

# Danushka BOLLEGALA

## CONTRACT INFORMATION

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## EDUCATION

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2007 – 2009	PhD Computer Science, The University of Tokyo, Japan. <i>Summa Cum Laude</i>
2005 – 2007	M.Sc. Computer Science, The University of Tokyo, Japan. <i>Summa Cum Laude</i>
2001– 2005	B.Sc. Computer Science, The University of Tokyo, Japan. <i>Summa Cum Laude</i>

## EMPLOYMENT HISTORY

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<i>Current</i> AUGUST 2013	Senior Lecturer, UNIVERSITY OF LIVERPOOL, UK.
APRIL 2012 – AUGUST 2013	Senior Assistant Professor, ( <i>koshi</i> ) UNIVERSITY OF TOKYO, Japan.
APRIL 2010 – MARCH 2012	Assistant Professor, UNIVERSITY OF TOKYO, Japan.
OCTOBER 2009 – MARCH 2010	JSPS Post-doctoral Research Fellow, UNIVERSITY OF SUSSEX, UK.
APRIL 2007 – SEPTEMBER 2010	Japan Society for Promotion of Science (JSPS), Doctoral Research Fellow (DC1) UNIVERSITY OF TOKYO, Japan.
APRIL 2005 – MARCH 2007	Research Assistant, National Institute of Advanced Industrial Science and Technology (AIST), Japan.
JUNE 2005 – MARCH 2010	Research Consultant, FAST a Microsoft Subsidiary (former FAST Search & Transfer), Norway.

## FELLOWSHIPS AND SCHOLARSHIPS

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2017.05-CURRENT	Chief Scientific Officer (CSO) Alt Ltd. Japan, specialising in Personalised Artificial Intelligence (PAI)
2017.09-CURRENT	Senior Fellow Cookpad PLC UK, specialising in cooking recipe analysis
2017.01-CURRENT	Advisor BrainPad PLC Japan, specialising in deep learning applications
2018.04-CURRENT	Advisor LexSnap UK, specialising in Legal Chatbot systems
2017.03-2017.06	Advisor Skwile UK, specialising in financial risk prediction
2011.04-2011.06	Visiting Research Fellow, Department of Computer Science, University of Cambridge, UK.
2009.10-2010.03	Japan Society for Promotion of Science (JSPS), Post-doctoral Research Fellow, University of Sussex, UK.
2007.04-2009.09	Japan Society for Promotion of Science (JSPS), Doctoral Research Fellow, University of Tokyo, Japan.
2000.04-2007.03	Japan Ministry of Education Overseas Full Scholarship, University of Tokyo, Japan

## HONOURS AND AWARDS

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1. EPSRC Top Peer Reviewer's Award 2017.
2. Best Journal Paper of the Year 2014-2015, Japanese Society for Artificial Intelligence.
3. IEEE Young Author Award 2011.
4. Best paper award at 2011 Genetic and Evolutionary Computation (GECCO) Conference.
5. Best poster paper at 2010 Pacific Rim International Conference on Artificial Intelligence (PRICAI).
6. Annual Conference Award for the Best Paper at 2010 Japanese Society for Artificial Intelligence (JSAI).
7. Dean's Award for the Best Doctoral Thesis of the Year 2010.
8. Dean's Award for the Best Masters Thesis of the Year 2007.
9. Dean's Award for the Best Undergraduate Thesis of the Year 2005.

## RESEARCH GRANTS

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Total research income so far GBP 2,040,100.

1. **Procedural Natural Language Inference** (Cookpad), PI, (GBP 24k), 2017-2018.
2. **Legal Advisor Dialogue Engine** (LexSnap), PI, (GBP 12k), 2017-2018.
3. **Algorithm Design for Automatic Classification of Transactions into a Taxonomy** (Rosslyn Data Technologies), PI, (GBP 5k), 2017-2018.
4. **Track Analytics For Effective Triage Of Wide Area**, Defence Science Technology Laboratory (DSTL), Co-I (GBP 243k), 2017-2019.
5. **Digital Legal Assistant**, Knowledge Transfer Partnership (Innovate UK), PI (GBP 492k), 2017-2020.

