List of research topics for NII International Internship Program 2025 1st Call

No.	Research Area	Title of the Research	Website	Name of supervisor	Title of the supervisor	Requirements for Applicants: Master / Ph.D. Student	Total Number of Acceptance per Supervisor	Duration : 2-6months (less than 180days)	Comments
1. Principles of Informatics Research Division									
P00501	Algorithm theory	Research on Enumeration algorithms and related algorithm theory		Takeaki Uno	Professor	Either	3	2 - 6 months	
P01101	Machine learning	Geometric analysis of machine learning models	https://mahito.nii.ac.jp	Mahito Sugiyama	Associate Professor	Ph.D.	2	3 - 6 months	Legendre decomposition (information geometric tensor decomposition; NeurIPS2018): https://arxiv.org/abs/1802.04502 Many-body approximation for tensors (NeurIPS2023): https://openreview.net/forum?id=5yedZXV7wt
P01102	Machine learning	Geometric analysis of T-PRISM, a logic programming language based on tensor embedding for statistical modeling	https://mahito.nii.ac.jp	Mahito Sugiyama	Associate Professor	Ph.D.	2	3 - 6 months	Legendre decomposition (information geometric tensor decomposition; NeurIPS2018): https://arxiv.org/abs/1802.04502 T-PRISM: https://github.com/prismplp/prism
P01103	Machine learning/Data mining	Machine learning for graphs	https://mahito.nii.ac.jp	Mahito Sugiyama	Associate Professor	Ph.D.	2	3 - 6 months	Molecular Graph Generation by Decomposition and Reassembling: https://doi.org/10.1021/acsomega.3c01078
P01201	Artificial Intelligence	Knowledge Graph Applications	http://www-kasm.nii.ac.jp/~takeda	Hideaki Takeda	Professor	Either	3	3 - 6 months	
P01202	Artificial Intelligence	Building and Applications for Academic Knowledge Graph		Hideaki Takeda	Professor	Either	3	3 - 6 months	
P01301	software verification	separation logic	http://research.nii.ac.jp/~tatsuta/index-e.html	Makoto Tatsuta	Professor	Either	2	2 - 6 months	
P02001	Theoretical Computer Science	Sensitivity Analysis/Lipschitz Continuous Algorithms	https://arxiv.org/abs/2211.04674 https://arxiv.org/abs/2111.02657 https://arxiv.org/abs/2411.02744	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6 months	
P02002	Data Mining	Sensitivity Analysis/Lipschitz Continuous Algorithms	https://openreview.net/forum?id=VM7u8ecLrZV https://openreview.net/forum?id=boik01yhssB	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6 months	
P02003	Theoretical Computer Science	Spectral Graph Theory for Directed Graphs and Hypergraphs	https://arxiv.org/abs/2106.02353 https://arxiv.org/abs/2201.07289	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6 months	
P02004	Theoretical Computer Science	Sublinear-time Algorithms	https://arxiv.org/abs/2204.08404 https://arxiv.org/abs/2210.12601	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6 months	
P02101	Computational Complexity Theory	Meta-complexity, average-case complexity, pseudorandomness, and the Minimum Circuit Size Problem	https://eccc.weizmann.ac.il/report/2022/119/ https://eccc.weizmann.ac.il/report/2021/058/	Shuichi Hirahara	Associate Professor	Either	2	2 - 6 months	It is desirable that applicants have a conference publication in complexity theory.
P02701	Algorithmic game theory / Combinatorial optimization	Algorithmic studies on information design, correlated equilibria, and online learning	https://fujiik.github.io/	Kaito Fujii	Assistant Professor	Either	2	2 - 6 months	
P03401	Robotics	Real-world robot learning		Taisuke Kobayashi	Assistant Professor	Ph.D.	2	4 - 6 months	Knowledge and experience of reinforcement learning and/or imitation learning are required. The details of the research contents will be decided by prior discussion.
P03501	Quantum information	Theoretical and/or numerical research on quantum information processing		Akihito Soeda	Associate Professor	Either	2	2 - 6 months	
P03601	Robotics olfaction, Mechatronics, System control engineering, Computational Neuroscience, Ethology	Modeling and Robot Implementation of Insect Locomotion Control Using Computational Neuroscience	https://sshigaki.jimdofree.com/research/	Shunsuke Shigaki	Assistant Professor	Ph.D.	1	2 - 6 months	
P03701	Theoretical Computer Science	Counting Small Patterns in Graphs	See e.g. https://arxiv.org/abs/2004.06595 or https://arxiv.org/abs/2311.08988	Philip Wellnitz	Assistant Professor	Ph.D.	2	4 - 6 months	
P03702	Theoretical Computer Science	Fine-Grained Complexity Theory	See e.g. https://arxiv.org/abs/2305.06659 or https://arxiv.org/abs/2010.09096	Philip Wellnitz	Assistant Professor	Either	2	4 - 6 months	

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P03703	Theoretical Computer Science/Algorithm Engineering	Fast Approximate String Matching in Practice		Philip Wellnitz	Assistant Professor	Either	2	3 - 6 months	The ultimate goal would be to implement (parts of) https://arxiv.org/abs/2004.08350, especially in the fully-compressed setting for Hamming distance. Efficient implementations might require theoretical results as well. Profound knowledge in C++ or Rust is preferred.
