

# Xiao Ling

SOFTWARE ENGINEER · MACHINE LEARNING SCIENTIST · PAINTER

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## Education

### UNIVERSITY OF PENNSYLVANIA

Philadelphia, PA

MASTER OF SCIENCE IN ENGINEERING: ROBOTICS

2014 - 2017

- **GPA: 3.7/4.0**

- *Relevant coursework:* Computer Vision, Machine Learning, Independent Study in Natural Language Processing, Deep Learning for Conversational Intelligence, Theory of Probability, Linear Algebra and Optimization, Computational Learning Theory, Theory of Computation, Randomized Algorithms, Model Theory, Software Foundations
- *Activities:* Philly Startup Leaders, PennStatNLP Reading Group, Wharton Venture Initiation Program (invited applicant), Penn Computational Linguistics Group (Presenter, Participant), Penn Computational Linguistic Lunch (Invited Speaker), Teaching assistant for advanced programming (mentored 30 graduate/undergraduate students in principles of functional programming using Haskell)

### UNIVERSITY OF PENNSYLVANIA

Philadelphia, PA

BACHELOR OF SCIENCE IN ENGINEERING: BIOENGINEERING, MATHEMATICS, ENGINEERING ENTREPRENEURSHIP

2007 - 2011

- *Activities:* Men's Heavyweight Crew (20+ hours committed per week), smart-grid startup co-founder, engineering entrepreneurship TA

## SELECT RESEARCH EXPERIENCE

### Clustering Adjectives by Semantic Similarity and Ranking by Emotional Intensity

Philadelphia, PA

ADVISORS: PROFESSOR CHRIS CALLISON-BURCH, PROFESSOR JEAN GALLIER

Summer 2016 - Present

- Major part of a multiple year study to gather adjectives in the paraphrase database, cluster them based on semantic similarity, and rank adjectives within each cluster by emotional intensity, with application to intelligent conversational agents (<http://scalar-adjectives.herokuapp.com/>).
- Led the ranking effort by first successfully reproducing the state of the art study by Bansal and de Melo (2013), then improved it by 7.5% (measured by Kendall's tau score) on de Melo's test set, and suppressed de Melo by over 400% on new test set procured from Amazon Mechanical Turks.
- Researched, developed and tested multiple ranking methods including: page rank, personalized page rank, various integer linear programming formulations, elastic net regression, logistic regression with L1 and L2 penalties, and incorporated prior information using beta-binomial model.

### Conversational AI using Recurrent Neural Networks and Reinforcement Learning

Philadelphia, PA

ADVISOR: PROFESSOR LYLE UNGAR

Spring 2017

- Collaborated closely with Ph.D. and master students to develop an intelligent agent capable of open domain conversation.
- Implemented and trained hierarchical recurrent neural net to maintain conversation history, and used deep reinforcement learning to incorporate the future outcome of the conversation in current word choice.
- Weekly reading group discussing select chapters from the "deeplearningbook" and critiqued the latest papers in the domain.

### Bilingual Lexicon Induction with Deep Convolutional Neural Networks

Philadelphia, PA

ADVISOR: PROFESSOR CHRIS CALLISON-BURCH

Spring 2017

- Part of a three year effort to compile, pre-process, and evaluate one of the world's largest collection of bilingual dictionaries pivoting through similar images (100 languages, 100 images per word, 25 terabytes of data) outside of those held by private entities such as Google.
- Constructed lexical representation of words in multiple languages using feature extraction layer of a deep convolutional neural network (AlexNet) for the purpose of automatic machine translation.

### Learning Translations via Matrix Completion

Philadelphia, PA

ADVISOR: PROFESSOR CHRIS CALLISON-BURCH

Spring 2017

- Part of a collaborative group comprised of Ph.D.'s, post-doctoral student, and visiting scholar to create a common framework for machine translation leveraging multiple sources of information, each of which incomplete and noisy.
- Participated in weekly meetings and co-authored final paper submitted and accepted to EMNLP 2017 (26% acceptance rate).

### Dense 3D Scene Reconstruction and Visual Odometry in Laparoscopic Video

Philadelphia, PA

ADVISOR: PROFESSOR KOSTAS DANIILIDIS

Spring 2014 - Fall 2014

- Researched, developed, and trained convolutional neural net for human tissue segmentation in low resolution videos with the goal of assisting surgeons in augmented reality.
- Constructed training and test set and manually labeled tissue classes.

## PUBLICATIONS

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- 2017 **Deep Reinforcement Learning with Hierarchical Recurrent Encoder-Decoder for Conversation**, Heejin Jeong<sup>1</sup>, **Xiao Ling**<sup>1</sup>. Mid-Atlantic Student Colloquium on Speech, Language and Learning. *Washington, DC*
- 2017 **Learning Translations via Matrix Completion**, Derry Wijaya, Brendan Callahan, John Hewitt, Jie Gao, **Xiao Ling**, Marianna Apidianaki, Chris Callison-Burch. EMNLP. *Copenhagen, Denmark*
- 2018 **Phenomenal > amazing: Using paraphrases to cluster and order adjectives by intensity**, Veronica Wharton, **Xiao Ling**, Ellie Pavlick, Marianna Apidianaki, Anne Cocos, Chris Callison-Burch. NAACL. *in submission*
- 2018 **A Large Multilingual Corpus for Learning Translation from Images**, Brendan Callahan, John Hewitt, **Xiao Ling**, Derry Wijaya, Reno Kriz, Daphne Ippolito, Chris Callison-Burch. NAACL. *in submission*

## INVITED PRESENTATIONS

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### Using paraphrases to cluster and order adjectives by intensity

*Philadelphia, PA*

ORAL PRESENTATION AT PENN COMPUTATIONAL LINGUIST LUNCH

*May 2017*

### A shared augmented reality application for early childhood education

*Philadelphia, PA*

TECHNOLOGY DEMO AT PENNIMMERSIVE OPEN HOUSE

*November 2017*

## HACKATHONS

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### Hacking Arts

*Boston, MA*

TEAM LEAD

*November 2017*

- Competed in 12 hour hackathon hosted by MIT Media lab with a focus on the future of art in a technologically enabled world.
- Led a team of six engineers and professional dancer to build a system that mapped motion of ballet dancer to virtual reality avatar.
- **Won** sponsorship prize from Noitcom: the Perceptual Neuron motion capture system (\$1499 value).

### Reality, Virtually

*Boston, MA*

COMPETITOR, PRESENTATION LEAD

*October 2017*

- Competed against 400 people and 80 teams in three day hackathon hosted by MIT Media lab focused on virtual reality (VR) and augmented reality (AR).
- Collaborated with a team of engineers and graphic artists to built an ARKit app that enabled multiple users to place objects in the same place in real time.
- **Won** 1st place mobile AR (\$3000 cash prize). **Won** 1st place engineering/construction category (\$2000 cash prize).

### PennApps

*Philadelphia, PA*

TEAM LEAD

*September 2017*

- Competed in the world's largest hackathon in the AR/VR vertical, built an AR app that placed photographs in the real world to promote artistic expression.
- Led a group of Ph.D. student and FullBright scholar with no iPhone development experience, learned ARKit over 48 hours and delivered a functional application.
- Arranged for private app demo with Charlie Cheever, cofounder of Quora and early employee at Facebook.

## Programming Languages and Technologies

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PYTHON, SWIFT, HASKELL, JAVASCRIPT, MATLAB, COQ, LATEX, TENSORFLOW, ARKIT, OPENCV