6. **WEB-RADR: Recognising Adverse Drug Reactions**, (European Commission) Innovative Medicine Initiative, Co-PI (GBP 471k), 2014-2017.
7. **I knew that relation from news**, Innovation Voucher Scheme, University of Liverpool, PI (GBP 5k), 2015-2016.
8. **The Revierview Law Contract Map Project**, Knowledge Transfer Partnership (Innovate UK), Co-PI (GBP 269k), 2015-2018.
9. **Resolving Relational Ambiguity between Entities on the Web**, Microsoft Research (MSR) CORE-9 Research Grant, PI, (GBP 10K), 2013-2015.
10. **Domain Adaptation for Semantic Relation Extraction**, Japanese Society for the Promotion of Science (JSPS), Research Grant for Young Researchers (B). PI (GBP 20K), 2012-2015.
11. **Cross-Language Relational Search**, Microsoft Research (MSR) CORE-7 Research Grant, PI, (GBP 20K), 2011-2012.
12. **Developing a Cross-Language Web Search Engine**, Information Technology Promotion Agency of Japan (IPA) grant for explorative software development (Mito Project), PI, (GBP 26.5K), 2010-2011.
13. **A Latent Relational Search Engine**, Google Research Award, Co-PI, (GBP 18.6K), 2010-2011.
14. **Developing a Relational Search Engine to Retrieve Semantic Relations between Entities**, Japanese Society for the Promotion of Science (JSPS) research grant, PI. (GBP 29.8K), 2010-2012.
15. **Research grant for overseas visiting scholars**, Global Centre of Excellence (GCOE), Japan. PI. (GBP 9.7K), April 2011-June 2011.
16. **Extracting Attributes for Entities using Web Data**, Global Centre of Excellence (GCOE), Japan. Sole PI. (GBP 7.5K), 2010-2011.
17. **Learning to Rank Entities on the Web**, Microsoft Research (MSR) CORE-6 Research Grant, Co-PI, (GBP 19.4K), 2010-2011.
18. **Using Web Mining to Provide Useful Information to Drivers**, Toyota InfoTechnology Centre, Co-PI, (GBP 29.8K) 2009-2012.
19. **Disambiguating Personal Names on the Web**, Japan Society for the Promotion of Science (JSPS) Research Grant PI. (GBP 29.8K), 2007-2009.
20. **Using Network Theory and Machine Learning to Structure and Represent Information Available on the Web**, Co-PI, (GBP 298K), 2009-2012.

## ADMINISTRATIVE ROLES

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| 2017.10-CURRENT | Head of the Data Mining and Machine Learning (DMML) Research Group. |
| 2016.01-CURRENT | Undergraduate admissions tutor                                      |
| 2013.09-2016.01 | Disability Support Officer  |

## SUPERVISION OF PHD STUDENTS

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Graduated PhD Students under my (co)-supervision:

1. Asif Hussain Khan, graduated March 2014, now assistant professor, University of Dhaka.
2. Leon Palafox, graduated March 2012, now postdoc at University of Arizona.
3. Liu Shu, graduated March 2011, now engineer at Microsoft.
4. Makoto Tanji, graduated March 2011, now engineer at Wantedly.
5. Akio Watanabe, graduated March 2012, now engineer at CyberAgent.
6. Nguyen Tuan Duc, graduated March 2011, now engineer at Alt+.
7. Hugo Hernault, graduated March 2011, now engineer at Barclays.

## PHD EXAMINATIONS:

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1. Fatima Abdullahi, University of Liverpool, May 2016.
2. Liyung Gong, University of Liverpool, November, 2014.
3. Tocoa Renevey Francisco, University of Tokyo, March, 2013.
4. Mamdouh Farouk Mohamed, University of Tokyo, March, 2012.
5. Haibo Li, University of Tokyo, March 2011.
6. Alena Neviarouskaya, University of Tokyo, March 2011.

## MY CURRENT PHD STUDENTS:

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Pavithra Rajendran, Huda Hakami, Alsuhaibani Mohammed, Abdullah Alsheri, Xia Cui, James O'Neill.

## TEACHING ACTIVITIES

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I have extensive experience in both university lecturing and international lecturing at scientific events, and I hold a teaching qualification from the University of Tokyo. I have taught a variety of courses in computer science such as data mining, machine learning, artificial intelligence and object oriented programming at University of Liverpool and University of Tokyo.