P03901	Combinatorial Optimization	Development of a High-Level Modeling Interface and/or Search Algorithms for Routing Problems Using Domain-Independent Dynamic Programming		Ryo Kuroiwa	Assistant Professor	Either	3	2 - 6 months	
P03902	Combinatorial Optimization	Constraint Propagation in Domain-Independent Dynamic Programming		Ryo Kuroiwa	Assistant Professor	Ph.D.	3	2 - 6 months	

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2. Information Systems Architecture Science Research Division									
A00301	Software Engineering, Formal Methods, Testing, Generative AI	Generative AI for Trustworthy Software Engineering	https://research.nii.ac.jp/~f-ishikawa/en/call.htm	Fuyuki Ishikawa	Associate Professor	Either	5	2 - 6 months	
A00302	Software Engineering, Testing, Fault Localization, Deep Learning, Generative AI	Testing and Trust Exploration for AI Systems	https://research.nii.ac.jp/~f-ishikawa/en/call.htm	Fuyuki Ishikawa	Associate Professor	Either	5	2 - 6 months	
A00601	Wireless and Mobile Networks, Sensing, Signal Processing, AI/ML for wireless communications	Energy-efficient edge AI-based wireless networks design for Beyond 5G	https://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	3	4 - 6 months	Required programming skills: Matlab, Python. Basic knowledge in wireless/digital communications and signal processing is required.
A00602	Wireless and Mobile Networks, Sensing, Signal Processing, AI/ML for wireless communications	Joint wireless communications and sensing for IoT massive connectivity	https://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	3	4 - 6 months	Required programming skills: Matlab, Python. Basic knowledge in wireless/digital communications and signal processing is required.
A00603	Wireless and Mobile Networks, Sensing, Signal Processing, AI/ML for wireless communications	Integrated terrestrial and spatial wireless communications for 6G	https://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	3	4 - 6 months	Required programming skills: Matlab, Python. Basic knowledge in wireless/digital communications and signal processing is required.
A00801	Wireless Communications	Resource management in 6G mobile networks	https://klab.nii.ac.jp/	Yusheng Ji	Professor	Either	3	3 - 6 months	
A00802	Networking	AI/ML for networking	https://klab.nii.ac.jp/	Yusheng Ji	Professor	Either	3	3 - 6 months	
A01201	Programming Language Theory, Program Verification	Type-Based Temporal Verification and Its Automation	https://skymountain.github.io/	Taro Sekiyama	Associate Professor	Either	4	4 - 6 months	This topic aims to develop an advanced type-based approach to verification of temporal properties, a class of properties about sequences of events, called traces. Real-world programs involve not only pure computation but also side effects, and many side effects have certain disciplines to be met. For example, file resources need to be opened first, and reading from and writing to them should be done before closing them, and opened files should be closed eventually. In this example, "open", "read", "write", and "close" are regarded as events on files, and the discipline of files to be met can be described as temporal properties about traces of such events. In this topic, we study 1) theory of temporal verification for higher-order programs and 2) implementation of verifiers to automate the temporal verification. Reference - T. Sekiyama et al. Temporal Verification with Answer-Effect Modification. POPL'23. - T. Sekiyama et al. Algebraic Temporal Effects. POPL'25
A01202	Programming Language Theory, Program Verification	Advanced Type Systems for Computational Effects	https://skymountain.github.io/	Taro Sekiyama	Associate Professor	Either	4	4 - 6 months	Real-world programs involve side effects, such as memory, file, nondeterminism, and probability. This topic aims to study advanced type systems for uniformly verifying programs with such effects. As a means to express side effects in a uniform manner, we plan to focus on algebraic effect handlers, a programming construct able to model a variety of side effects. The expressivity of algebraic effect handlers comes from the ability to manipulate the notion of (delimited) continuations. Therefore, type systems to be studied need to effectively verify the use of continuations in programs. There are many directions and potentials to advance such type systems for algebraic effect handlers (the details will be discussed with applicants). Reference -F. Kawamata et al. Answer Refinement Modification. POPL'24. -T. Sekiyama et al. Signature restriction for polymorphic algebraic effects. ICFP'20, JFP'24. - T. Yoshioka et al. Abstracting Effect Systems for Algebraic Effect Handlers. ICFP'24.

