tokyo, Japan.
I lecture active and passive measurement for 3D reconstruction from images (in Japanese).

Languages

Japanese (native), English (basic)

Competitive Funds

Development of deep-layered analysis-by-synthesis techniques for acoustic scene analysis with human intervention
JSPS KAKENHI *Apr. 2023–Mar. 2027*

Sampling-frequency-independent deep learning for audio media processing
JST ACT-X (Frontier of Mathematics and Information Science) *Oct. 2021–Mar. 2024*

Research on acoustic scene analysis by integrating time-domain deep learning and multiresolution analysis

JSPS KAKENHI *Apr. 2020–Mar. 2023*

+ 3 funds received as representative, 3 funds received as co-researcher, and 3 travel grants.

Publications

Journal Papers

[1] Koichi Saito, Tomohiko Nakamura, Kohei Yatabe, and Hiroshi Saruwatari, "Sampling-frequency-independent convolutional layer and its application to audio source separation," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 30, pp. 2928–2943, Sep. 2022.

[2] Tomohiko Nakamura, Shihori Kozuka, and Hiroshi Saruwatari, "Time-domain audio source separation with neural networks based on multiresolution analysis," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 29, pp. 1687–1701, Apr. 2021. **[The Itakura Prize Innovative Young Researcher Award]**

[3] Tomohiko Nakamura and Hirokazu Kameoka, "Harmonic-temporal factor decomposition for unsupervised monaural separation of harmonic sounds," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 29, pp. 68–82, Nov. 2020.

[4] Tomohiko Nakamura, Eita Nakamura, and Shigeki Sagayama, "Real-time audio-to-score alignment of music performances containing errors and arbitrary repeats and skips," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 24, no. 2, pp. 329–339, Feb. 2016.

[5] +2 papers

Peer-Reviewed International Conferences

[1] Tomohiko Nakamura, Shinnosuke Takamichi, Naoko Tanji, Satoru Fukayama, and Hiroshi Saruwatari, "jaCappella corpus: A japanese a cappella vocal ensemble corpus," in *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing*, Jun. 2023.

[2] Kota Arai, Yutaro Hirao, Takuji Narumi, Tomohiko Nakamura, Shinnosuke Takamichi, and Shigeo Yoshida, "TimToShape: Supporting practice of musical instruments by visualizing timbre with 2D shapes based on crossmodal correspondences," in *Proceedings of ACM Conference on Intelligent User Interfaces*, Mar. 2023, pp. 850–865.

[3] Futa Nakashima, Tomohiko Nakamura, Norihiro Takamune, Satoru Fukayama, and Hiroshi Saruwatari, "Hyperbolic timbre embedding for musical instrument sound synthesis based on variational autoencoders," in *Proceedings of Asia Pacific Signal and Information Processing Association Annual Summit and Conference*, Nov. 2022, pp. 736–743.

[4] Yuki Ito, Tomohiko Nakamura, Shoichi Koyama, and Hiroshi Saruwatari, "Head-related transfer function interpolation from spatially sparse measurements using autoencoder with source position conditioning," in *Proceedings of International Workshop on Acoustic Signal Enhancement*, Sep. 2022.

[5] +22 papers

Patents

[1] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Unexamined Patent Application JP2021-033374, Mar. 1, 2021.

[2] Tomohiko Nakamura, "Trained model and training device, method, and program," Japan Unexamined Patent Application JP2021-033395, Mar. 1, 2021.

[3] Tomohiko Nakamura, "Object recognition device, method, and program," Japan Unexamined Patent Application JP2021-026685, Feb. 22, 2021.

[4] +6 patents

Invited Talks

[1] Tomohiko Nakamura, "Signal-processing-inspired deep learning," *IEEE NZ Signal Processing/Information Theory Joint Chapter in co-hosted by the Acoustics Research Centre, University of Auckland*, Dec. 2022.

[2] Tomohiko Nakamura, "Audio source separation combining wavelet transform and deep neural network," *Meeting on Technical Committee on Engineering Acoustics, IEICE*, Nov. 2022. (in Japanese)

Awards

1. The Itakura Prize Innovative Young Researcher Award, ASJ, Mar. 2022.
2. Dean's Award of Graduate School of Information Science and Technology, The University of Tokyo, Mar. 2016.
3. IPSJ Yamashita SIG Research Award, Mar. 2016.
4. +10 awards and 10 awards received by my students and collaborators