## ORGANISATION OF SCIENTIFIC MEETINGS

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- 2018 **Co-organiser** of the Knowledge Representation and Reasoning in Natural Languages (KRRNL) Workshop at the 16th International Conference on the Principles of Knowledge Representation and Reasoning
- 2017 **Local co-chair** of the 17th Annual Meeting of the International Society of Pharmacovigilance (ISoP)
- 2017 **Program chair** of the Pharmacovigilance and Social Media Workshop at ISoP
- 2012 **Program co-chair** of the International Organised Sessions at the 26th Annual Conference of Japanese Society for Artificial Intelligence

## COMMISSIONS OF TRUST

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- 2017– Member of the Advisory Committee, AI and Future Jobs, Royal Society of Science.
- 2017– Full member of Engineering and Physical Science Research Council (EPSRC) Peer Review College
- 2017– Remote assessor for the Irish Research Council
- 2016– Associate Editor of the Journal of Computational Social Sciences
- 2014– Evaluator of PhD scholarship programme for Xi'an Jiaotong-Liverpool University
- 2013–2016 Associate Editor of the Transactions of the Japanese Society for Artificial Intelligence (JSAI)

## PROGRAM COMMITTEE

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- 2014 – Senior Programme Committee member for the International Joint Conference in Artificial Intelligence
- 2014– Senior Programme Committee member for the AAAI Conference on Artificial Intelligence
- 2014 Information Extraction Area Chair for the International Conference on Computational Linguistics (COLING)
- 2010– PC member of ACL, EMNLP, NIPS, WWW, COLING, LREC and reviewer for JAIR, TKDE, TKDD, JMLR, TACL journals.

## MEMBERSHIP OF SCIENTIFIC SOCIETIES

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- 2010– Full Member IEEE
- 2010– Full Member ACL
- 2016– Full Member AAAI
- 2010– Senior member JSAI

## SELECTED KEYNOTE/INVITED TALKS

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1. Keynote speech at National Human Resource Conference, Colombo, 2018.
2. Invited talk at International Society for Pharmacovigilance, 2017.
3. Invited talk at Microsoft Research Beijing Lab, 2013.
4. Keynote at Information-Based Induction Sciences (IBIS) Conference, 2011.
5. Invited talk at Google Mountain View Lab, 2011.
6. Invited talk at Microsoft Research Seattle Lab, 2010.
7. Keynote at First Japanese Web Symposium, 2009.

## PATENTS

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1. Query Anonymisation via Semantic Decomposition, Japanese patent (filed), 2017.
2. A Method for Extracting the Semantic Relations that exist between two Entities from a Text Corpus, Japanese patent no: 2010-096551, 2010.
3. A Relational Search System, Japanese patent no: 2009-275762, 2009.

## PUBLICATIONS

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Dr. Bollegala has published over 110 papers in top international venues in Natural Language Processing, Machine Learning, Data Mining, Artificial Intelligence, and Social Media Analysis. His papers have been cited over 2600 times and Dr. Bollegala has an  $h$ -index of 26. For a full list of his publications see his [Google Scholar Profile](#). He leads the Data Mining and Machine Learning Research Group (DMML) in the Department of Computer Science, University of Liverpool.

## REFERRED JOURNAL PAPERS

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- [1] Abdullah Alsheri, Frans Coenen, and Danushka Bollegala. Iterative time keystroke continuous authentication: A time series based approach. *KI - Künstliche Intelligenz*, 32(1):1–13, 2018.
- [2] Mohammed Alsuhaibani, Danushka Bollegala, Takanori Maehara, and Ken ichi Kawarabayashi. Jointly learning word embeddings using a corpus and a knowledge base. *Plos One*, 13(3):1–26, 2018.
- [3] Danushka Bollegala, Vincent Atanasov, Takanori Maehara, and Ken ichi Kawarabayashi. Classinet – predicting missing features for short-text classification. *ACM Transactions on Knowledge Discovery from Data (TKDD)*, (to appear):1–29, 2018.
- [4] Danushka Bollegala, Richard Slone, Simon Maskell, Joanne Hajne, and Munir Pirmohammed. Learning causality patterns for detecting adverse drug reactions from social media. *Journal of Medical Internet Research Public Health Surveillance*, 4(2):1–20, 2018.
- [5] Xia Cui, Noor Al-Bazzaz, Danushka Bollegala, and Frans Coenen. A comparative study of pivot selection strategies for unsupervised cross-domain sentiment classification. *The Knowledge Engineering Review*, to appear:1–24, 2018.
- [6] Tomoyuki Kajiwar, Danushka Bollegala, Yuichi Yoshida, and Ken ichi Kawarabayashi. An iterative approach for the global estimation of sentence similarity. *PLoS ONE*, 12(9):1–15, July 2017.
- [7] Danushka Bollegala. Dynamic feature scaling for online learning of binary classifiers. *Knowledge-Based Systems*, 129:97–105, 2017.
- [8] Danushka Bollegala, Kohei Hayashi, and Ken ichi Kawarabayashi. Learning linear transformations between counting-based and prediction-based word embeddings. *PLoS ONE*, 12(9):1–21, 2017.
- [9] Huda Hakami and Danushka Bollegala. Compositional approaches for representing relations between words: A comparative study. *Knowledge-Based Systems*, 136C:172–182, 2017.
- [10] Danushka Bollegala, Georgios Kontonatsios, and Sophia Ananiadou. A cross-lingual similarity measure for detecting biomedical term translations. *PLOS ONE*, 10(6):1–28, 06 2015.
- [11] Danushka Bollegala, Tingting Mu, and Yannis Goulermas. Cross-domain sentiment classification using sentiment sensitive embeddings. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 28(2):398–410, 2015.