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A01203	Programming Language Theory, Program Verification	Program Verification for Concurrency, Parallelism, and Distributed Computing	https://skymountain.github.io/	Taro Sekiyama	Associate Professor	Either	4	4 - 6 months	Concurrency, parallelism, and distributed computing are techniques to distribute the computation over multiple processes or agents that interact with each other. They are fundamental to process big data or a large number of queries, but, on the other hand, they also make the systems complex, which hinders understanding and reasoning about the systems. The aim of this topic is to study a fundamental computational model of concurrent, parallel, or distributed systems and to develop verification techniques based on it. This is at an early stage of research, but there are a number of open questions worth exploring.
A01204	Security Verification	Modular Security Verification for System-level Code	https://skymountain.github.io/	Taro Sekiyama	Associate Professor	Either	4	4 - 6 months	Security verification is a crucial research theme to guarantee the absence of vulnerability in software systems or protocols. The aim of this topic is at building a theoretical or practical framework for (symbolic) security verification that targets a system-level code (e.g., the code in programming languages such as C/C++, Rust, Java, OCaml, and Haskell) and is modular, that is, can divide a verification problem of an entire system into the verification problems of its subcomponents. One of the goals of this topic is to build a new theory for security verification, rather than to use the off-the-shelf security verifiers. Therefore, the applicants are encouraged to be familiar with the theory of security verification, program verification, or programming languages (especially, type theory for modularity). Reference - Lélio Brun, Ichiro Hasuo, Yasushi Ono, Taro Sekiyama. Automated Security Analysis for Real-World IoT Devices. HASP@MICRO'23.
A01301	Cybersecurity	Security Policy Control based on Human Reliability	https://www.takakura.com/hiroki/index-e.html	Hiroki Takakura	Professor	Either	2	2 - 6 months	
A01701	Theoretical Computer Science	Categorical Foundation of Model Checking	https://group-mmm.org/~ichiro/	Ichiro Hasuo	Professor	Either	2	3 - 6 months	Fixed-point specifications (such as in LTL and modal \mu-calculus) have been conventionally studied in terms of finitary and combinatory structures (automata, games, etc.). These observations are recently being transferred to more abstract settings, opening up algorithms and proof methods for new application domains (esp. probabilistic, metric, etc.). There are a number of research questions waiting to be answered, both theoretical and algorithmic. References (you'll work on one line): - Fibrational line: [Komorida, Katsumata, Hu, Klin, Hasuo, LICS'19], [Komorida, Katsumata, Kupke, Rot, Hasuo, LICS'21], [Kori, Hasuo, Katsumata, CONCUR'21] - PDR line: [Kori+, CAV'22], [Kori+, CAV'23] - compositionality line: [Watanabe+, CAV'23] ## Desired: familiarity with mathematical and abstract reasoning used in logic, lattice theory and (possibly) category theory ## Interested? Please first consult https://group-mmm.org/eratommsd/internship-students/ (don't write an email to me)

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A01702	Theoretical Computer Science	Logical guidance in optimization metaheuristics	https://group-mmm.org/~ichiro/	Ichiro Hasuo	Professor	Either	2	3 - 6 months	Many real-world optimization problems have inherent logical and discrete structures, but many optimization metaheuristics (stochastic optimization, hill-climbing, evolutionary computation, etc.) do not make explicit use of such structures. We have used hierarchical optimization frameworks where the upper logical layer guides the lower metaheuristics layer for efficiency and explainability. The goal is to push the idea further in other applications and theoretical foundations. References: [Zhang, Hasuo, Arcaini, CAV'19], [Zhang, Ernst, Sedwards, Arcaini, Hasuo, EMSOFT'18] Desired: familiarity with, or eagerness to learn, 1) formal logic, 2) optimization metaheuristics, 3) statistical machine learning Interested? Please first consult https://group-mmm.org/eratommsd/internship-students/ (don't write an email to me)
A01703	Theoretical Computer Science	Logical safety for automated driving	https://group-mmm.org/~ichiro/	Ichiro Hasuo	Professor	Either	2	3 - 6 months	Responsibility-sensitive safety (RSS) is a recently proposed methodology for devising mathematically-guaranteed safety rules for automated driving. The candidate will work on its logical foundations and its application to various driving scenarios. The work is much like interactive theorem proving, but with unique theoretical challenges (e.g. continuous dynamics) and a hot application (automated driving). References: [Hasuo, Eberhart, Haydon, et al., IEEE Trans. Intelligent Vehicles, '23 (available at arXiv)] [Shalev-Shwartz, Shammah, Shashua, arXiv'17] Desired: familiarity with formal logic and interactive theorem proving, passion for bringing theory to practice Interested? Please first consult https://group-mmm.org/eratommsd/internship-students/ (don't write an email to me)
