

# Ben Athiwaratkun

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## EDUCATION

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### Cornell University

*Fourth Year Phd Candidate in Statistics and Special Masters in Computer Science*

*Advisor: Andrew Gordon Wilson*

### Williams College

*Bachelor of Arts in Mathematics and Economics with Honors in Mathematics, June 2012*

- Benedict First Prize in Mathematics 2010, Magna Cum Laude, Phi Beta Kappa and Sigma Xi

## RESEARCH EXPERIENCE

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### Improving Consistency-Based Semi-Supervised Learning with Weight Averaging

- Developed efficient a weight averaging method to improve generalization error on semi-supervised learning problems.

### Sentence Manifold Traversal (paper pending)

**Present**

- Exploring sentence generation by traversing the manifold of sentence space for semantic changes.
- Exploring the use of kernel-based method and adversarial method for the manifold traversal.

### Adversarial Deep Averaging Networks for Cross-Lingual Domain Adaptation (TACL 2018, conditional acceptance)

- Developed a model for domain adaptation between languages using adversarial training
- Experiments on English to Chinese sentiment classification show that our method significantly outperforms baselines such as a machine translation system.

### Bayesian Variational Autoencoders (In submission)

- Exploring different formulations of Bayesian approach on variational autoencoders, with application for diverse sentence generation and semi-supervised learning.

### Probabilistic Word Representations with Subword Information (ACL 2018)

- Developed a method that incorporates subword information to enhance the quality of word density representations.
- Our model can handle rare or out-of-vocabulary words, and be applied to other languages without further hyper parameter tuning.

### Hierarchical Density Order Embeddings (ICLR, 2018)

- Developed a methodology to train Gaussian representations on hierarchical data.
- Achieved state-of-the-art for WordNet hypernym prediction and HyperLex lexical entailment

### Multimodal Word Distributions (ACL, 2017)

- Exploring the use of multimodal distribution as word representation to capture meaning multiplicity of words.

### Neural Language Model for Malware Classification (ICASSP 2017)

**Summer 2016**

- Applied neural language models (LSTMs, GRUs) to sequences of APIs to extract file features.
- Experimented with multiple attention mechanisms on sequences of API features for malware file detection.

## RELEVANT WORK EXPERIENCE

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### Research Intern

Summer 2017 (AWS AI Lab, Palo Alto)

- Explored the idea of balancing dictionary-level and word-level representations for word embeddings using group sparsity regularization.
- Pivoted the idea and applied the subword structure to multimodal word distributions.

### Research Intern

Summer 2016 (Microsoft Research, Redmond)

- Experimented with neural language model and attention mechanism, as well as character level convolutional neural networks for malware detection. Published a paper to ICASSP 2017.

### Research Intern

Summer 2015 (Loop AI Labs, San Francisco)

- Trained recurrent neural network language models (RNN, GRU, LSTM) on large dataset to improve the semantics of embeddings for relationship extraction tasks
- Comparing word embeddings trained by multiple models such as word2vec, GloVe, WordRep, as well as embeddings evolved by supervised learning such as tree LSTM for relationship extraction

## MACHINE LEARNING PROJECTS

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### Heuristics Optimization for Neural Network Training

Fall 2014

- Explored the use of simulated annealing, genetic algorithm, and dynamically dimension search for neural network training.

### Book Rating Prediction

Spring 2014

- Used a probabilistic matrix factorization algorithm with collaborative constraint to predict book rating.

### Movie Revenue Prediction

Spring 2014

- Developed a neural network model with tailored cost function to perform movie revenue prediction.

### Swingy Monkey - Reinforcement Learning

Spring 2014

- Developed a Q-Learning algorithm to train an agent to play a game (swingy monkey). The model successfully trained the agent to become increasingly more competent over time.

### Pacman Tournament

Spring 2014

- Used support vector machine, Kmeans++, and state machine algorithm for Pacman Final Project Tournament. Won 2nd place of all teams (Harvard CS181)

## RELEVANT COURSEWORK

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- Machine Learning, Heterogeneous Parallel Programming, Natural Language Processing for Social Interactions, Heuristics Optimization, Advanced Machine Learning, Database, Computer Vision

## AWARDS

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- International Physics Olympiad 2007, Silver Medal

## TOOLBOXES

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**Deep Learning Tools:** Torch, Theano, Pylearn2, Tensorflow, PyTorch

**Programming Languages:** Python, Lua, R, Matlab/Octave, Java, C++, C, SQL

## PROFILE

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**LinkedIn:** [www.linkedin.com/in/benathi](http://www.linkedin.com/in/benathi)

**Github:** [www.github.com/benathi](http://www.github.com/benathi)

**Personal Website:** [www.benathiwaratkun.com](http://www.benathiwaratkun.com)

**Google Scholar:** <https://scholar.google.com/citations?user=KZpZTTQAAAAJ&hl=en>