- [12] Hakami Huda and Danushka Bollegala. A classification approach for detecting cross-lingual biomedical term translations. *Natural Language Engineering*, 1(1469-8110):1-21, 2015.
- [13] Nozomi Nori, Danushka Bollegala, and Mitsuru Ishizuka. Interest prediction via user's actions on social media. *Transactions of the Japanese Society for Artificial Intelligence*, pages 168-176, 2015.
- [14] Nozomi Nori, Danushka Bollegala, and Hisashi Kashima. Simultaneous higher-order relation prediction via collective incidence matrix embedding. *Transactions of the Japanese Society for Artificial Intelligence*, pages 459-465, 2015.
- [15] Hiroyuki Sato, Yoshihiko Hasegawa, Danushka Bollegala, and Hitoshi Iba. Improved sampling using loopy belief propagation for probabilistic model building genetic programming. *Swarm and Evolutionary Computation*, pages 1-8, 2015.
- [16] Richard Sloane, Orod Osanlou, David Lewis, Danushka Bollegala, Simon Maskell, and Munir Pirmohamed. Social media and pharmacovigilance: A review of the opportunities and challenges. *British Journal of Clinical Pharmacology*, 80(4):910 - 920, 2015.
- [17] Nozomi Nori, Danushka Bollegala, and Hisashi Kashima. A dimension reduction approach to multinomial relation prediction. *Transactions of the Japanese Society for Artificial Intelligence*, pages 168-176, 2014.
- [18] Danushka Bollegala. Deep learning for natural language processing. *Journal of the Japanese Society for Artificial Intelligence*, pages 195-203, 2013.
- [19] Danushka Bollegala, Tomokazu Goto, Nguyen Tuan Duc, and Mitsuru Ishizuka. Improving relational similarity measurement using symmetries in proportional word analogies. *Information Processing and Management*, 49(1):355 - 369, 2013.
- [20] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. Minimally supervised novel relation extraction using latent relational mapping. *IEEE Transactions on Knowledge and Data Engineering*, 25(2):419 - 432, 2013.
- [21] Danushka Bollegala and Ekaterina Shutova. Metaphor interpretation using paraphrases extracted from the web. *PLoS ONE*, 8(9):1-10, 2013.
- [22] Danushka Bollegala, David Weir, and John Carroll. Cross-domain sentiment classification using a sentiment sensitive thesaurus. *IEEE Transactions on Knowledge and Data Engineering*, 25(8):1719 - 1731, 2013.
- [23] Ken ichi Yokote, Danushka Bollegala, and Mitsuru Ishizuka. Jointly learning similarity transformations for textual entailment. *Transactions of of the Japanese Society for Artificial Intelligence*, pages 220-229, 2013.
- [24] Muhammad Asif Hossain Khan, Danushka Bollegala, Guangwen Li, and Kaoru Sezaki. Delineating real-time events by identifying relevant tweets with popular discussion points. *ASE Human Journal*, 2(3):136 - 150, 2013.
- [25] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. Automatic annotation of ambiguous personal names on the web. *Computational Intelligence*, 28(3):398 - 425, 2012.
- [26] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. Measuring the degree of synonymy between words using relational similarity between word pairs as a proxy. *Institute of Electronics, Information and Communication Engineers (IEICE) Transactions on Information Systems*, pages 2116-2123, 2012.