A01704	Theoretical Computer Science	Logic and semantics for safe AI	https://group-mmm.org/~ichiro/	Ichiro Hasuo	Professor	Either	2	3 - 6 months	We are interested in logical, semantical, and programming language techniques for safe AI. Most importantly, we will be combining discrete/symbolic/algebraic/logical structures with smooth/numeric/differentiable/fuzzy machine learning algorithms. References: [Zhang, Hasuo, Arcaini, CAV'19], [Hasuo, Eberhart, Haydon, et al., IEEE Trans. Intelligent Vehicles, '23 (available at arXiv)] Desired: familiarity with, or eagerness to learn, 1) formal logic, 2) statistical machine learning Interested? Please first consult https://group-mmm.org/eratommsd/internship-students/ (don't write an email to me)
A01801	Computer network	Network security measurement and analysis	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	2	5 - 6 months	Solid programming and machine learning skills
A01802	Computer network	Network config/log analysis	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	2	5 - 6 months	Solid programming and network operation skills
A01803	Computer network	IoT traffic anomaly detection	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	2	5 - 6 months	Solid programming and machine learning skills

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3. Digital Content and Media Sciences Research Division									
K00101	Natural language processing	Natural language understanding	http://www-al.nii.ac.jp	Akiko Aizawa	Professor	Either	4	3 - 6 months	
K00102	Natural language processing	Deep analysis of scientific papers	http://www-al.nii.ac.jp	Akiko Aizawa	Professor	Either	4	3 - 6 months	
K00103	Natural language processing	Domain adaptation of large-scale language models	http://www-al.nii.ac.jp	Akiko Aizawa	Professor	Either	4	3 - 6 months	
K00401	Molecular biology	Quantitative Enhancement of Drug Discovery: Advancing QED and logP Prediction through Molecular Scoring Function Optimization	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_1.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	cooperation with the Japanese National Institute of Health Sciences (NIHS) .
K00402	Education and privacy	Ontological Rule-based Generative AI with Large Language Models (LLMs) for personal information privacy assessment	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_2.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	Collaboration with ISO standardisation SC36 experts
K00403	High Performacne Computing	Transitioning a research application to SaaS: the Geom-SAC case study	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_3.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	cooperation with the CNRS French Laboratory
K00404	Molecular biology	Precision Pharmacotherapy: Personalized Drug Customization through Multi-Omics Integration and Machine Learning	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_4.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	cooperation with the Japanese National Institute of Health Sciences (NIHS) .
K00405	Data Science	OntoAI learning annotation service	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_5.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	Cooperation with IRISA Lab (France)
K00406	Data Science	OntoAI cooking recipe classification service	http://research.nii.ac.jp/~andres/official/intern2025_ON_SITE_topic_6.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	Cooperation with CRWB project
K00501	3D Computer Vision	3D Computer Vision- 3D reconstruction and visualization (single-view, multi-view)- 3D human modeling and understanding- 3D scene reconstruction and analysis- 3D Generation (text-to-3D, image-to-3D, video-to-3D)	https://satoshi-ikehata.github.io/	Satoshi Ikehata	Associate Professor	Ph.D.	2	4 - 6 months	Required: - Research experience in Computer Vision or Deep Learning - Strong coding skills in Deep Learning frameworks - Experience in writing scientific papers (including theses) Desired: - Knowledge of 3D Computer Vision - Publication record in international conferences/journals - Experience in submitting research proposals If you are interested in this topic, please send: - Your CV - A document explaining your research experience and the topic you are interested in - Bachelor's or Master's thesis - Conference or journal papers (optional) - Research proposals (optional) *I plan to accept two students from all the topics

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K00502	3D Sensing and Computational Photography	3D sensing and Computational Photography- Multispectral Analysis- Photometric Stereo- Shape-from-X (e.g., shape from polarisation)- Physics-based Vision	https://satoshi-ikehata.github.io/	Satoshi Ikehata	Associate Professor	Ph.D.	2	4 - 6 months	Required: - Research experience in Computer Vision or Deep Learning - Strong coding skills in Deep Learning frameworks - Experience in writing scientific papers (including theses) Desired: - Knowledge of 3D Computer Vision - Publication record in international conferences/journals - Experience in submitting research proposals If you are interested in this topic, please send: - Your CV - A document explaining your research experience and the topic you are interested in - Bachelor's or Master's thesis - Conference or journal papers (optional) - Research proposals (optional) *I plan to accept two students from all the topics
