

Luke Vilnis

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Research Interests

Machine Learning

- Representation learning
- Probabilistic modeling
- Structured prediction
- Machine reasoning

Applications

- Common sense knowledge
- Knowledge base construction
- Biomedical science
- Green energy

Education

- 2012–2021 **Computer Science (PhD)**, *University of Massachusetts*, Amherst, MA.
Advised by Andrew McCallum, 3.92 GPA
- 2012–2015 **Computer Science (MS)**, *University of Massachusetts*, Amherst, MA.
Advised by Andrew McCallum, 3.9 GPA
- 2006–2010 **Mathematics, Economics (BS)**, *Duke University*, Durham, NC.
3.44 GPA, 3.67 in major (Math), 3.41 in major (Economics)

Experience

- 2012–Present **Research Assistant**, *Information Extraction and Synthesis Lab*, University of Massachusetts, Amherst, MA.
- Summer 2016 **Research Intern**, *Google*, Mountain View, CA.
- Summer 2015 **Research Intern**, *Google*, Mountain View, CA.
- Summer 2014 **Research Intern**, *Microsoft*, Redmond, WA.
- Fall 2013 **Teaching Assistant, Guest Lecturer**, *CS585: Natural Language Processing*, University of Massachusetts, Amherst, MA.
- Summer 2013 **Data Science Intern**, *LinkedIn*, Mountain View, CA.
- 2008–2012 **Software Engineer**, *Mavenomics Inc.*, Cambridge, MA.
- Designed a functional query/calculation language and implemented the compiler and query engine, coded high performance financial math and simulations, as well as front-end components (UI components, layout managers, data visualization, workflow).

Awards

- 2017 Best paper at AKBC Workshop 2017
- 2015 Outstanding paper at ACL 2015
- 2015 Passed PhD candidacy exam with distinction
- 2013–2014 Yahoo! Award for Accomplishments in Search and Mining

Publications

- *Improving Local Identifiability for Probabilistic Box Embeddings*. Shib Dasgupta, Michael Boratko, Dongxu Zhang, **Luke Vilnis**, Xiang Li, Andrew McCallum. Neural Information Processing Systems (**NeurIPS**), 2020.
- *Representing Joint Hierarchies with Box Embeddings*. Dhruvesh Patel, Shib Sankar Dasgupta, Michael Boratko, Xiang Li, **Luke Vilnis**, Andrew McCallum. Automated Knowledge Base Construction (**AKBC**), 2020.
- *Smoothing the Geometry of Probabilistic Box Embeddings*. Xiang Li*, **Luke Vilnis***, Dongxu Zhang, Michael Boratko, Andrew McCallum. International Conference on Learning Representations (**ICLR**), 2019. *Equal contribution. **Oral presentation**.
- *Embedded-State Latent Conditional Random Fields for Sequence Labeling*. Dung Thai, Sree Harsha Ramesh, Shikhar Murty, **Luke Vilnis**, Andrew McCallum. Conference on Computational Natural Language Learning (**CoNLL**), 2018.
- *Probabilistic Embedding of Knowledge Graphs with Box Lattice Measures*. **Luke Vilnis***, Xiang Li*, Shikhar Murty, Andrew McCallum. Annual Meeting of the Association for Computational Linguistics (**ACL**), 2018. *Equal contribution.
- *Hierarchical Losses and New Resources for Fine-grained Entity Typing and Linking*. Shikhar Murty, Patrick Verga, **Luke Vilnis**, Irena Radonvanovic, Andrew McCallum. Annual Meeting of the Association for Computational Linguistics (**ACL**), 2018. **Oral presentation**.
- *Learning Conditionally Calibrated Equations of State for Direct Fired sCO₂ Cycles with Deep Neural Networks*. **Luke Vilnis**, David Freed, Navid Rafati, Joe Camilo, Andrew McCallum. The 6th International Supercritical CO₂ Power Cycles Symposium (**sCO₂**), 2018.
- *Unsupervised Hypernym Detection by Distributional Inclusion Vector Embedding*. Haw-Shiuan Chang, ZiYun Wang, **Luke Vilnis**, Andrew McCallum. Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (**NAACL**), 2018.
- *Go for a Walk and Arrive at the Answer: Reasoning Over Knowledge Bases with Reinforcement Learning*. Rajarshi Das*, Shehzaad Dhuliawala*, Manzil Zaheer, **Luke Vilnis**, Ishan Durugkar, Akshay Krishnamurthy, Alex Smola and Andrew McCallum. International Conference on Learning Representations (**ICLR**), 2018. *Equal contribution.
- *Finer Grained Entity Typing with TypeNet*. Shikhar Murty, Patrick Verga, **Luke Vilnis**, Andrew McCallum. Neural Information Processing Systems Workshop on Automated Knowledge Base Construction (**AKBC**), 2017.
- *(Workshop Version) Go for a Walk and Arrive at the Answer: Reasoning Over Knowledge Bases with Reinforcement Learning*. Rajarshi Das*, Shehzaad Dhuliawala*, Manzil Zaheer, **Luke Vilnis**, Ishan Durugkar, Akshay Krishnamurthy, Alex Smola and Andrew McCallum. Neural Information Processing Systems Workshop on Automated Knowledge Base Construction (**AKBC**), 2017. *Equal contribution. **Oral presentation. Best paper award**.