- [27] Danushka Bollegala, Naoaki Okazaki, and Mitsuru Ishizuka. A preference learning approach to sentence ordering for multi-document summarization. *Information Sciences*, 217:78 – 95, 2012.
- [28] Danushka Bollegala, Naoki Tani, and Mitsuru Ishizuka. Improving the accuracy of attribute extraction using the relatedness between attribute values. *Transactions of the Japanese Society for Artificial Intelligence*, pages 245–252, 2012.
- [29] Nguyen Tuan Duc, Danushka Bollegala, and Mitsuru Ishizuka. Cross-language latent relational search between japanese and english languages using a web corpus. *ACM Transactions on Asian Language Processing (TALIP)*, 11(3):1 – 33, 2012.
- [30] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. Automatic discovery of personal name aliases from the web. *IEEE Transactions on Knowledge and Data Engineering*, 23(6):831 – 844, July 2011.
- [31] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. A web search engine-based approach to measure semantic similarity between words. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 23(7):977–990, July 2011.
- [32] Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. A supervised classification approach for measuring similarity between word pairs. *Transactions of the Institute of Electronics, Information and Communication Engineers (IEICE)*, E94-D(11):2227–2233, 2011.
- [33] Nguyen Tuan Duc, Danushka Bollegala, and Mitsuru Ishizuka. Exploiting relational similarity between entity pairs for latent relational search. *Transactions of the Information Processing Society of Japan*, 52(4):1790–1802, 2011.
- [34] Nguyen Tuan Duc, Danushka Bollegala, and Mitsuru Ishizuka. Relation representation and indexing method for fast and high precision latent relational search engine. *Special issue of the Transactions of the Japanese Society for Artificial Intelligence*, 26(2):307–312, 2011.
- [35] Tomokazu Goto, Nguyen Tuan Duc, Danushka Bollegala, and Mitsuru Ishizuka. Improving relational search performance using relational symmetries and predictors. *Transactions of of the Japanese Society for Artificial Intelligence*, 26(6):649–656, 2011.
- [36] Wataru Sunayama, Yasufumi Takama, Danushka Bollegala, Yoko Nishihara, Hidekazu Tokunaga, Mineo Kushima, and Mitsunori Matsushita. Total environment for text data mining. *Transactions of of the Japanese Society for Artificial Intelligence*, 26(4):483–493, 2011.
- [37] Danushka Bollegala, Naoaki Okazaki, and Mitsuru Ishizuka. A bottom-up approach to sentence ordering for multi-document summarization. *Information Processing and Management*, 46(1):89 – 109, 2010.
- [38] Keigo Watanabe, Danushka Bollegala, Yutaka Matsuo, and Mitsuru Ishizuka. Automatic extraction of related terms using web search engines. *Journal of the Japan Society for Fuzzy Theory and Intelligent Informatics*, 23(4):483–493, 2010.
- [39] D. BOLLEGALA, N. OKAZAKI, and M. ISHIZUKA. Agglomerative clustering based approach to sentence ordering for multi-document summarization. *IEIC Technical Report (Institute of Electronics, Information and Communication Engineers)*, 105(594):13–18, 2006.



