List of research topics for NII International Internship Program 2024 2nd 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									
P01101	Machine learning	Geometric analysis of machine learning models	https://mahito.nii.ac.jp	Mahito Sugiyama	Associate Professor	Ph.D.	2	3 - 6months	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 - 6months	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 - 6months	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	Master	3	3 - 6months	
P01202	Artificial Intelligence	Building and Applications for Academic Knowledge Graph		Hideaki Takeda	Professor	Master	3	3 - 6months	
P01301	software verification	separation logic	http://research.nii.ac.jp/~tatsuta/index-e.html	Makoto Tatsuta	Professor	Either	2	2 - 6months	
P02001	Theoretical Computer Science	Sensitivity Analysis/Lipschitz Continuous Algorithms	https://arxiv.org/abs/2211.04674https://arxiv.org/abs/2111.02657	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6months	
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 - 6months	
P02003	Theoretical Computer Science	Spectral Graph Theory for Directed Graphs and Hypergraphs	https://arxiv.org/abs/2106.02353https://arxiv.org/abs/2201.07289	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6months	
P02004	Theoretical Computer Science	Sublinear-time Algorithms	https://arxiv.org/abs/2204.08404https://arxiv.org/abs/2210.12601	Yuichi Yoshida	Professor	Ph.D.	3	2 - 6months	
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 - 6months	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 - 6months	
P03401	Robotics	Real-world robot learning		Taisuke Kobayashi	Assistant Professor	Ph.D.	2	4 - 6months	Knowledge and experience of reinforcement learning and/or imitation learning are required
P03501	Quantum information	Theoretical and/or numerical research to address scaling-related problems in quantum information processing		Akihito Soeda	Associate Professor	Either	1	2 - 4months	
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	Either	1	2 - 6months	
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 - 6months	
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 - 6months	
P03703	Theoretical Computer Science/Algorithm Engineering	Fast Approximate String Matching in Practice		Philip Wellnitz	Assistant Professor	Either	2	3 - 6months	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.

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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 - 6months	
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 - 6months	
A00601	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	Energy-efficient edge AI-based wireless networks design for Beyond 5G	http://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	2	5 - 6months	Required programming skills: Matlab, Python. Basic knowledge in wireless/digital communications and signal processing is required.
A00602	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	Joint wireless communications and sensing for IoT connectivity	http://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	2	4 - 6months	Required programming skills: Matlab, Python. Basic knowledge in wireless/digital communications and signal processing is required.
A00603	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning	Integrated terrestrial and spatial wireless communications for 6G	http://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Professor	Either	2	4 - 6months	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning http://research.nii.ac.jp/~megkaneko/
A00801	Wireless communications	Resource management in beyond 5G and 6G wireless networks	https://klab.nii.ac.jp/	Yusheng Ji	Professor	Either	3	3 - 6months	Understanding of wireless communications and basic knowledge on optimization are required.
A00802	Networking	AI/ML for networking	https://klab.nii.ac.jp/	Yusheng Ji	Professor	Either	3	3 - 6months	Experience in machine learning (deep learning, reinforcement learning, etc.) is preferred.
A01201	Theory of Programming Languages, Program Verification	Type-Based Temporal Verification and Its Automation	https://researchmap.jp/t-sekiym?lang=en	Taro Sekiyama	Associate Professor	Either	4	4 - 6months	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 - Taro Sekiyama, Hiroshi Unno. Temporal Verification with Answer-Effect Modification. POPL'23.
A01202	Theory of Programming Languages, Program Verification	Advanced Type Systems for Computational Effects	https://researchmap.jp/t-sekiym?lang=en	Taro Sekiyama	Associate Professor	Either	4	4 - 6months	Real-world programs involve many side effects, such as memory and file manipulation, 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). References: - Fuga Kawamata et al. Answer Refinement Modification: Refinement Type System for Algebraic Effects and Handlers. POPL'24. - Taro Sekiyama et al. Signature restriction for polymorphic algebraic effects. ICFP'20, JFP'24.