- *Improved Representation Learning for Predicting Commonsense Ontologies*. Xiang Li, **Luke Vilnis**, Andrew McCallum. International Conference on Machine Learning Workshop on Deep Structured Prediction (**ICML WS**), 2017.
- *Low-Rank Hidden State Embeddings for Viterbi Sequence Labeling*. Dung Thai, Shikhar Murty, Trapit Bansal, **Luke Vilnis**, David Belanger, Andrew McCallum. International Conference on Machine Learning Workshop on Deep Structured Prediction (**ICML WS**), 2017.
- *Generating Sentences from a Continuous Space*. Samuel Bowman*, **Luke Vilnis***, Oriol Vinyals, Andrew Dai, Rafal Jozefowicz, Samy Bengio. Conference on Computational Natural Language Learning (**CoNLL**), 2016. *Equal contribution. **Oral presentation**.
- *Adding Gradient Noise Improves Learning for Very Deep Networks*. Arvind Neelakantan*, **Luke Vilnis***, Quoc V. Le, Ilya Sutskever, Lukasz Kaiser, Karol Kurach, James Martens. International Conference on Learning Representations Workshop (**ICLR WS**), 2016. *Equal contribution.
- *Bethe Projections for Non-Local Inference*. **Luke Vilnis***, David Belanger*, Daniel Sheldon, Andrew McCallum. Uncertainty in Artificial Intelligence (**UAI**), 2015. *Equal contribution.
- *Learning Dynamic Feature Selection for Fast Sequential Prediction*. Emma Strubell, **Luke Vilnis**, Kate Silverstein, Andrew McCallum. Annual Meeting of the Association for Computational Linguistics (**ACL**), 2015. **Oral presentation. Outstanding paper award**.
- *Word Representations via Gaussian Embedding*. **Luke Vilnis**, Andrew McCallum. International Conference on Learning Representations (**ICLR**), 2015. **Oral presentation**.
- *Generalized Eigenvectors for Large Multiclass Problems*. **Luke Vilnis**, Nikos Karampatziakis, Paul Mineiro. Neural Information Processing Systems Workshop on Representation and Learning Methods for Complex Outputs (**NIPS WS**), 2014. **Oral presentation**.
- *Training for Fast Sequential Prediction Using Dynamic Feature Selection*. Emma Strubell, **Luke Vilnis**, Andrew McCallum. Neural Information Processing Systems Workshop on Modern Machine Learning and Natural Language Processing (**NIPS WS**), 2014.
- *Optimization and Learning in Factorie*. Alexandre Passos, **Luke Vilnis**, Andrew McCallum. Neural Information Processing Systems Workshop on Optimization for Machine Learning (**NIPS WS**), 2013.
- *Dynamic Knowledge Base Alignment for Coreference Resolution*. Jiaping Zheng, **Luke Vilnis**, Sameer Singh, Jinho Choi, Andrew McCallum. Conference on Computational Natural Language Learning (**CoNLL**), 2013.

■ Software

- Chief maintainer of FACTORIE toolkit for machine learning and graphical models.