List of research topics for NII International Internship Program 2024 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									
P00301	Knowledge Representation and Reasoning	Integration of Knowledge Representation and Machine Learning	http://research.nii.ac.jp/il/	Katsumi Inoue	Professor	Ph.D.	2	4 - 6 months	Knowledge and experience in both KR&R and machine learning are required. Contact Prof. Inoue in advance.
P00302	Knowledge Representation and Reasoning	Theory, Extension and Applications of Learning from Interpretation Transition	http://research.nii.ac.jp/il/	Katsumi Inoue	Professor	Ph.D.	2	4 - 6 months	Basic knowledge of symbolic AI and machine learning is required. Please specify how LFIT is applied or extended in the proposal.
P00303	Knowledge Representation and Reasoning	Reasoning Techniques for Handling Inconsistent Information	http://research.nii.ac.jp/il/	Katsumi Inoue	Professor	Ph.D.	2	3 - 6 months	Some experience of research on KR&R and XAI is requested. Contact Prof. Inoue in advance.
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	Master	3	3 - 6 months	
P01202	Artificial Intelligence	Building and Applications for Academic Knowledge Graph		Hideaki Takeda	Professor	Master	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/2211.04674https://arxiv.org/abs/2111.02657	Yuichi Yoshida	Professor	Ph.D.	2	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.	2	2 - 6 months	
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.	2	2 - 6 months	
P02004	Theoretical Computer Science	Sublinear-time Algorithms	https://arxiv.org/abs/2204.08404https://arxiv.org/abs/2210.12601	Yuichi Yoshida	Professor	Ph.D.	2	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	After January 2025
P03401	Robotics	Bio-inspired machine learning for robot control		Taisuke Kobayashi	Assistant Professor	Ph.D.	2	3 - 6 months	Develop a bio-inspired machine learning algorithm/theory Apply it to a real-robot control task
P03402	Robotics	Lifelong learning for human-robot interaction		Taisuke Kobayashi	Assistant Professor	Either	2	5 - 6 months	Improve the lifelong learning method we are developing Apply it to human-robot interaction scenario
P03501	Quantum information	Making a general framework to explore large-scale quantum programs		Akihito Soeda	Associate Professor	Either	2	2 - 6 months	
P03502	Quantum information	Making more accurate physical models to describe quantum information processing devices		Akihito Soeda	Associate Professor	Either	2	2 - 6 months	
P03601	Robotics olfaction, Mechatronics, System control engineering, Insect-machine interface, Ethology	Development of a Drone System Implementing Multi-Sensory Integration	https://sshigaki.jimdofree.com/research/	Shunsuke Shigaki	Assistant Professor	Either	2	2 - 6 months	
P03602	Robotics olfaction, Mechatronics, System control engineering, Insect-machine interface, Ethology	Modeling an insect by Data-driven method and validation experiments in real-world	https://sshigaki.jimdofree.com/research/	Shunsuke Shigaki	Assistant Professor	Either	2	2 - 6 months	

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
2. Information Systems Architecture Science Research Division									
A00301	Software Engineering, Generative AI, Testing, Formal Methods	Generative AI for Trustworthy Software Engineering	https://research.nii.ac.jp/~f-ishikawa/en/call.html	Fuyuki Ishikawa	Associate Professor	Either	5	2 - 6 months	
A00302	Software Engineering, Testing, Generative AI, Evolutionary Computation, Security	Testing and Trust Exploration for Generative AI	https://research.nii.ac.jp/~f-ishikawa/en/call.html	Fuyuki Ishikawa	Associate Professor	Either	5	2 - 6 months	
A00303	Software Engineering, Evolutionary Computation, Deep Learning	Search-based Repair for Deep Learning-based Systems	https://research.nii.ac.jp/~f-ishikawa/en/call.html	Fuyuki Ishikawa	Associate Professor	Either	5	2 - 6 months	
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	Associate 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, Machine Learning	Joint wireless communications and sensing for IoT massive connectivity	http://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Associate 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, Machine Learning	Integrated terrestrial and spatial wireless communications for 6G	http://research.nii.ac.jp/~megkaneko/	Megumi Kaneko	Associate Professor	Either	3	4 - 6 months	Wireless and Mobile Networks, Sensing, Signal Processing, Machine Learning http://research.nii.ac.jp/~megkaneko/
A00801	Wireless communication	Resource management in beyond 5G and 6G wireless networks	https://klab.nii.ac.jp	Yusheng Ji	Professor	Either	3	3 - 6 months	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 - 6 months	Experience in machine learning (deep learning, reinforcement learning, or federated 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	3 - 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. References - 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	3 - 6 months	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 verifying such effectful programs uniformly. As a uniform mean to express side effects, we plan to focus on algebraic effect handlers, an emerging construct to model a variety of side effects. The expressivity of algebraic effect handlers comes from the ability to manipulate the notion of continuations. Therefore, type systems to be studied need to verify effectively how continuations are used. There are many directions and potentials to advance 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.