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A01203	Theory of Programming Languages, Program Verification	Program Verification for Concurrency, Parallelism, and Distributed Computing	https://researchmap.jp/t-sekiym?lang=en	Taro Sekiyama	Associate Professor	Either	4	4 - 6months	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://researchmap.jp/t-sekiym?lang=en	Taro Sekiyama	Associate Professor	Either	4	4 - 6months	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.
A01701	Theoretical Computer Science	Categorical Foundation of Model Checking	https://group-mmm.org/~ichiro/	Ichiro Hasuo	Professor	Either	2	3 - 6months	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 - 6months	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 - 6months	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)
A01801	Computer network	Network security measurement and analysis	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	3	5 - 6months	Solid programming skills (C++ or python)
A01802	Computer network	Network management (syslog and config analysis)	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	3	5 - 6months	Solid programming skills (C++ or python)
A01803	Computer network	Network anomaly detection	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	3	5 - 6months	Solid programming (python or C++) and ML 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 - 6months	
K00102	Natural language processing	Deep analysis of scientific papers	http://www-al.nii.ac.jp	Akiko Aizawa	Professor	Either	4	3 - 6months	
K00103	Natural language processing	Domain adaptation of large-scale language models	http://www-al.nii.ac.jp	Akiko Aizawa	Professor	Either	4	3 - 6months	
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/intern2024_ON_SITE_topic_1.htm	Frederic ANDRES	Associate Professor	Either	5	6months	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/intern2024_ON_SITE_topic_2.htm	Frederic ANDRES	Associate Professor	Either	5	6months	Collaboration with ISO standardisation SC36 experts
K00403	Molecular biology	Quantum-Assisted Drug Discovery: Leveraging Quantum Machine Learning for Enhanced Molecular Property Prediction	http://research.nii.ac.jp/~andres/official/intern2024_ON_SITE_topic_3.htm	Frederic ANDRES	Associate Professor	Either	5	6months	cooperation with the Japanese National Institute of Health Sciences (NIHS) .
K00404	Molecular biology	Precision Pharmacotherapy: Personalized Drug Customization through Multi-Omics Integration and Machine Learning	http://research.nii.ac.jp/~andres/official/intern2024_ON_SITE_topic_4.htm	Frederic ANDRES	Associate Professor	Either	5	6months	cooperation with the Japanese National Institute of Health Sciences (NIHS) .
K00405	Data Science	OntoAI learning annotation service	http://research.nii.ac.jp/~andres/official/intern2024_ON_SITE_topic_5.htm	Frederic ANDRES	Associate Professor	Either	5	6months	Cooperation with IRISA Lab (France)
K00406	Data Science	OntoAI cooking recipe classification service	http://research.nii.ac.jp/~andres/official/intern2024_ON_SITE_topic_6.htm	Frederic ANDRES	Associate Professor	Either	5	6months	Cooperation with CRWB project
K00501	Computer Vision	Computer Vision Research		Satoshi Ikehata	Associate Professor	Either	1	3 - 6months	
K01001	Digital Humanities	Machine learning for image processing (esp. character recognition), geographic information, linked data, metadata management, and data infrastructure for cultural big data	http://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6months	Programming skills are required, and collaboration with domain experts is requested for an interdisciplinary theme.
K01002	Earth Environmental Informatics	Big data analytics (esp. image processing, remote sensing, and machine learning) for solving environmental and societal problems	http://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6months	Programming skills are required, and collaboration with domain experts is requested for an interdisciplinary theme.
K01003	Crisis Informatics	Big data analytics (esp. image processing, natural language processing, and machine learning) for natural disasters and crisis	http://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6months	Programming skills are required, and collaboration with domain experts is requested for an interdisciplinary theme.
K01004	Open Science	Research on a new trend in science, such as open data, data citation, citizen science, and open innovation	http://agora.ex.nii.ac.jp/~kitamoto/education/internship/index.html.en	Asanobu Kitamoto	Professor	Either	4	3 - 6months	Programming skills are required, and collaboration with domain experts is requested for an interdisciplinary theme.
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 - 6months	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 - 6months	A basic knowledge of Image Analysis and/or Machine learning, and good programming skills are required

