Ryan Lowe

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Education

2016 – present	**Ph.D. Computer Science** McGill University, Montreal, Canada Supervisor: Joelle Pineau CGPA: 4.0/4.0
2014 – 2015	**M.Sc. Computer Science** (PhD fast-track) McGill University, Montreal, Canada Supervisor: Joelle Pineau CGPA: 3.95/4.0
2010 – 2014	**B.Eng. Mathematics & Engineering** Queen's University, Kingston, Canada Supervisor: Abdol-Reza Mansouri CGPA: 3.82/4.3

Research Interests

- Deep learning
- Reinforcement learning
- Multi-agent communication
- Dialogue systems, generative models for natural language
- Causal models

Publications

Journal Articles

[1] R. Lowe, N. Pow, I. V. Serban, L. Charlin, C.-W. Liu, and J. Pineau, "Training end-to-end dialogue systems with the ubuntu dialogue corpus," *Dialogue & Discourse*, 2017.

Journal Manuscripts Under Review

[1] P. Benner, R. Lowe, and M. Voigt, "L∞-norm computation for large-scale descriptor systems using structured iterative eigensolvers," *Numerical Algebra, Control, and Optimization (submitted)*, 2016.

[2] I. V. Serban, R. Lowe, L. Charlin, and J. Pineau, "A survey of available corpora for building data-driven dialogue systems," *Dialogue & Discourse (submitted)*, 2015.

Conference Proceedings

[1] R. Lowe, Y. Wu, A. Tamar, J. Harb, P. Abbeel, and I. Mordatch, "Multi-agent actor-critic for mixed cooperative-competitive environments," *Neural Information Processing Systems (NIPS)*, 2017.

[2] R. Lowe, M. Noseworthy, I. V. Serban, N. Angelard-Gontier, Y. Bengio, and J. Pineau, "Towards an automatic turing test: Learning to evaluate dialogue responses," *Association for Computational Linguistics (ACL)*, 2017.

[3] T. Long, E. Bengio, R. Lowe, J. C. K. Cheung, and D. Precup, "World knowledge for reading comprehension: Rare entity prediction with hierarchical lstms using external descriptions," in *Empirical Methods in Natural Language Processing (EMNLP)*, pp. 836–845, 2017.

[4] D. Bahdanau, P. Brakel, K. Xu, A. Goyal, R. Lowe, J. Pineau, A. Courville, and Y. Bengio, "An actor-critic algorithm for sequence prediction," *International Conference on Learning Representations (ICLR)*, 2017.

[5] I. V. Serban, A. Sordoni, R. Lowe, L. Charlin, J. Pineau, A. Courville, and Y. Bengio, "A hierarchical latent variable encoder-decoder model for generating dialogues," *Association for the Advancement of Artificial Intelligence (AAAI)*, 2017.

[6] C.-W. Liu, R. Lowe, I. V. Serban, M. Noseworthy, L. Charlin, and J. Pineau, "How not to evaluate your dialogue system: An empirical study of unsupervised evaluation metrics for dialogue response generation," *Empirical Methods in Natural Language Processing (EMNLP)*, 2016.

[7] R. Lowe, I. Serban, M. Noseworthy, L. Charlin, and J. Pineau, "On the evaluation of dialogue systems with next utterance classification," *Proceedings of SIGDIAL (short paper)*, 2016.

[8] T. Long, R. Lowe, J. Cheung, and D. Precup, "Leveraging lexical resources for learning entity embeddings in multi-relational data," *Association for Computational Linguistics (ACL, short paper)*, 2016.

[9] R. Lowe, N. Pow, I. Serban, and J. Pineau, "The ubuntu dialogue corpus: A large dataset for research in unstructured multi-turn dialogue systems," *Proceedings of SIGDIAL*, 2015.

Workshops & Symposia

[1] I. Serban, R. Lowe, L. Charlin, and J. Pineau, "Generative deep neural networks for dialogue: A short review," *NIPS Workshop on Learning Methods for Dialogue*, 2016.

[2] E. Bengio, P.-L. Bacon, R. Lowe, J. Pineau, and D. Precup, "Reinforcement learning of conditional computation policies for neural networks," *ICML Workshop on Abstractions in Reinforcement Learning*, 2016.

[3] R. Lowe, N. Pow, I. V. Serban, L. Charlin, and J. Pineau, "Incorporating unstructured textual knowledge into neural dialogue systems," *NIPS Workshop on Machine Learning for Spoken Language Understanding*, 2015.

[4] P. Benner, R. Lowe, and M. Voigt, "Numerical methods for computing the $\mathcal{H}\infty$ norm of large-scale descriptor systems," *Householder Symposium XIX, Spa Belgium*, 2014.

[5] P. Benner, R. Lowe, and M. Voigt, "Computation of the $\mathcal{H}\infty$ norm for large-scale systems," *Numerical Solutions of PDE Eigenvalue Problems, Oberwolfach, Germany*, 2013.

Research Experience

2017 **Research Intern**, OpenAI, San Francisco, United States
- Developed algorithms for actor-critic variants of multi-agent reinforcement learning, in order to better solve cooperative and competitive multi-agent communication tasks.

2014 **Research Assistant**, Institute for Quantum Computing, Waterloo, Canada
- Investigated the applications of tensor networks and matrix product states to the simulation of quantum systems using randomized algorithms.

2013 **Research Assistant**, Max Planck Institute for the Dynamics of Complex Technical Systems, Magdeburg, Germany
- Implemented an algorithm for the computation of the $\mathcal{L}\infty$ norms of certain descriptor systems.
- Solved unexpected problems relating to the eigensolvers used in the calculation.

2011-2012 **Research Assistant**, National Research Council, Ottawa, Canada
- Developed equations to calculate engine parameters used to determine the validity of a combustion phasing estimation technique.
- Wrote multiple reports analyzing the importance of certain engine operating parameters to aid in the selection of future research projects.

Teaching Experience

2015–present **Graduate Teaching Assistant**, School of Computer Science, McGill University, Montreal, Canada
Courses taught:
- Machine Learning – COMP 652
- Applied Machine Learning – COMP 551
- Introduction to Artificial Intelligence – COMP 424

2013 – 2014 **Teaching Assistant**, Faculty of Applied Science, Queen's University, Kingston, Canada
Courses taught:
- Calculus II – APSC172
- Calculus I – APSC171
- Introduction to Computer Programming – APSC 142

2011 – 2012 **Tutor**, EngLinks Program, Queen's University, Kingston, Canada
Provided tutoring instruction for first and second year applied science students, both individually and in small groups, in calculus, linear algebra, mechanics, electromagnetics, and differential equations courses.

Professional Awards & Scholarships

2017	**Vanier Graduate Scholarship** ($150,000)
2017	**NSERC Alexander Graham Bell Canada Graduate Scholarship** ($105,000, *declined*)
2017	**Fonds de recherche du Québec - Nature et technologies (FRQNT) Scholarship** ($42,000, *declined*)
2014	**Dean's Scholar Certificate** (awarded for obtaining Dean's List Honours in each semester of academic career), Queen's University
2013	**DAAD RISE Scholarship** (€1,625 to pursue research at a top German institution)
2010	**Principal's Scholarship**, Queen's University ($8000)
2010 – 2014	**Dean's List Honours**, Queen's University

Miscellaneous

- Co-organized the Montreal AI Ethics Group to discuss technical issues related to AI safety with machine learning researchers from McGill and University of Montreal.
- Author and editor for Graphite Publications, particularly the Artificial Intelligence series.
- Fluently bilingual in English and French.