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
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 - 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.
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)
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)

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
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)
A01801	Computer network	Network security measurement and analysis	http://www.flab.nii.ac.jp/internship	Kensuke Fukuda	Professor	Either	3	5 - 6 months	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 - 6 months	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 - 6 months	Solid programming (python or C++) and ML skills

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
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/intern2024_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/intern2024_ON_SITE_topic_2.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	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	6 months	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	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/intern2024_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/intern2024_ON_SITE_topic_6.htm	Frederic ANDRES	Associate Professor	Either	5	6 months	Cooperation with CRWB project
K00501	Learning-based 3D Computer Vision	The topic will be decided through discussions between the mentor and the intern. For example:- Learning-based Physics-based Vision (e.g., Photometric Stereo, Multispectral Analysis)- Novel View Synthesis and 3D Reconstruction (including NeRF and Gaussian Splatting)- 3D Computer Vision x Generative AI. (e.g., Fine-tune T2I or T2V model for 3D generation)	https://satoshi-ikehata.github.io/	Satoshi Ikehata	Assistant Professor	Either	2	3 - 6 months	If the number of applicants exceeds the available positions, interviews will be conducted. I place great importance on students who are proactive in learning new things and find enjoyment in reading academic papers.
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 - 6 months	
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 - 6 months	
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 - 6 months	
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 - 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

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
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	3 - 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 Deep Video Understanding, can be considered.https://trecvid.nist.gov/	http://www.satoh-lab.nii.ac.jp/	Shin'ichi Satoh	Professor	Either	3	2 - 6 months	
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))		Shin'ichi Satoh	Professor	Either	3	2 - 6 months	
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	4	4 - 6 months	
K01702	Data Mining	Tabular Data Analysis	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	4	4 - 6 months	
K01703	Data Mining	Sequence Data Mining	https://www.tlab.nii.ac.jp/	Atsuhiro Takasu	Professor	Either	4	4 - 6 months	
K02001	Large Language Models (LLM), Large Multimodal Models (LMMs)	LLMs and LMMs for Bitcoin Market Prediction	http://research.nii.ac.jp/~prendinger/papers/FY2024(1)_Topics.html	Helmut PRENDINGER	Professor	Either	3	4 - 6 months	We investigate the potential of LLMs and LMMs for predicting the price action of Bitcoin and other financial instruments (indexes, stocks, etc.) as a basic component for swing trading. The success of LLMs in natural language applications and vision tasks is already clearly understood (e.g., ChatGPT). 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 consider both tuning based predictors (e.g., Time-LLM or TEMPO) and non-tuning based predictors (e.g., PromptCast, LLMTime). Please see the link for references.