K01001	Digital Humanities	Machine learning for image processing (esp. character recognition), geographic information, linked data, metadata management, and data infrastructure for cultural big data	https://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6 months	
K01002	Earth Environmental Informatics	Big data analytics (esp. image processing, remote sensing, and machine learning) for solving environmental and societal problems	https://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6 months	
K01003	Crisis Informatics	Big data analytics (esp. image processing, natural language processing, and machine learning) for natural disasters and crisis	https://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6 months	
K01004	Open Science	Research on a new trend in science, such as open data, data citation, citizen science, and open innovation	https://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6 months	
K01301	Computer Vision and Computer Graphics	Computational Photography: Deep learning, Image-based rendering, Image processing, Color analysis, Spectral imaging	http://research.nii.ac.jp/~imarik/ http://research.nii.ac.jp/pbv/	Imari Sato	Professor	Either	3	5 - 6 months	A basic knowledge of Image Analysis and/or Machine learning, and good programming skills are required
K01302	Computer Vision and Application	3D medical image analysis, Deep learning, Image processing, Color analysis, Spectral imaging	http://research.nii.ac.jp/~imarik/ http://research.nii.ac.jp/pbv/	Imari Sato	Professor	Either	3	5 - 6 months	A basic knowledge of Image Analysis and/or Machine learning, and good programming skills are required
K01401	Content-Based Image and Video Analysis	General image analysis topics, e.g., image semantic analysis, semantic segmentation, classification, image captioning, image retrieval, and so on. Landmark image retrieval can be considered, e.g., Google Landmark Image Retrieval https://www.kaggle.com/competitions/landmark-retrieval-2021	http://www.satoh-lab.nii.ac.jp/	Shin'ichi Satoh	Professor	Either	3	2 - 6 months	
K01402	Content-Based Image and Video Analysis	General video analysis topics, e.g., video semantic analysis, video segmentation, classification, video captioning, video retrieval, and so on. TRECVID ad-hoc video retrieval, or Video to Text description, can be considered. https://trecvid.nist.gov/	http://www.satoh-lab.nii.ac.jp/	Shin'ichi Satoh	Professor	Either	3	2 - 6 months	

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K01601	computer vision	One of the following topics (but not limited to):(1) 3D vision, (2) Human activity recognition, (3) Vision and language, (4) Object detection and segmentation from video using deep learning, (5) Image/video generation using deep learning.	http://www.dgcv.nii.ac.jp	Akihiro Sugimoto	Professor	Either	5	4 - 6 months	Longer duration is better. Rigorous background on mathematics is required. Strong programming skills on image processing and computer vision are also required. In the case of Master course students, highly motivated students who can stay for 6 months are preferable. Students who are willing to pursuit ph.D at NII are preferable as well. Potential applicants should send your CV and research interests/proposals directly to Prof. Sugimoto before your application.
K01602	digital geometry	(1) Discretization model of geometric shape, (2) Discrete shape fitting to noisy integer points,(3) Any proposed topic related with digital geometry.	http://www.dgcv.nii.ac.jp	Akihiro Sugimoto	Professor	Either	5	3 - 6 months	Rigorous background on mathematics as well as computer vision is required. In particular, strong knowledge on linear algebra, graph theory, and number theory is important requirements. Programming skills on image processing or computer vision are also required. Potential applicants should send your CV and research interests/proposals directly to Prof. Sugimoto before your application.
K01701	Data Mining	Recommender System	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	3	4 - 6 months	
K01702	Data Mining	Tabular Data Recognition and Analysis	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	3	4 - 6 months	
K01703	Data Mining	Sequence Data Mining	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	3	4 - 6 months	
K02001	Generative AI	LLMs and LMMs for Stock/Crypto Market Prediction	http://research.nii.ac.jp/~prendinger/papers/FY2025(1)_Topics.html	Helmut PRENDINGER	Professor	Either	4	4 - 6 months	Our goal is to study LLMs and LMMs for price forecasting of financial instruments. We focus on tuning based predictors (e.g., Time-LLM). Forecasting the market is more than applying available time series models to financial assets, and also consider neuro-symbolic AI. Our experience shows that we also need to study methods and techniques developed in AI for Finance (de Prado, 2018). Finally, interest in price action of financial assets is important to enjoy this topic. Reference: M. Jin, S. Wang, L. Ma, Z. Chu, J. Y. Zhang, X. Shi, P.-Y. Chen, Y. Liang, Y.-F. Li, S. Pan, Q. Wen, TIME-LLM: Time Series Forecasting by Reprogramming Large Language Models, 2024.2, ICLR 2024, https://arxiv.org/pdf/2310.01728.pdf
