

## List of research topics for NII International Internship Program 2020 **-ONLINE**

No.	Research area	Title of the research	Website	Name of supervisor	Title of the supervisor	Requirements for applicants: Master's / Ph.D. Student	Total number of acceptance per supervisor	Duration : 2-6 months (less than 180days)	Comments
<b>1. Principles of Informatics Research Division</b>									
L1	Foundations of Big Data Analysis	Sensitivity Analysis of Algorithms	<a href="https://arxiv.org/abs/1904.03248">https://arxiv.org/abs/1904.03248</a> <a href="https://arxiv.org/abs/2006.04094">https://arxiv.org/abs/2006.04094</a> <a href="https://arxiv.org/abs/2009.04556">https://arxiv.org/abs/2009.04556</a>	Yuichi Yoshida	Associate Professor	PhD students	3	2-6 months	
L2	Foundations of Big Data Analysis	Sublinear-Time Algorithms on Real Functions and Matrices	<a href="https://arxiv.org/abs/2007.07449">https://arxiv.org/abs/2007.07449</a> <a href="https://arxiv.org/abs/1909.03391">https://arxiv.org/abs/1909.03391</a>	Yuichi Yoshida	Associate Professor	PhD students		2-6 months	
L3	Foundations of Big Data Analysis	Spectral Graph Theory for Digraphs and Hypergraphs	<a href="https://arxiv.org/abs/2006.08302">https://arxiv.org/abs/2006.08302</a> <a href="https://arxiv.org/abs/1809.04396">https://arxiv.org/abs/1809.04396</a> <a href="https://arxiv.org/abs/1807.04974">https://arxiv.org/abs/1807.04974</a>	Yuichi Yoshida	Associate Professor	PhD students		2-6 months	
L4	Foundations of Big Data Analysis	Submodular Function Optimization	<a href="https://arxiv.org/abs/2004.14650">https://arxiv.org/abs/2004.14650</a> <a href="https://arxiv.org/abs/2002.05477">https://arxiv.org/abs/2002.05477</a>	Yuichi Yoshida	Associate Professor	PhD students		2-6 months	
L5	Machine learning	Geometric analysis of machine learning	<a href="https://mahito.nii.ac.jp/">https://mahito.nii.ac.jp/</a>	Mahito Sugiyama	Associate Professor	PhD students	2	6 months	
L6	Juris-informatics (AI and Law)	NLP for Legal Reasoning		Ken Satoh	Professor	PhD students	3	3-6months	
L7	Juris-informatics (AI and Law)	Legal Compliance Mechanisms		Ken Satoh	Professor	PhD students		3-6 month	
L8	Juris-informatics (AI and Law)	Formalizing Private International Law		Ken Satoh	Professor	PhD students		3-6months	

2. Information Systems Architecture Science Research Division									
L9	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	AI and Machine Learning-based wireless networks for beyond 5G and 6G	<a href="http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/">http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/</a>	Megumi Kaneko	Associate Professor	Master's or PhD students	2	4-6 months	Required programming skills: Matlab. Basic knowledge wireless/digital communications and signal processing is required.
L10	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	Energy efficiency optimization and energy harvesting for IoT wireless communications and sensing	<a href="http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/">http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/</a>	Megumi Kaneko	Associate Professor	Master's or PhD students		4-6 months	Required programming skills: Matlab. Basic knowledge wireless/digital communications and signal processing is required.
L11	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	Integrated terrestrial and spatial wireless communications for beyond 5G and 6G	<a href="http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/">http://www.nii.ac.jp/en/faculty/architecture/kaneko_megumi/</a>	Megumi Kaneko	Associate Professor	Master's or PhD students		4-6 months	Required programming skills: Matlab. Basic knowledge wireless/digital communications and signal processing is required.