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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 - 6months	
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 Deep Video Understanding, can be considered.https://trecvid.nist.gov/	http://www.satoh-lab.nii.ac.jp/	Shin'ichi Satoh	Professor	Either	3	2 - 6months	
K01403	Content-Based Image and Video Analysis	Diversity analysis of television archives, e.g., gender balance, age distribution, their roles, etc. Building tools to enable this as well as social aspect by observing television archives will be sought.(this topic will be jointly supervised by Camille Guinaudeau (Paris Saclay University, remotely) and Shin'ichi Satoh (NII))	http://www.satoh-lab.nii.ac.jp/	Shin'ichi Satoh	Professor	Either	3	2 - 6months	
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 - 6months	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 - 6months	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 - 6months	
K01702	Data Mining	Tabular Data Recognition and Analysis	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	3	4 - 6months	
K01703	Data Mining	Sequence Data Mining	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	3	4 - 6months	
K02001	Generative AI	LLMs and LMMs for Stock/Crypto Market Prediction	http://research.nii.ac.jp/~prendinger/papers/FY2024(2)_Topics.htmlM. 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	Helmut PRENDINGER	Professor	Either	4	4 - 6months	We investigate the potential of Large Language Models (LLMs) and Large Multimodal Models (LMMs), such as GPT-4o, for predicting the price action of stocks and crypto assets as a basic component for swing trading. The success of LLMs in natural language applications and vision tasks is already clearly understood (e.g., Chat-GPT). A very recent development is to prompt an LLM with both text and time series data, or even images, such as technical price charts (in case of LMMs). Our goal is to establish LLMs and LMMs for price forecasting of financial instruments. We focus on tuning based predictors (e.g. Time-LLM or TEMPO). 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.

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K02002	Generative AI	Time Series Foundation Models for Stock/Crypto Market Prediction	http://research.nii.ac.jp/~prendinger/papers/FY2024(2)_Topics.htmlAbdul Fatir Ansari, Lorenzo Stella, Caner Turkmen, Xiyuan Zhang, Pedro Mercado, Huibin Shen, Oleksandr Shchur, Syama Sundar Rangapuram, Sebastian Pineda Arango, Shubham Kapoor, Jasper Zschiegner, Danielle C. Maddix, Michael W. Mahoney, Kari Torkkola, Andrew Gordon Wilson, Michael Bohlke-Schneider, Yuyang Wang, Chronos: Learning the Language of Time Series, 2024.3, https://arxiv.org/abs/2403.07815	Helmut PRENDINGER	Professor	Either	4	4 - 6months	We investigate time series foundation models for predicting the price action of stocks and crypto assets as a basic component for swing trading. A foundation model for financial time series data is a model that has been pre-trained on a large and diverse set of historical price action and other indicators (Relative Strength Index, Volume, etc.) 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.
K02003	Token Economy, Smart Contract, Generative AI	Market Design for Advanced Air Mobility (drones and "flying cars")	http://research.nii.ac.jp/~prendinger/papers/FY2024(2)_Topics.htmlSven Seuken, Paul Friedrich, Ludwig Dierks, Market design for drone traffic management. AAAI, 2022, https://ojs.aaai.org/index.php/AAAI/article/view/21493	Helmut PRENDINGER	Professor	Either	4	4 - 6months	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 (Video: https://youtu.be/QuIEdMqFJqw). We investigate market design for AAM, based on ideas from token economy (Web3). Our studies include: Introduction of a AAM related crypto token; Investigation of large language models (LLMs) for handling smart contracts.
K02101	Image Processing	Sign language recognition/translation	https://research.nii.ac.jp/~bono/	Mayumi Bono	Associate Professor	Either	2	2 - 6months	
K02102	Natural Language Processing	Sign language recognition/translation	https://research.nii.ac.jp/~bono/	Mayumi Bono	Associate Professor	Either	2	2 - 6months	
K02103	Sign Language Linguistics	Understanding sign languages	https://research.nii.ac.jp/~bono/	Mayumi Bono	Associate Professor	Either	2	2 - 6months	
K02301	Audio-visual processing	Multi-modality deepfake detection	Relevant but not limited to [1] For background information on speech deepfake detection, please check this practical guidehttps://arxiv.org/abs/2201.03321 [2] For audio-visual deepfake detection, please check databases such as AV-Deepfake1M https://arxiv.org/abs/2311.15308, FakeAVCeleb https://arxiv.org/abs/2108.05080, PolyGlotFake https://arxiv.org/abs/2405.08838, [3] For methods, check https://ieeexplore.ieee.org/document/9710387, https://arxiv.org/pdf/2406.14176, https://ieeexplore.ieee.org/abstract/document/10081373/"	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	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 are preferable. Supervision teams include Dr. Xin Wang.
K02302	Speech processing	Responsible audio generation through deep-learning-based watermarking	Relevant but not limited to [1] For background, please check overview papers https://doi.org/10.1016/j.sigpro.2016.04.005, https://www.nature.com/articles/s41598-021-99811-x[2] For related methods, please check latest DNN-based watermarking methods: https://arxiv.org/abs/2406.03822, https://doi.org/10.1109/ICASSP48485.2024.10447253, https://arxiv.org/abs/2401.17264, https://arxiv.org/abs/2406.06979, https://ai.meta.com/blog/stable-signature-watermarking-generative-ai/, https://arxiv.org/abs/2308.12770, https://arxiv.org/abs/2309.15224, https://arxiv.org/abs/2303.15435	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	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 are preferable. Supervision teams include Dr. Xin Wang and Dr. Wanying Ge.