K02002	Generative AI	Time Series Foundation Models for Stock/Crypto Market Prediction	http://research.nii.ac.jp/~prendinger/papers/FY2025(1)_Topics.html	Helmut PRENDINGER	Professor	Either	4	4 - 6 months	Our goal is to test time series foundation models (e.g., Chronos) for price forecasting of financial instruments. Besides price action (closing prices of some asset class), we consider technical analysis (chart analysis), market sentiment, and other relevant factors for accurately predicting the market. Our experience shows that we also need to study methods and techniques developed in AI for Finance (de Prado, 2018). Finally, interest in price action of financial assets is important to enjoy this topic. Reference: Abdul Fatir Ansari, Lorenzo Stella, et al., Chronos: Learning the Language of Time Series, 2024.3, https://arxiv.org/abs/2403.07815
K02003	Token Economy, Crypto Token, Smart Contract	Market Design for Advanced Air Mobility (drones and "flying cars")	http://research.nii.ac.jp/~prendinger/papers/FY2025(1)_Topics.html	Helmut PRENDINGER	Professor	Either	4	4 - 6 months	We have developed a prototype of a complete distributed advanced air mobility (AAM) system to safely coordinate drones and “flying cars”, and conducted related simulation studies. We investigate market design for AAM, based on ideas from token economy (Web3). Our studies include: •Development of a AAM related crypto token •Use of blockchain in an AAM simulator •Use of cryptography and Zero-Knowledge Proofs (ZKPs) •Development of Smart Contracts with Solidity •Use of Generative AI (LLMs) to create Smart Contracts

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K02301	Speech processing	Watermark for deep audio generative models, collaborative and non-collaborative approaches	Relevant but not limited to [1] For background, please check https://www.nature.com/articles/s41598-021-99811-x [2] For related methods, pease check doi:10.1109/ICME55011.2023.00019 https://arxiv.org/abs/2409.13382 https://arxiv.org/abs/2409.02915 https://arxiv.org/abs/2401.17264	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Xin Wang, Dr. Wanying Ge, and Dr. Yigitcan Özer.
K02302	Speech processing	Effective continuous learning of deepfake detection using informaiton-theory-based data drift detectioin and active data selection	Relevant but not limited to [1] For background, please check https://www.asvspoof.org [2] For active learning: https://arxiv.org/abs/2405.00334, https://arxiv.org/pdf/2203.14553 [3]For data drift detection: https://www.nature.com/articles/s41467-024-46142-w [4] For uncertainty and information theory: https://arxiv.org/abs/1506.02142, https://arxiv.org/abs/1703.04977	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Xin Wang, Dr. Wanying Ge.
K02303	Speech processing	High-capacity, robust multi-bit watermarking for real and synthesized speech	Relevant but not limited to[1] Background:https://arxiv.org/abs/2406.06979 [2] Watermark methods: https://arxiv.org/abs/2312.03410 https://arxiv.org/abs/2401.17264	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Wanying Ge, Dr. Xin Wang, and Dr. Yigitcan Özer.
K02304	Speech processing	Adversarial attacks targeting deepfake detection and watermark extraction, and their mutual impacts	Relevant but not limited to[1] Adversarial attack to watermarking: https://arxiv.org/abs/2406.06979[2] Adversarial attack to deepfake detection: https://arxiv.org/abs/2212.14597"	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Wanying Ge and Dr. Xin Wang.
K02305	Speech processing	Investigate speech editing methods in in-the-wild DeepFake audio detection	Relevant but not limited to [1] For background, please check https://www.asvspoof.org https://arxiv.org/abs/2408.14066[2] For related methods, please check https://arxiv.org/abs/2407.05361 https://arxiv.org/abs/2409.08711 https://arxiv.org/abs/2409.17285	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Xuechen Liu.
K02306	Speech processing	Multi-attribute DeepFake audio detection based on spoofing and speaker meta information	Relevant but not limited to [1] For background, please check https://www.asvspoof.org [2] For primary related work, please check https://arxiv.org/abs/2412.18191 https://arxiv.org/abs/2501.05310	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Xuechen Liu.
K02307	Image processing	Generalizable deepfake image detection based on foundation models and multi-optimization criteria.	Relevant but not limited to [1] For background, please check https://arxiv.org/abs/2307.01426 [2] For primary related work, please check https://arxiv.org/abs/2405.00355 https://arxiv.org/abs/2304.13949	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in image processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Yusuke Yasuda.
K02308	Speech processing	Automatic quality prediction of synthetic speech beyond mean opinion scores.	Relevant but not limited to [1] For background, please check https://sites.google.com/view/voicemos-challenge [2] For related methods, please check https://arxiv.org/abs/2308.15203 https://arxiv.org/abs/2204.02152	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Yusuke Yasuda.