L12	Machine Learning, Software Engineering, Testing and Debugging	Automated Testing and Debugging of Machine Learning-based Systems	<a href="http://research.nii.ac.jp/~f-ishikawa/en/lab.html">http://research.nii.ac.jp/~f-ishikawa/en/lab.html</a>	Fuyuki Ishikawa	Associate Professor	Master's or PhD students	5	2-6 months	Access to resources may be limited in the online case (e.g., dataset and code of industry partners)
L13	Cyber-Physical Systems, Software Engineering, Testing and Debugging	Automated Testing and Debugging of Autonomous Driving Systems	<a href="http://research.nii.ac.jp/~f-ishikawa/en/lab.html">http://research.nii.ac.jp/~f-ishikawa/en/lab.html</a>	Fuyuki Ishikawa	Associate Professor	Master's or PhD students		2-6 months	Access to resources may be limited in the online case (e.g., dataset and code of industry partners)
L14	Cyber-Physical Systems, Software Engineering, Safety Engineering, Formal Methods	Safety Analysis and Verification for Cyber-Physical Systems	<a href="http://research.nii.ac.jp/~f-ishikawa/en/lab.html">http://research.nii.ac.jp/~f-ishikawa/en/lab.html</a>	Fuyuki Ishikawa	Associate Professor	Master's or PhD students		2-6 months	Access to resources may be limited in the online case (e.g., dataset and code of industry partners)
L15	Machine Learning & Program Verification	Applying machine learning to program verification	<a href="https://www.nii.ac.jp/en/faculty/architecture/sekiyama_taro/">https://www.nii.ac.jp/en/faculty/architecture/sekiyama_taro/</a>	Taro Sekiyama	Assistant Professor	Master's or PhD students	3	4-6 months	
L16	Programming Language	Theory and design of programming languages	<a href="https://www.nii.ac.jp/en/faculty/architecture/sekiyama_taro/">https://www.nii.ac.jp/en/faculty/architecture/sekiyama_taro/</a>	Taro Sekiyama	Assistant Professor	Master's or PhD students		4-6 months	Specifically, programming languages with computational effects or gradual typing will be focused on
L17	wireless communication	resource management in wireless networks	<a href="https://klab.nii.ac.jp/">https://klab.nii.ac.jp/</a>	Yusheng Ji	Professor	Master's or PhD students	2	3 to 6 months	
L18	networking	AI/ML for networking	<a href="https://klab.nii.ac.jp/">https://klab.nii.ac.jp/</a>	Yusheng Ji	Professor	Master's or PhD students		3 to 6 months	

3. Digital Content and Media Sciences Research Division									
L19	Traditional Geometric Computer Vision	3D Reconstruction for Large-Scale Image Collections; 3D Scan Using Mobile Devices; Underwater 3D Reconstruction	<a href="https://researchmap.jp/yinqiangzheng?lang=en">https://researchmap.jp/yinqiangzheng?lang=en</a>	Yinqiang Zheng	Associate Professor	Master's or PhD students	4	2-6 months	Students aiming at top conferences (ICCV, CVPR, ECCV) and journals (PAMI, IJCV) are encouraged to join us.
L20	Data-Driven Geometric Computer Vision	Deep Learning for 3D Capture, Point Cloud Denosing, Surface Completion, CAD Model Extraction and Realistic Rendering	<a href="https://researchmap.jp/yinqiangzheng?lang=en">https://researchmap.jp/yinqiangzheng?lang=en</a>	Yinqiang Zheng	Associate Professor	Master's or PhD students		2-6 months	Students aiming at top conferences (ICCV, CVPR, ECCV) and journals (PAMI, IJCV) are encouraged to join us.
L21	Traditional Photometric Computer Vision	Multispectral and Hyperspectral Imaging System; Spectral Image Denosing and Superresolution; Intrinsic Images; Polarizing Imaging;	<a href="https://researchmap.jp/yinqiangzheng?lang=en">https://researchmap.jp/yinqiangzheng?lang=en</a>	Yinqiang Zheng	Associate Professor	Master's or PhD students		2-6 months	Students aiming at top conferences (ICCV, CVPR, ECCV) and journals (PAMI, IJCV) are encouraged to join us.
L22	Data-Driven Photometric Computer Vision	Deep Learning for Image Enhancement, Colorization, Style Transfer; Data-Driven Optimal Camera Design for Object Detection and Recognition	<a href="https://researchmap.jp/yinqiangzheng?lang=en">https://researchmap.jp/yinqiangzheng?lang=en</a>	Yinqiang Zheng	Associate Professor	Master's or PhD students		2-6 months	Students aiming at top conferences (ICCV, CVPR, ECCV) and journals (PAMI, IJCV) are encouraged to join us.
