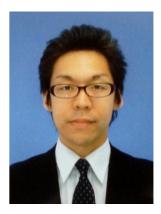# Naoya Inoue, Ph. D.

Postdoctral Associate

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Research Interests

- Natural Language Processing
- Commonsense Reasoning
- Discourse Processing
- Logical Inference
- Argumentation Mining

Degrees

2013   Ph. D. Information Science. Tohoku University, Sendai, Japan.

2010   M. S. Engineering. Nara Institute of Science and Technology, Nara, Japan.

2008   B. A. Economics. Musashi University, Tokyo, Japan.

Education

Apr. 2010 – Mar. 2013	PhD student at Graduate School of Information Sciences at Tohoku University, Japan Society for the Promotion of Science (JSPS) Fellow (DC1)
Apr. 2008 – Mar. 2010	Student at Graduate School of Information Science, Nara Institute of Science and Technology
Apr. 2006 – Mar. 2007	Exchange student at Korea University
Apr. 2004 – Mar. 2008	Student at Faculty of Economics at Musashi University

Professional Experience

Sep. 2020 – Current	Postdoctoral Associate at Stony Brook University
Apr. 2020 – Current	Independent researcher self-employed by Modus Ponens Research, Japan

Apr. 2017 – Sep. 2017	Visiting researcher at University College London, UK (host: Sebastian Riedel)
Sep. 2016 – Feb. 2017	Visiting researcher at University of Southern California / Institute for Creative Technologies, USA (host: Andrew S. Gordon)
Aug. 2015 – Apr. 2020	Assistant professor at Tohoku University, Japan
Jul. 2013 – Jul. 2015	Researcher at DENSO CORPORATION
Apr. 2013 – Jul. 2015	Postdoctoral researcher at Tohoku University
June. 2012 – Aug. 2012	Research intern at Information Sciences Institute at University of Southern California, USA. (host: Jerry Hobbs) *Task*: Abduction-based coreference resolution
Sep. 2011 – Dec. 2011	Visiting researcher at Information Sciences Institute at University of Southern California, USA. (host: Jerry Hobbs) *Task*: Development of Integer Linear Programming-based framework for abductive inference
Sep. 2009 – Dec. 2009	Research intern at NHN Corporation, South Korea. *Task*: Extraction of synonymous word pairs and transliteration pairs

Grants

June 2019 — Mar. 2020	UCL-Tohoku Strategic Partner Funds, "Creating Large-scale Corpus for Machine Reading Comprehension with Human Reasoning" (Collaborator, £10,000)
Apr. 2019 — Mar. 2023	Japan Society for the Promotion of Science (JSPS) Grants-in-Aid for Scientific Research, "Developing Flexible Inference Mechanism by Embedding Causality Knowledge into Continuous Space" (Principal Investigator, 4,160,000JPY, 19K20332)
Apr. 2017 — Mar. 2020	Japan Science and Technology Agency (JST), "Mechanism Design for Accelerating Circulation and Extension of Knowledge." (Collaborator, 60,000,000JPY)
Oct. 2016 — Mar. 2018	Japan Society for the Promotion of Science (JSPS) Grants-in-Aid for Scientific Research, "Structuring and

	Aggregating Widely Spread Pieces of World Knowledge." (Principal Investigator, 2,990,000JPY, 16H06614)
Apr. 2015 — Mar. 2019	Japan Society for the Promotion of Science (JSPS) Grants-in-Aid for Scientific Research, "Reading between the Lines by Integrating Logical Inference, Machine Learning and Physics Simulation" (Collaborator, 21,060,000JPY, 15H01702)
Apr. 2010 — Mar. 2013	Japan Society for the Promotion of Science (JSPS) Research Fellowship, "Development of Interaction Simulator and Its Application to Discourse Analysis." (Principal Investigator, 1,200,000JPY, 10J09719)
May. 2008 – Mar. 2009	Creative and International Competitiveness Project Leader (CICP2008), "Dear Proofreaders: Development of Proofread Network with Blog Plugin", Nara Institute of Science and Technology.

Awards

2020	Annual Meeting Best Linguistic Resource Paper, Association for Natural Language Processing (in Japan)
2018	Funai Research Award
2018	Tokin Technology Award
2016	Annual Meeting Excellent Paper, Association for Natural Language Processing (in Japan)
2014	Annual Meeting Excellent Paper, Association for Natural Language Processing (in Japan)
2013	Dean's Award for Excellence in Graduate School of Information Sciences at Tohoku University
2012	Honorable Mention, the 15th Information-Based Induction Sciences Workshop
2012	IPSJ Yamashita SIG Research Award
2012	Annual Meeting Excellent Paper, Association for Natural Language Processing (in Japan)
2010	Information Processing Society Japan (IPSJ) Certificate of Excellent Master's Thesis.