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K02309	Natural language processing, Computer Vision	Integrative Approaches in Multimodal Fact-Checking: From Text to Images to Metadata	Relevant but not limited to [1] For background, please check https://aclanthology.org/2023.findings-emnlp.361.pdf https://dl.acm.org/doi/full/10.1145/3697349 [2] For fact-verfiers, please check https://aclanthology.org/2024.findings-emnlp.764.pdf https://dl.acm.org/doi/pdf/10.1145/3539618.3591879 https://arxiv.org/abs/2403.03627	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in NLP, computer vision, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and CV tools is preferable. Supervision teams include Dr. Iffat Maab.
K02310	Natural language processing	Dissecting Bias: Detecting Misinformation in Social Media Narratives	Relevant but not limited to [1] For background, please check https://www.sciencedirect.com/science/article/pi/S0957417423021437 https://aclanthology.org/D19-1664/ [2] For fact-verfiers, please check https://aclanthology.org/2024.naacl-long.227/ https://aclanthology.org/2023.ijcnlp-main.50/ https://aclanthology.org/2024.findings-acl.24.pdf https://aclanthology.org/2024.findings-acl.356.pdf	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in NLP, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and LLMs is preferable. Supervision teams include Dr. Iffat Maab.
K02311	Speech processing	Speaker anonymization and synthetic data for machine learning	Relevant but not limited to [1] For background,please check the overview paper on privacy in speech and other modalities:https://arxiv.org/abs/2305.05227 https://dl.acm.org/doi/abs/10.1145/1749603.1749605 https://doi.org/10.1016/j.csl.2022.101362 [2] For related method, please see https://arxiv.org/abs/2309.06141 https://arxiv.org/abs/2305.18823	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Xin Wang, Dr. Zhe Zhang.
K02312	Music Information Retrieval	Musical Instrument Sound Synthesis	Relevant but not limited to our previous work:https://arxiv.org/abs/2104.12292 https://arxiv.org/abs/2211.13868 https://arxiv.org/abs/2309.07658v1	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in music information retrieval, speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Zhe Zhang and Dr. Yigitcan Ozer.
K02313	Music Information Retrieval	Enhancement of source separation of piano music recordings	Relevant but not limited to [1] For an overview of the sound demixing challenge in music https://transactions.ismir.net/articles/10.5334/tismir.171 [2] For source separation on piano music recordings https://ieeexplore.ieee.org/abstract/document/10413592 [3] For the enhancement of source separation model outputs https://arxiv.org/abs/2208.12387 https://arxiv.org/pdf/2206.03065	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a PhD student in music information retrieval, speech processing, computer science, or a related discipline. He or she should have strong programming skills. Familiarity with DNN tools (e.g., Pytorch) and speech tools is preferable. Supervision teams include Dr. Yigitcan Özer and Dr. Zhe Zhang.

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K02901	Natural Language Processing	Better evaluation of large language models: evaluation methods and task design	https://penzant.net	Saku Sugawara	Assistant Professor	Either	2	4 - 6 months	https://aclanthology.org/2024.emnlp-main.905/ https://aclanthology.org/2023.emnlp-main.9/ https://aclanthology.org/2023.acl-short.53/ https://aclanthology.org/2023.findings-acl.861/ When you reach out to me, please mention what kind of tasks or linguistic phenomena you are interested in for evaluation (e.g., by referring to recent papers).
K02902	Natural Language Processing	Understanding language models through the lens of human language acquisition	https://penzant.net	Saku Sugawara	Assistant Professor	Either	2	4 - 6 months	https://aclanthology.org/2024.emnlp-main.1146/ https://aclanthology.org/2024.findings-acl.865/ https://aclanthology.org/2024.findings-acl.913/ When you reach out to me, please mention what aspect of language modeling or human language acquisition you are interested in (e.g., by referring to recent papers).
K03501	Audio Processing	Physics-informed machine learning for spatial audio processing	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6 months	Knowledge of deep learning, signal processing, and acoustics is required. Programming skills in Python or Julia are also required. Reference: Koyama, et al., IEEE SPM 2025 (in press, preprint is available), Ribeiro, et al. IEEE/ACM TASLP 2024.
K03502	Audio Processing	Spatial active noise cancelling	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6 months	Knowledge of adaptive signal processing and acoustics is required. Programming skills in Python are also required. Reference: Koyama, et al. IEEE TASLP 2021.
K03503	Audio Processing	Head-related transfer function upsampling/personalization for VR audio	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6 months	Knowledge of deep learning, signal processing, and acoustics is required. Programming skills in Python are also required. Reference: Ito, et al. IWAENC 2022.