L23	content-based image and video analysis	video and image search (esp. TRECVID AVS task. see: <a href="http://www-nlpir.nist.gov/projects/trecvid/">http://www-nlpir.nist.gov/projects/trecvid/</a> )	<a href="http://www.satoh-lab.nii.ac.jp/">http://www.satoh-lab.nii.ac.jp/</a>	Shin'ichi Satoh	Professor	Master's or PhD students	3	more than 90 days	
L24	content-based image and video analysis	identification of specific object in video and image (esp. TRECVID instance search. see: <a href="http://www-nlpir.nist.gov/projects/trecvid/">http://www-nlpir.nist.gov/projects/trecvid/</a> )	<a href="http://www.satoh-lab.nii.ac.jp/">http://www.satoh-lab.nii.ac.jp/</a>	Shin'ichi Satoh	Professor	Master's or PhD students		more than 90 days	
L25	content-based image and video analysis	Video Event Analysis (esp. TRECVID ActEv task. see: <a href="http://www-nlpir.nist.gov/projects/trecvid/">http://www-nlpir.nist.gov/projects/trecvid/</a> )	<a href="http://www.satoh-lab.nii.ac.jp/">http://www.satoh-lab.nii.ac.jp/</a>	Shin'ichi Satoh	Professor	Master's or PhD students		more than 90 days	
L26	content-based image and video analysis	Disaster Scene Analysis (esp. TRECVID Disaster Scene Description and Indexing (DSDI): see <a href="http://www-nlpir.nist.gov/projects/trecvid/">http://www-nlpir.nist.gov/projects/trecvid/</a> )	<a href="http://www.satoh-lab.nii.ac.jp/">http://www.satoh-lab.nii.ac.jp/</a>	Shin'ichi Satoh	Professor	Master's or PhD students		more than 90 days	
L27	content-based image and video analysis	Landmark image retrieval, e.g., Google Landmark Image Retrieval <a href="https://www.kaggle.com/c/landmark-retrieval-2020">https://www.kaggle.com/c/landmark-retrieval-2020</a> .	<a href="http://www.satoh-lab.nii.ac.jp/">http://www.satoh-lab.nii.ac.jp/</a>	Shin'ichi Satoh	Professor	Master's or PhD students		more than 90 days	
L28	computer vision	One of the following topics: (1) 3D vision, (2) Human activity recognition, (3) Gaze sensing and navigation, (4) Object segmentation from video using deep learning, and (5) Image/video generation using deep learning	<a href="http://www.dgcv.nii.ac.jp">http://www.dgcv.nii.ac.jp</a>	Akihiro Sugimoto	Professor	Master's or PhD students	4	Up to 6 months (at least 3 months; a longer period is better)	
L29	digital geometry	(1) Discretization model of geometric shape, (2) Discrete shape fitting to noisy integer points.	<a href="http://www.dgcv.nii.ac.jp">http://www.dgcv.nii.ac.jp</a>	Akihiro Sugimoto	Professor	Master's or PhD students		Up to 6 months (at least 3 months)	
L30	Digital Humanities	Machine learning for image processing (esp. character recognition), geographic information, linked data and metadata management for cultural heritage	<a href="http://agora.ex.nii.ac.jp/~kitamoto/education/internship/">http://agora.ex.nii.ac.jp/~kitamoto/education/internship/</a>	Asanobu Kitamoto	Professor	Master's or PhD students	4	3-6 months	A student with programming skills and interests in real problems is preferred.
L31	Earth Environmental Informatics	Big data analytics (esp. image processing, remote sensing and machine learning) for societal problems such as environment and sustainability	<a href="http://agora.ex.nii.ac.jp/~kitamoto/education/internship/">http://agora.ex.nii.ac.jp/~kitamoto/education/internship/</a>	Asanobu Kitamoto	Professor	Master's or PhD students		3-6 months	A student with programming skills and interests in real problems is preferred.

L32	Crisis Informatics	Big data analytics (esp. image processing, natural language processing, and machine learning) for natural disasters, pandemics and crisis	<a href="http://agora.ex.nii.ac.jp/~kitamoto/education/internship/">http://agora.ex.nii.ac.jp/~kitamoto/education/internship/</a>	Asanobu Kitamoto	Professor	Master's or PhD students		3-6 months	A student with programming skills and interests in real problems is preferred.
L33	Open Science	Research on a new trend of science, such as open data, data citation, citizen science, and open innovation	<a href="http://agora.ex.nii.ac.jp/~kitamoto/education/internship/">http://agora.ex.nii.ac.jp/~kitamoto/education/internship/</a>	Asanobu Kitamoto	Professor	Master's or PhD students		3-6 months	A student with programming skills and interests in real problems is preferred.