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K02303	Speech processing	Privacy Protection for Speech Databases Using Generative Models	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 - 6months	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 are preferable. Supervision teams include Dr. Xin Wang and Dr. Zhe Zhang.
K02304	Natural language processing	Enhancing LLMs for Disinformation Detection through Model Merging	https://proceedings.neurips.cc/paper_files/paper/2022/file/70c26937fbf3d4600b69a129031b66ec-Paper-Conference.pdfhttps://huggingface.co/blog/mlabonne/merge-modelshttps://aclanthology.org/2023.emnlp-main.883.pdfhttps://blog.marvik.ai/2024/06/19/model-merging-combining-different-fine-tuned-llms/https://www.linkedin.com/pulse/model-merging-expanding-skills-llm-go-nelson-fernandez-pinto-wpwle	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	The successful candidate should be a PhD student in natural language processing, computer science/engineering, mathematics, or a related discipline, and familiar with DL frameworks (e.g., PyTorch). Supervision teams include Dr. Iffat Maab.
K02305	Natural language processing	Detecting and Mitigating Social Bias in Text Generation Using LLMs	https://proceedings.mlr.press/v139/liang21a/liang21a.pdfhttps://dl.acm.org/doi/full/10.1145/3597307	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	The successful candidate should be a PhD student in natural language processing, computer science/engineering, mathematics, or a related discipline, and familiar with DL frameworks (e.g., PyTorch). Supervision teams include Dr. Iffat Maab.
K02306	Natural language processing	Deepfake Detection in Text Through Multimodal Analysis	https://arxiv.org/pdf/2402.00045https://aclanthology.org/2020.emnlp-main.193.pdfhttps://aclanthology.org/2024.naacl-tutorials.1.pdfhttps://arxiv.org/abs/2309.14203	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	The successful candidate should be a PhD student in natural language processing, computer science/engineering, mathematics, or a related discipline, and familiar with DL frameworks (e.g., PyTorch). Supervision teams include Dr. Iffat Maab.
K02307	Speech processing	Deepfake Detection Architecture for Long-form Audio	https://arxiv.org/abs/2210.02437https://arxiv.org/abs/2311.15308	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	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 are preferable. Supervision teams include Dr. Xuechen Liu.
K02308	Speech processing	Multi-speaker, multi-lingual deepfake detection	https://arxiv.org/abs/2401.09512	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6months	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 are preferable. Supervision teams include Dr. Xuechen Liu.
K03501	Audio Processing	Physics-informed machine learning for spatial audio processing	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6months	Knowledge of deep learning, signal processing, and acoustics is required. Programming skills in Python or Julia are also required. Reference: Shigemi, et al. IWAENC 2022, Ribeiro, et al. TechRxiv 2023.
K03502	Audio Processing	Spatial active noise cancelling	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6months	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/individualization for VR audio	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	3	3 - 6months	Knowledge of deep learning, signal processing, and acoustics is required. Programming skills in Python are also required. Reference: Ito, et al. IWAENC 2022.
K03601	Vision and Language	Development and Assessment of visual language models (VLM) or multimodal language models (MLM), including topics of multimodal document processing, referring expression comprehension/open vocabulary object detection, 2D graph and diagram (e.g., TikZ) generation from texts.	https://shuheikurita.github.io/	Shuhei Kurita	Assistant Professor	Either	2	6months	

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
K03602	Video, 3D and Language	Understanding of the real world through the lens of video and 3D data, including topics of Gaussian Splatting / NeRF and language (e.g., LangSplat / LERF), 3D language model, video analyses with texts, and robotic applications from texts.	https://shuheikurita.github.io/	Shuhei Kurita	Assistant Professor	Either	2	6months	

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
4. Information and Society Research Division									
J00301	Multimedia forensics	Generation and detection of fake facial videos	http://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	6	6months	
J00302	Multimedia security	Generation and detection of adversarial examples	http://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	6	6months	
J00303	Multimedia forensics	Image-based fact verification	http://research.nii.ac.jp/~iechizen/crest/en/research.html	Isao Echizen	Professor	Either	6	6months	