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
K02002	Foundation Models	Time Series Analysis for Bitcoin Market Forecasting	http://research.nii.ac.jp/~prendinger/papers/FY2024(1)_Topics.html	Helmut PRENDINGER	Professor	Either	3	4 - 6 months	We aim to understand the predictability of financial instruments, such cryptocurrencies (Bitcoin), indexes (S&P500), stocks, etc. Our goal is to investigate foundation models for time series data to forecast the price action of financial instruments. Such capability is an important component for successful swing trading. Note: 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.) Please see the link for references.
K02003	Token Economy, Blockchain	Market Design for Unmanned Aircraft Systems ("drone") Traffic Management (UTM)	http://research.nii.ac.jp/~prendinger/papers/FY2024(1)_Topics.html	Helmut PRENDINGER	Professor	Either	3	4 - 6 months	We have developed a prototype of a complete distributed UTM system to manage advanced air mobility (drones and "flying cars"), and conducted related simulation studies. Recently, we got interested in market design for UTM, based on ideas from token economy (Web3). The project aims to investigate the benefit of introducing a UTM related crypto token to the UTM eco-system. Please see the link for references.
K02301	Speech processing	Multilingual deepfake detection and its adaptation to a new language	Relevant but not limited to [1] For background, please check https://www.asvspoof.org and https://arxiv.org/abs/2210.02437[2] For practical deepfake detector, please check this practical guide https://arxiv.org/abs/2201.03321 [3] For the dataset, please check https://arxiv.org/abs/2401.09512	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a Ph.D. 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.
K02302	Speech processing	Regarding fairness of speech and speaker recognition systems	"Relevant but not limited to [1] For a gentle introductory background, please check this talk and related literature https://www1.icsi.berkeley.edu/~stolcke/talks/Fairness-and-GraphLP-Dec2023.pdf[2] For more background about fairness of speaker recognition systems, please check https://arxiv.org/abs/2204.12649[3] For same topic as [2], please check https://arxiv.org/abs/2203.09122"	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 are preferable. Supervision teams include Dr. Xuechen Liu
K02303	Speech processing	Privacy-preserving processing for speech signals using speaker anonymized and differential privacy techniques	"Relevant but not limited to [1] For background, please check Tomashenko, N. et al. The VoicePrivacy 2020 Challenge: Results and findings. Comput. Speech Lang. 101362 (2022) doi:10.1016/j.csl.2022.101362. [2] For related method, please check Shamsabadi, et al. https://arxiv.org/pdf/2202.11823.pdf"	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	The successful candidate should be a Ph.D. 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.
K02304	Speech processing	Robust deepfake speech detection based on likelihood ratio and generative models	"Relevant but not limited to [1] For background, please check https://www.asvspoof.org and this practical guide https://arxiv.org/abs/2201.03321 [2] For related methods, please check Chen, et al., https://doi.org/10.1109/SLT48900.2021.9383572[3] Another related method is Sizov, et al., https://doi.org/10.1109/TIFS.2015.2407362"	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 are preferable. Supervision teams include Dr. Xin Wang
K02305	Speech processing	Responsible audio generation through deep-learning-based watermarking	"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 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 - 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 are preferable. Supervision teams include Dr. Xin Wang

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
K02306	Natural language processing	Fact-checking over structured andunstructured data	Relevant papers include, but are not limited to:Aly et al., FEVEROUS: Fact Extraction and VERification Over Unstructured and Structured information, NeurIPS Datasets and Benchmarks 2021.Huanhuan Ma, Weizhi Xu, Yifan Wei, Liuji Chen, Liang Wang, Qiang Liu, Shu Wu, Liang WangEX-FEVER: A Dataset for Multi-hop Explainable Fact Verificationhttps://arxiv.org/abs/2310.09754	Junichi Yamagishi	Professor	Ph.D.	6	4 - 6 months	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.
K02901	Natural Language Processing	Better evaluation of large language models: evaluation methods and dataset design	Supervisor website: https://penzant.netRefer to recent papers (e.g., Kawabata and Sugawara 2023; Sugawara and Tsugita) for more details	Saku Sugawara	Assistant Professor	Either	2	3 - 6 months	
K03501	Audio Processing	Physics-grounded machine learning forspatial audio recording	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	2	3 - 6 months	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 control	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	2	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/individualization	https://www.ap.nii.ac.jp/	Shoichi Koyama	Associate Professor	Either	2	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.

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	10	3 - 6 months	
J00302	Multimedia security	Generation and detection of adversarial examples	http://research.nii.ac.jp/~iechizen/official/research/research5-e.html	Isao Echizen	Professor	Either	10	3 - 6 months	
J00303	Multimedia forensics	Image-based fact verification	http://research.nii.ac.jp/~iechizen/crest/en/research.html	Isao Echizen	Professor	Either	10	3 - 6 months	
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	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.	Noriko Kando	Professor	Either	6	6 months	To enhance the prototype Interactive user guide system for Museum, 1) propose a effective ranking and recommendation mechanism based on the relationship among the artifacts, user behaviour on the app and locational move in the museum, etc. 2) conducts user experiments of the app, 3) user experiments on the design of the post card automatically produced by the guide app based on the user's behaviour during a museum visit.