L34	Multimedia Data Mining and Analysis	Multimodal deep learning for cross-modal retrieval between image and text, venue inference, multimedia content recommendation	<a href="http://research.nii.ac.jp/~yiyu/">http://research.nii.ac.jp/~yiyu/</a>	Yi Yu	Assistant Professor	Master's or PhD students	4	3-6 months	
L35	Artificial Intelligence and Music	Deep generative model for lyrics-to-melody generation, melody-to-lyrics generation, singing voice synthesis	<a href="http://research.nii.ac.jp/~yiyu/">http://research.nii.ac.jp/~yiyu/</a>	Yi Yu	Assistant Professor	Master's or PhD students		3-6 months	
L36	Data science, Climate change	CaRbon fOotprint reciPe oPtimizER 3.0	<a href="https://perma.cc/93R4-TX96">https://perma.cc/93R4-TX96</a>	Frederic ANDRES	Associate Professor	Master's or PhD students	8	6 months	collaboration with IRISA and University of South Florida/
L37	Data science, Food Science. Big data	Giga CRWB dataset	<a href="https://perma.cc/YKZ5-EPM4">https://perma.cc/YKZ5-EPM4</a>	Frederic ANDRES	Associate Professor	Master's or PhD students		6 months	collaboration with the Big Data LOD benchmark meets Intelligent Food and Cooking Recipe project
L38	Computer Science, AI	Parallelized Sparse Low Rank (SLR) Algorithm	<a href="https://perma.cc/3FPF-BKMD">https://perma.cc/3FPF-BKMD</a>	Frederic ANDRES	Associate Professor	Master's or PhD students		6 months	collaboration with BHC (India) and the Computational Challenges in AI beyond Deep Learning 3.0 project
L39	Data science, Collective intelligence	Programming Language for Mulsemedia Generator Based on Algebraic System of Aggregates	<a href="https://perma.cc/7QE4-L3CJ">https://perma.cc/7QE4-L3CJ</a>	Frederic ANDRES	Associate Professor	Master's or PhD students		6 months	collaboration with Brunel University and National Technical University of Ukraine
L48	Algorithm, Optimization	Research and development of scalable CDR (Conflict Detection and Resolution) algorithms for Unmanned Aircraft Systems ("drone") Traffic Management (UTM)	<a href="http://research.nii.ac.jp/~prendinger/papers/FY2020(1)_Topic.html">http://research.nii.ac.jp/~prendinger/papers/FY2020(1)_Topic.html</a>	Helmut Prendinger	Professor	Both okay	3	4-6 months	Please check the website for details!
L49	Deep Learning, Robotics	Advanced Robotics Challenge (World Drone Competition): Environment recognition and person detection from drone perspective	<a href="http://research.nii.ac.jp/~prendinger/papers/FY2020(1)_Topic.html">http://research.nii.ac.jp/~prendinger/papers/FY2020(1)_Topic.html</a>	Helmut Prendinger	Professor	Both okay		4-6 months	Please check the website for details!
<b>4. Information and Society Research Division</b>									
L50	Educational Data Mining, Knowledge Tracing, Learning Analytics	Personalized learning and cognitive diagnostic modelling		Yuan Sun	Associate Professor	Master's or PhD students	1	2-6 months	

Revised / Added									
As of Dec. 21									
L40	Speech processing	Rich expression modeling for end-to-end speech synthesis	Relevant papers include, but do not limited to, [1] Shuhei Kato, Yusuke Yasuda, Xin Wang, Erica Cooper, Shinji Takaki, Junichi Yamagishi Modeling of Rakugo Speech and Its Limitations: Toward Speech Synthesis That Entertains Audiences, IEEE Access, July 2020 [2] Erica Cooper, Cheng-I Lai, Yusuke Yasuda, Fuming Fang, Xin Wang, Nanxin Chen, Junichi Yamagishi, "Zero-Shot Multi-Speaker Text-To-Speech with State-of-the-Art Neural Speaker Embeddings," ICASSP 2020,	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech processing, computer science, engineering, linguistics, mathematics, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Erica Cooper
L41	Speech processing	Explainable and robust speech anti-spoofing and fake audio detection	Relevant papers include, but do not limited to, [3] Massimiliano Todisco, Xin Wang, Ville Vestman, Md Sahidullah, Héctor Delgado, Andreas Nautsch, Junichi Yamagishi, Tomi Kinnunen, Nicholas Evans, Kong Aik Lee, "ASVspoof 2019: Future Horizons in Spoofed and Fake Audio Detection" Interspeech 2019, Sept. 2019 [4] Anssi Kanervisto, Ville Hautama "ki, Tomi Kinnunen, Junichi Yamagishi, "An initial investigation on optimizing tandem speaker verification and countermeasure systems using reinforcement learning" Speaker Odyssey 2020	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech processing, computer science, engineering, linguistics, mathematics, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Xin Wang
