Lucy Chai

lrchai@mit.edu | +1 732 502 6219

Education

Massachusetts Institute of Technology   Cambridge, MA
Department of Electrical Engineering and Computer Science   2018
Ph.D. Student

University of Cambridge, Churchill College   Cambridge, UK
Department of Engineering   2017 – 2018
Machine Learning, Speech and Language Technology, *MPhil with Distinction*
Thesis: Uncertainty Estimation in Bayesian Neural Networks
              and Links to Interpretability

University of Pennsylvania   Philadelphia, PA
School of Engineering and Applied Science   2013 – 2017
Bachelor of Science in Engineering, *Summa Cum Laude*
Majors: Computer Science, Bioengineering | Minor: Mathematics

Awards

NSF Graduate Research Fellowship Program, 2017
Churchill Scholarship Recipient, 2017
Wolf-Hallac Award, 2017
Herman P. Schwan Bioengineering Award, 2017
Senior Design Award, 2017
Biomedical Engineering Society Annual Meeting Outstanding Poster Award, 2016
Delaware Valley Engineers Week Undergraduate Student Paper Award Recipient, 2016
Pinkel Fund Award Recipient, 2016
Manfred Altman Memorial Award, 2015
Chemical Rubber Company Chemistry Award, 2014
Dean's List, 2013-2017
Thomas J. Watson Memorial Scholarship, 2013-2017

Memberships

Tau Beta Pi
Rachleff Scholars Program

Research Experience

Machine Learning Group, Computational and Biological Learning Lab, 2018
Department of Engineering, University of Cambridge, Cambridge, UK
Project title: Uncertainty in Bayesian Neural Networks and Links to Interpretability
- Bayesian neural networks provide uncertainty estimates with model predictions. We investigate methods for interpretability in Bayesian neural networks – specifically how to visualize what regions of an input image make model predictions uncertain.

Complex Systems Group, Undergraduate Researcher, 2014-2017
Department of Bioengineering, University of Pennsylvania, Philadelphia, PA
Project titles:
- Functional network dynamics of the language network
  - We model language processing regions of the brain as a graph, using statistical null models and network science algorithms to study temporal dynamics involved in understanding language.
- Evolution of brain network dynamics in neurodevelopment
  - We use a non-negative matrix factorization approach to study how brain structure flexibly adapts to enable increasing cognitive function through childhood and adolescence.
- Evolution of semantic networks in biomedical texts
  - The structure of scientific literature changes throughout the drafting and revision process. We use network analysis tools to study how these changes enable more efficient information transfer.
- Mentoring for undergraduate projects: Yueqi Ren (BSE 2019), Brooke Behrbaum (BSE 2019)

Publications

Lucy R. Chai, Dale Zhou, Danielle S. Bassett. Evolution of semantic networks in biomedical texts. Journal of Complex Networks, 2019.

Henderson J. C., Gertner, A., Zarella, G., Chai, L. R., Miller, K. Name and Face Matching. US. Patent App. 16/042,958.

Jeffrey E. Eben, Trevor L. Vent, Chloe J. Choi, Sushmitha Yarrabothula, Lucy Chai, Margaret Nolan, Elizabeth Kobe, Raymond J. Acciavatti, Andrew D. A. Maidment. Development of a Next Generation Tomosynthesis System. SPIE Medical Imaging Conference, 2018.

Chai, L. R., Khambhati, A. N., Ciric, R., Moore, T., Gur, R. C., Gur, R. E., Satterthwaite, T. D., Bassett, D.S. Evolution of brain network dynamics in neurodevelopment. Network Neuroscience, 2017.

Chai, L. R., Mattar, M. G., Blank, I. A., Fedorenko, E., and Bassett, D. S. Functional network dynamics of the language system. Cerebral Cortex, 2016.

Presentations

Chai, L. R., Mattar, M. G., Blank, I. A., Fedorenko, E., and Bassett, D. S. Functional network dynamics of the language system.
- Poster presented at Biomedical Engineering Society Annual Meeting (BMES), Oct 7-10, 2015, Tampa, FL, USA, 2015.

- Poster presented at Society for Neuroscience (SfN), Oct 17-21, 2015, Chicago, IL, USA, 2015.
- Poster presented at Penn Science Student Research Symposium sponsored by the Biomedical Graduate Students Association, March 2015.

Chai, L. R., Khambhati, A. N., Ciric, R., Moore, T., Gur, R. C., Gur, R. E., Satterthwaite, T. D., Bassett, D.S. Evolution of brain network dynamics in neurodevelopment.
- Poster presented at Rachleff Summer Symposium, August 7, 2015.
- Talk at Brain Behavior Laboratory Imaging Meeting, March 17, 2016.
- Poster presented at Biomedical Engineering Society Annual Meeting, 2016.

Dynamic Brain Networks. 60-second lecture at Quaker Days Research Conference for Penn Center for Undergraduate Research and Fellowships. April, 2015.

Work Experience

Software Developer Intern, Summer 2016
athenahealth, Watertown, MA
- Built an interactive web map for the athenahealth campus in the style of Google maps, with a custom map tile cutting utility and a fuzzy string comparison search feature to search up to desk-level granularity

Teaching Assistant for Prof. Aaron Roth, CIS 262, Fall 2016
Department of Computer Science, University of Pennsylvania, Philadelphia, PA
- Finite automata and regular languages, Turing machines, undecidability, tractability and NP-completeness

Teaching Assistant for Prof. Dan Huh, BE 350, Spring 2017
Department of Bioengineering, University of Pennsylvania, Philadelphia, PA
- Fluid mechanics, Navier Stokes equations, thermodynamics, and energy and mass transport

Data Science Intern, Summer 2017
MITRE, Bedford, MA
- Built deep learning models for image to text matching using Python, Keras, and Tensorflow

Other Projects

- Github page: https://github.com/chail
- *CalPal*: an iOS application using computer vision, optical character recognition, and natural language processing to detect details on an event poster and automatically populate a calendar event; finalist at PennApps XIV (Fall 2016)

- *ResolVe:* (Senior Design Project) an Arduino program and circuit to coordinate an Xray generator, Xray detector, motion controller, and manual switch to take xray images in a customized pattern over a 2-D plane

Volunteering

Miracle League Baseball—assist children with various cognitive disabilities in playing modified baseball games
Access Engineering—assist in teaching introductory engineering topics for high school students
We Can Swim Philadelphia—free swimming lessons to local underprivileged children between 6 and 15 years of age
GEARS Day—activities to introduce high school-aged girls to topics in engineering