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4. Information and Society Research Division									
J00301	AI Security	Fake Information Generation Technology and Attack Technology Using Fake Information (e.g., Fraudulent human perception and cognition,Attacks on biometric and large-scale AI models)	https://research.nii.ac.jp/~iechizen/synthetiq-x/en/research.html https://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	6	3 - 6 months	
J00302	AI Security	Technology to Protect Spread of Fake Information (e.g., Authenticity judgment, Estimation of tampering area, Provenance management, Cross-modal judgment)	https://research.nii.ac.jp/~iechizen/synthetiq-x/en/research.html https://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	6	3 - 6 months	
J00303	AI Security	Technology to Prevent Spread of Fake Information (e.g., Makes collection of training data difficult, Disables generation of fake information, Purification of training data)	https://research.nii.ac.jp/~iechizen/synthetiq-x/en/research.html https://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	6	3 - 6 months	
J00401	Blockchain	Social Implication of Blockchain and Distributed Ledger Technology		Hitoshi Okada	Associate Professor	Ph.D.	1	2 - 6 months	Applicants are required to possess a postgraduate level of academic knowledge on social scientific methods, expected to have published papers in the field of blockchain-related research and/or currency-related research.
J00501	Interactive Information Retrieval	Understanding and Modeling User Behaviour during Complex Search Task	The current project page has not been set up, but the previous related project page is available at; http://cres.jpn.org/?FrontPage	Noriko Kando	Professor	Either	6	2 - 6 months	The grand target of the project is to propose a mechanism to support the users conducting complex/exploratory search tasks including conversational search. As a step toward the target, several internship research tasks are prepared as following, but not limited to: 1) propose or enhance a method to assess the outcomes of the complex/exploratory search so called "search as learning" process, 2) investigate the affects of the user search behaviour in terms of dwell time, link depth, search trail, engagement, perceived task difficulty, cognitive task complexity on the learning outcome, 3) investigate the relationship between user's attributes such as domain expertise, task familiarity, time constraint, etc. and the search behaviour and the learning outcomes, 4) investigate the approach towards longitudinal learning effects, 5) building and/or enhancing the tools usable for the above mentioned 1) -4). Any other topic related to this research direction shall be considered.
J00502	Human computer Interaction, Design	Interactive user guide app for Museum using iPad	No project page is set up yet, but please refer the following to understand some aspect of the project; - Y. Shoji et al., "Museum Experience into a Souvenir: Generating Memorable Postcards from Guide Device Behavior Log," 2021 ACM/IEEE Joint Conference on Digital Libraries (JCDL), Champaign, IL, USA, 2021, pp. 120-129, doi: 10.1109/JCDL52503.2021.00024.- J. Yu et al.: Personalized Treasure Hunt Game for Proactive Museum Appreciation by Analyzing Guide App Operation Log. ICADL (2) 2023: 30-45, doi: https://doi.org/10.1007/978-981-99-8088-8_3	Noriko Kando	Professor	Either	6	2 - 6 months	

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J00503	Information Retrieval	Evaluation of Information Access Technologies using LLMs	Relevant papers include, but not limited to;G. Faggioli, et al.: Who Determines What Is Relevant? Humans or AI? Why Not Both? Commun. ACM 67(4): 31-34 (2024), https://doi.org/10.1145/3624730 - G. Faggioli et al: Perspectives on Large Language Models for Relevance Judgment. ICTIR 2023: 39-50, https://doi.org/10.1145/3578337.3605136 - related project: NTCIR: https://research.nii.ac.jp/ntcir/index-en.html	Noriko Kando	Professor	Either	6	2 - 6 months	Investigate methodologies to evaluation information access technologies including information retrieval, question answering and summerization. Especially the project places emphasis on the methodology using LLMs for evaluation, relevance judgments, annotation.
J00801	AI in Educational Assessment and Personalized Learning Support	Evaluating and Evaluating Large Language Models (LLMs) for knowledge concept mapping		Yuan Sun	Professor	Either	2	3 - 6 months	
J00802	AI in Educational Assessment and Personalized Learning Support	Generating Effective Exercises and Feekback Using Large Language Models (LLMs)		Yuan Sun	Professor	Either	2	3 - 6 months	
J00803	AI in Educational Assessment and Personalized Learning Support	Developing Dialogue/Chat-Based Learning Assessment with AI		Yuan Sun	Professor	Either	2	3 - 6 months	
K02101	Linguistics	Sign language research	https://research.nii.ac.jp/~bono/en/index.html	Mayumi Bono	Associate Professor	Either	2	2 - 6 months	
K02102	Image Processing	Sign language recognition/translation	https://research.nii.ac.jp/~bono/en/index.html	Mayumi Bono	Associate Professor	Either	2	2 - 6 months	
K02103	Natural Language Processing	Sign language recognition/translation	https://research.nii.ac.jp/~bono/en/index.html	Mayumi Bono	Associate Professor	Either	2	2 - 6 months	