Teaching

- Programming Course (C language)

Academic Activity

- YANS NLP Program Committee (2018/04-2019/03)
- YANS NLP Vice chairman (2019/04-2020/03)
- YANS NLP Chairman (2020/04-)
- NLP2020 Program Committee (2019/08-)
- Journal of Natural Language Processing Editor (2019/10-)
- SIG Language & Robotics Program Committee (2018/03-)

Reviewer

- Empirical Methods in Natural Language Processing (EMNLP): 2015, 2017, 2018, 2020
- Association for Computational Linguistics (ACL): 2016, 2017, 2018, 2019, 2020
- Asian Association for Computational Linguistics (AACL): 2020
- Computational Linguistics (COLING): 2016, 2018, 2020
- Transactions on Asian and Low-Resource Language Information Processing (TALIP): 2016
- Scientific Document Analysis Workshop (SCIDOCA): 2016, 2017, 2018
- International Conference on Artificial Intelligence (ICOAI): 2016
- Journal of Natural Language Processing (JNLP): 2013, 2015, 2018, 2019, 2020
- Journal of Japanese Society for Artificial Intelligence (JSAI): 2013, 2015, 2017, 2019
- International Symposium on Commonsense Reasoning (Commonsense-2017): 2017
- International Conference on Language Resources and Evaluation (LREC): 2018
- Women and Underrepresented Minorities in NLP Workshop (WiNLP): 2017, 2020
- Widening NLP Workshop (WiNLP): 2018, 2019, 2020
- IEICE Transaction D: 2017 (2)
- 信学会和文論文誌 D: 2018

- Association for the Advancement of Artificial Intelligence (AAAI): 2014 (subreviewer)

Selected Publications

International conferences

- <u>Naoya Inoue</u>, Pontus Stenetorp and Kentaro Inui. R4C: A Benchmark for Evaluating RC Systems to Get the Right Answer for the Right Reason. In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*, July 2020, to appear.

- Tatsuki Kuribayashi, Hiroki Ouchi, <u>Naoya Inoue</u>, Paul Reisert, Toshinori Miyoshi, Jun Suzuki and Kentaro Inui. An Empirical Study of Span Representations in Argumentation Structure Parsing. In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL)*, August 2019.

- Paul Reisert, Gisela Vallejo, <u>Naoya Inoue</u>, Iryna Gurevych and Kentaro Inui. An Annotation Protocol for Collecting User-Generated Counter-Arguments using Crowdsourcing. *Proceedings of the 20th International Conference on Artificial Intelligence in Education (AIED)*, June 2019.

- Reina Akama, Kazuaki Inada, <u>Naoya Inoue</u>, Sosuke Kobayashi, and Kentaro Inui. Generating Stylistically Consistent Dialog Responses with Transfer Learning. In *Proceedings of the 8th International Joint Conference on Natural Language Processing (IJCNLP)*, pp.408-412, November 2017.

- Shota Sasaki, Sho Takase, <u>Naoya Inoue</u>, Naoaki Okazaki, and Kentaro Inui. Handling Multiword Expressions in Causality Estimation. In *Proceedings of 12th International Conference on Computational Semantics (IWCS)*, September 2017.

- <u>Naoya Inoue</u>, Yuichiro Matsubayashi, Masayuki Ono, Naoaki Okazaki and Kentaro Inui. Modeling Context-sensitive Selectional Preference with Distributed Representations. In *Proceedings of the 26th International Conference on Computational Linguistics (COLING)*, December 2016.

- <u>Naoya Inoue</u>, Yasutaka Kuriya, Sosuke Kobayashi and Kentaro Inui. Recognizing potential traffic risks through logic-based deep scene understanding. In *Proceedings of the 22nd ITS World Congress*, October 2015.

- Paul Reisert, <u>Naoya Inoue</u>, Naoaki Okazaki and Kentaro Inui. A Computational

Approach for Generating Toulmin Model Argumentation. In *Proceedings of the 2nd Workshop on Argumentation Mining*, pp.45–55, June 2015.

- Canasai Kruengkrai, <u>Naoya Inoue</u>, Jun Sugiura, and Kentaro Inui. An Example-Based Approach to Difficult Pronoun Resolution. In *Proceedings of the 28th Pacific Asia Conference on Language, Information and Computing*, pp.358-367, December 2014.

- Jun Sugiura, <u>Naoya Inoue</u> and Kentaro Inui. Recognizing Implicit Discourse Relations through Abductive Reasoning with Large-scale Lexical Knowledge. In *Proceedings of the 1st Workshop on Natural Language Processing and Automated Reasoning*, September 2013.