## REFERRED CONFERENCE PAPERS

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- [40] Cong Bao and Danushka Bollegala. Learning word meta-embeddings by autoencoding. In *Proc. of the 27th International Conference on Computational Linguistics (COLING)*, pages XX–XX, (to appear) 2018.
- [41] Danushka Bollegala, Kohei Hayashi, and Danushka Bollegala. Why does pairdiff work? - a mathematical analysis of bilinear relational compositional operators for analogy detection. In *Proc. of the 27th International Conference on Computational Linguistics (COLING)*, pages XX–XX, (to appear) 2018.
- [42] Danushka Bollegala, Kohei Hayashi, and Ken ichi Kawarabayashi. Think globally, embed locally – locally linear meta-embedding of words. In *Proc. of IJCAI-EACL*, (to appear) 2018.
- [43] Khai Mai, Thai-Hoang Pham, Minh Trung Nguyen, Nguyen Tuan Duc, Danushka Bollegala, Ryohei Sasano, and Satoshi Sekine. Which model performs best in this situation? an empirical study on fine-grained named entity recognition. In *Proc. of the 27th International Conference on Computational Linguistics (COLING)*, pages XX–XX, (to appear) 2018.
- [44] Mohammed Alsuhaibani and Danushka Bollegala. Joint learning of sense and word embeddings. In *Proc. of the Eleventh International Conference on Language Resources and Evaluation (LREC)*, pages 1–7, 2018.
- [45] Danushka Bollegala, Yuichi Yoshida, and Ken ichi Kawarabayashi. Using  $k$ -way Co-occurrences for Learning Word Embeddings. In *Proc. of the Thirty Second AAAI Conference on Artificial Intelligence (AAAI)*, pages 5037–5044, 2018.
- [46] Joshua Coates and Danushka Bollegala. Frustratingly easy meta-embedding - computing meta-embeddings by averaging source word embeddings. In *Proc. of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, pages 194–198, 2018.
- [47] Xia Cui, Kojaku Sadamori, Naoki Masuda, and Danushka Bollegala. Solving feature sparseness in text classification using core-periphery decomposition. In *Proc. of Seventh Joint Conference on Lexical and Computational Semantics*, pages 255–264, 2018.
- [48] Angrosh Mandya, Danushka Bollegala, Frans Coenen, and Katie Atkinson. A dataset for inter-sentence relation extraction using distant supervision. In *Proc. of the Eleventh International Conference on Language Resources and Evaluation (LREC)*, pages 1–7, 2018.
- [49] Pavithra Rajendran, Danushka Bollegala, and Simon Parsons. Is something better than nothing? automatically predicting stance-based arguments using deep learning and small labelled dataset. In *Proc. of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, pages 28–34, 2018.
- [50] Pavithra Rajendran, Danushka Bollegala, and Simon Parsons. Sentiment-stance-specificity (sss) dataset: Identifying support-based entailment among opinions. In *Proc. of the Eleventh International Conference on Language Resources and Evaluation (LREC)*, pages 1–7, 2018.
- [51] Krasen Samardzhiev, Andrew Gargett, and Danushka Bollegala. Learning neural word salience scores. In *Proc. of the Seventh Joint Conference on Lexical and Computational Semantics*, pages 33–42, 2018.

- [52] Abdullah Alsheri, Frans Coenen, , and Danushka Bollegala. Accurate continuous and non-intrusive user authentication with multivariate keystroke streaming. In *Proc. of the 9th International Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (KDIR)*, pages 61–70, 2017.
- [53] Abdullah Alsheri, Frans Coenen, , and Danushka Bollegala. Spectral analysis of keystroke streams: Towards effective real-time and continuous user authentication. In *Proc. of Workshop on Spatial and Spatio-temporal Data Mining (SSTDM) at the IEEE International Conference on Data Mining (SSTDM)*, pages 62–73, 2017.
- [54] Abdullah Alsheri, Frans Coenen, , and Danushka Bollegala. Spectral analysis of keystroke streams: Towards effective real-time continuous user authentication. In *4th International Conference on Information Systems Security and Privacy (ICISSP)*, pages 62–73, 2017.
- [55] Xia Cui, Frans Coenen, and Danushka Bollegala. Effect of data imbalance on unsupervised domain adaptation of part-of-speech tagging and pivot selection strategies. In *Proc. of the Workshop on Learning With Imbalanced Domains: Theory and Applications (LIDTA) at the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, pages 103–115, 2017.
- [56] Xia Cui, Frans Coenen, and Danushka Bollegala. Tsp: Learning task-specific pivots for unsupervised domain adaptation. In *Proc. of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, pages 754–771, 2017.
- [57] Matias Garcia-Constantino, Katie Atkinson, Danushka Bollegala, Karl Chapman, Frans Coenen, Clare Roberts, and Katy Robson. Cliel: Context-based information extraction from commercial law documents. In *Proc. of the 16th International Conference on Artificial Intelligence and Law (ICAIL)*, pages 79–87, 2017.
- [58] Huda Hakami and Danushka Bollegala. Discovering representative space for relational similarity measurement. In *Proc. of the 15th International Conference of the Pacific Association for Computational Linguistics (PACLING)*, pages 76–87, 2017.
- [59] Angrosh Mandya, Danushka Bollegala, Frans Coenen, and Katie Atkinson. Classifier-based pattern selection approach for relation instance extraction. In *Proc. of the International Conference on Computational Linguistics and Intelligent Text Processing (CI-CLing)*, pages 1–16. LNCS, Springer, 2017.
- [60] Angrosh Mandya, Danushka Bollegala, Frans Coenen, and Katie Atkinson. Frame-based semantic patterns for relation extraction. In *Proc. of the 15th International Conference of the Pacific Association for Computational Linguistics (PACLING)*, pages 51–62, 2017.
- [61] Pavithra Rajendran, Danushka Bollegala, and Simon Parsons. Identifying argument based relation properties in opinions. In *Proc. of the 15th International Conference of the Pacific Association for Computational Linguistics (PACLING)*, pages 1–12, 2017.
- [62] Abdullah Alsheri, Frans Coenen, , and Danushka Bollegala. Keyboard usage authentication using time series analysis. In *Proc. of 18th International Conference on Big Data Analytics and Knowledge Discovery (DaWak 2016)*, pages 239–252, 2016.
- [63] Abdullah Alsheri, Frans Coenen, , and Danushka Bollegala. Towards keystroke continuous authentication using time series analytics. In *Proc. of the 36th SGA International Conference on Artificial Intelligence (SGAI), Research and Development in Intelligent Systems XXXVIII*, pages 325–339. Springer, 2016.