L42	Speech processing	Speaker anonymization and privacy preserving processing for speech	Relevant papers include, but do not limited to, [5] Fuming Fang, Xin Wang, Junichi Yamagishi, Isao Echizen, Massimiliano Todisco, Nicholas Evans, Jean-Francois Bonastre, "Speaker Anonymization Using X-vector and Neural Waveform Models". SSW10 2019. [6] Natalia Tomashenko, Brij Mohan Lal Srivastava, Xin Wang, Emmanuel Vincent, Andreas Nautsch, Junichi Yamagishi, Nicholas Evans, Jose Patino, Jean-François Bonastre, Paul-Gauthier Noé, Massimiliano Todisco, "Introducing the VoicePrivacy Initiative" Interspeech 2020	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech processing, computer science, engineering, linguistics, mathematics, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Xin Wang
L43	Speech processing	Speech intelligibility enhancement under adverse conditions	Relevant paper includes, but do not limited to, [7] iMetricGAN: Intelligibility Enhancement for Speech-in-Noise using Generative Adversarial Network-based Metric Learning, Interspeech 2020	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech processing, computer science, engineering, linguistics, mathematics, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Yi Zhao.
L44	Music processing	Music and instrument sound modeling using deep learning	Relevant papers include, but do not limited to: [8] Yi Zhao, Xin Wang, Lauri Juvela, Junichi Yamagishi, "Transferring neural speech waveform synthesizers to musical instrument sounds generation", Accepted for ICASSP 2020 and [9] Xin Wang, Shinji Takaki, Junichi Yamagishi, "Neural Source-Filter Waveform Models for Statistical Parametric Speech Synthesis", IEEE/ACM Trans ASLP, Nov 2019	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech or music signal processing, computer science, or a related discipline. He or she should have strong programming skills and experience with speech and audio processing and/or machine learning. • Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Erica Cooper
L45	Audio processing and machine learning	Speech, music or sound representation learning	Relevant paper includes, but do not limited to, [9] Jennifer Williams, Yi Zhao, Erica Cooper, Junichi Yamagishi, "Learning Disentangled Phone and Speaker Representations in a Semi-Supervised VQ-VAE Paradigm" ArXiv 2020 (Submitted to ICASSP 2021)	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in speech or music signal processing, computer science, or a related discipline. He or she should have strong programming skills and experience with speech and audio processing and/or machine learning. • Familiarity with DNN tools and speech tools are preferable. Supervision teams include Dr. Yi Zhao

L46	Natural language processing	Data augmentation for low-resource NLP	Relevant papers include, but do not limited to: [10] Bosheng Ding, Linlin Liu, Lidong Bing, Canasai Kruengkrai, Thien Hai Nguyen, Shafiq Joty, Luo Si and Chunyan Miao, "DAGA: Data Augmentation with a Generation Approach for Low-resource Tagging Tasks", EMNLP 2020	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in natural language processing, machine learning, computer science, or a related discipline. He or she should have strong programming skills and experience with machine learning. • Familiarity with DNN tools are preferable. Supervision teams include Dr. Canasai Kruengkrai.
L47	Natural language processing	Automatic fact checking	Relevant papers include, but do not limited to: [11] Thorne, James, et al. "FEVER: a Large-scale Dataset for Fact Extraction and VERification", NAACL-HLT 2018 and [12] Wadden, David, et al. "Fact or Fiction: Verifying Scientific Claims", EMNLP 2020	Junichi Yamagishi	Professor	Master's or PhD students		4-6 months	The successful candidate should be a Master/PhD student in natural language processing, machine learning, computer science, or a related discipline. He or she should have strong programming skills and experience with machine learning. • Familiarity with DNN tools are preferable. Supervision teams include Dr. Canasai Kruengkrai.
<b>As of Jan. 7, 2021</b>									
L51	Computer Graphics	Fluid Simulation	<a href="https://ryichando.graphics">https://ryichando.graphics</a>	Ryoichi Ando	Assistant Professor	Master's or PhD students	1	180 days	