- Kazeto Yamamoto, <u>Naoya Inoue</u>, Yotaro Watanabe, Naoaki Okazaki and Kentaro Inui. Discriminative Learning of First-order Weighted Abduction from Partial Discourse Explanations. In *Proceedings of the 14th International Conference on Intelligent Text Processing and Computational Linguistics*, pp.545-558, March 2013.

- <u>Naoya Inoue</u>, Ekaterina Ovchinnikova, Kentaro Inui, and Jerry R. Hobbs. Coreference Resolution with ILP-based Weighted Abduction. In *Proceedings of the 24th International Conference on Computational Linguistics*, pp.1291-1308, December 2012.

- <u>Naoya Inoue</u> and Kentaro Inui. Large-scale Cost-based Abduction in Full-fledged First-order Predicate Logic with Cutting Plane Inference. In *Proceedings of the 13th European Conference on Logics in Artificial Intelligence*, pp.281-293, September 2012.

- <u>Naoya Inoue</u> and Kentaro Inui. ILP-based Reasoning for Weighted Abduction. In *Proceedings of AAAI Workshop on Plan, Activity and Intent Recognition*, pp. 25-32, August 2011.

Journal papers

- Tadahiro Taniguchi, Daichi Mochihashi, Takayuki Nagai, Satoru Uchida, <u>Naoya Inoue</u>, Ichiro Kobayashi, Tomoaki Nakamura, Yoshinobu Hagiwara, Naoto Iwahashi, Tetsunari Inamura. Survey on Frontiers of Language and Robotics. *Advanced Robotics*, Vol. 33, No. 12, 31 pages, June 2019.

- Qin Dai, <u>Naoya Inoue</u>, Paul Reisert, and Kentaro Inui. Leveraging Unannotated Texts for Scientific Relation Extraction. *IEICE Transactions on Information and Systems*, Vol. E101-D, No. 12, pp.3209-3217, December

2018.

- Ryo Takahashi, <u>Naoya Inoue</u>, Yasutaka Kuriya, Sosuke Kobayashi, and Kentaro Inui. Explaining potential risks in traffic scenes by combining logical inference and physics simulation. *International Journal of Machine Learning and Computing*, Vol. 6, No. 5, pp. 248-255, October 2016.

- Kazeto Yamamoto, <u>Naoya Inoue</u>, Kentaro Inui, Yuki Arase and Jun'ichi Tsujii. Boosting the Efficiency of First-order Abductive Reasoning Using Pre-estimated Relatedness between Predicates. *International Journal of Machine Learning and Computing*, Vol. 5, No. 2, pp. 114-120, April 2015.

- <u>Naoya Inoue</u> and Kentaro Inui. ILP-based Inference for Cost-based Abduction on First-order Predicate Logic. *Journal of Natural Language Processing*, Vol.20, No.5, pp.629-656, December 2013.

- <u>Naoya Inoue</u>, Ryu Iida, Kentaro Inui, and Yuji Matsumoto. Resolving Direct and Indirect Anaphora for Japanese Definite Noun Phrases (in Japanese). *Journal of Natural Language Processing*, Vol.17, No.1, pp.221-246, January 2010.

Book chapter

- Ryu Iida, Mamoru Komachi, <u>Naoya Inoue</u>, Kentaro Inui and Yuji Matsumoto. NAIST Text Corpus: Annotating Predicate-Argument and Coreference Relations in Japanese. In Nancy Ide and James Pustejovsky (Eds), *Handbook of Linguistic Annotation*, Part II, pp.1177-1196, Springer, July 2017.

- <u>Naoya Inoue</u>, Ekaterina Ovchinnikova, Kentaro Inui, and Jerry R. Hobbs. Weighted Abduction for Discourse Processing Based on Integer Linear Programming. In Gita Sukthankar, Christopher Geib, Robert P. Goldman, Hung Bui, and David V. Pynadath (Eds), *Plan, Activity, and Intent Recognition*, Elsevier, pp.33-55, March 2014.

Thesis

- Naoya Inoue. Exploiting World Knowledge in Discourse Processing: A Comparison of Feature-Based and Inference-Based Approaches. *Doctoral Dissertation, Tohoku University*. (Advisor: Kentaro Inui)

- Naoya Inoue. Anaphora Resolution for Japanese Definite Noun Phrases. Master's thesis, Graduate School of Information Science. *Nara Institute of Science and Technology*. (Advisor: Kentaro Inui and Yuji Matsumoto)

Language Skills

- Japanese (Native)
- English (Business and conversational)
- Korean (Conversational)

Computer skills

- *Languages*: Python, C++, C, JavaScript, HTML, BASIC, Object Pascal
- *Platforms*: Mac OS X, Linux, Windows
- *Machine Learning:* Tensorflow, Keras, numpy, crowdsourcing