- [64] Danushka Bollegala, Alsuhaibani Mohammed, Takanori Maehara, and Ken ichi Kawarabayashi. Joint word representation learning using a corpus and a semantic lexicon. In *Proc. of AAAI*, pages 2690–2696, 2016.
- [65] Pavithra Rajendran, Danushka Bollegala, and Simon Parsons. Assessing weight of opinion by aggregating coalitions of arguments. In *Proc. of 6th International Conference on Computational Models of Argument (COMMA)*, pages 431–438, 2016.
- [66] Pavithra Rajendran, Danushka Bollegala, and Simon Parsons. Contextual stance classification of opinions: A step towards enthymeme reconstruction in online reviews. In *Proc. of the 3rd Workshop on Argument Mining*, pages 31–39, 2016.
- [67] Danushka Bollegala, Takanori Maehara, and Ken ichi Kawarabayashi. Embedding semantic relations into word representations. In *Proc. of IJCAI*, pages 1222 – 1228, 2015.
- [68] Danushka Bollegala, Takanori Maehara, and Ken ichi Kawarabayashi. Unsupervised cross-domain word representation learning. In *Proc. of ACL*, pages 730 – 740, 2015.
- [69] Danushka Bollegala, Takanori Maehara, Yuichi Yoshida, and Ken ichi Kawarabayashi. Learning word representations from relational graphs. In *Proc. of 29th AAAI Conference on Artificial Intelligence*, pages 2146 – 2152, 2015.
- [70] Pascal Kuyten, Danushka Bollegala, Bernd Hollerit, Helmut Prendinger, and Kiyoharu Aizawa. A discourse search engine based on rhetorical structure theory. In *Proc. of 37th European Conference on Information Retrieval (ECIR 2015)*, pages 80–91, 2015.
- [71] Danushka Bollegala, David Weir, and John Carroll. Learning to predict distributions of words across domains. In *Proc. of Association for Computational Linguistics (ACL)*, pages 613 – 623, 2014.
- [72] Danushka Bollegala, Mitsuru Kusumoto, Yuichi Yoshida, and Ken ichi Kawarabayashi. Mining for analogous tuples from an entity-relation graph. In *Proc. of International Joint Conferences on Artificial Intelligence*, pages 2064 – 2070, 2013.
- [73] Muhammad Asif Hossain Khan, Danushka Bollegala, Guangwen Li, and Kaoru Sezaki. Multi-tweet summarization of real-time events. In *IEEE International Conference on Social Computing (SocialComp)*, pages 128 – 133, 2013.
- [74] Hiroyuki Sato, Danushka Bollegala, Yoshihiko Hasegawa, and Hitoshi Iba. Learning non-linear ranking functions for web search using probabilistic model building gp. In *Proc. of IEEE Congress on Evolutionary Computation (CEC 2013)*, pages 3371 – 3378, 2013.
- [75] Ken ichi Yokote, Danushka Bollegala, and Mitsuru Ishizuka. Similarity is not entailment – jointly learning similarity transformations for textual entailment. In *Proc. of the National Conference on Artificial Intelligence (AAAI)*, pages 1720 – 1726, 2012.
- [76] Nozomi Nori, Danushka Bollegala, and Hisashi Kashima. Multinomial relation prediction in social data: A dimension reduction approach. In *AAAI’12*, pages 115 – 121, 2012.
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