

Zhongtian (Falcon) Dai

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Education

Toyota Technological Institute at Chicago, Chicago, IL

Ph.D. in Computer Science (pending), Ph.D. candidate. September 2015 - present.

M.S. within Ph.D. in Computer Science. Granted in September 2017.

> Advised by Professor Matthew R. Walter

> Selective courses: learning theory, natural language processing, computer vision, dynamical systems

The University of Chicago, Chicago, IL

B.S. with Honors in Mathematics and B.A. with Honors in Physics. September 2008 - June 2012.

Cumulative GPA: **3.76/4.00**.

> Student Marshal of Class 2012 (top University distinction)

> James Franck Institute Summer Undergraduate Research Fellowship, 2011

> Advanced courses: mathematical logic, graduate quantum mechanics, graduate general relativity

Working papers

> Dai FZ, Walter MR. Loop Estimators for Discounted Values in Markov Reward Processes. In submission, 2019.

> Dai FZ. Word2vec conjecture and A Limitative Result. In submission, 2019.

> Vasiljevic I, Kolkin N, Zhang S, Luo R, Wang H, Dai FZ, Daniele AF, Mostajabi M, Basart S, Walter MR, Shakhnarovich G. DIODE: A Dense Indoor and Outdoor DEpth Dataset. In submission, 2019.

Publications

> Dai FZ, Walter MR. Maximum Expected Hitting Cost of a Markov Decision Process and Informativeness of Rewards. *Neural Information Processing Systems (NeurIPS)*, 2019.

> Dai FZ, Cai Z. Towards Near-imperceptible Steganographic Text. *Association for Computational Linguistics (ACL)*, 2019. **[Nominated for best paper awards]**

> Gehrmann S, Dai FZ, Elder H, Rush AM. End-to-End Content and Plan Selection for Natural Language Generation. *International Conference on Natural Language Generation (INLG)*, 2018.

> Dai FZ*, Cai Z*. Glyph-aware Embedding of Chinese Characters. Subword and Character level models in NLP workshop at Empirical Methods in Natural Language Processing conference (EMNLP), 2017.

> Towle VL, Dai Z, Zheng W, Issa N. "Mapping Cortical Function with Event-Related Electroencephalography," in *Functional Mapping of the Cerebral Cortex*, ed. Richard W. Byrne. (Springer, 2016), 91-104.

> Brang D, Dai Z, Zhang W, Towle VL. Registering Imaged ECoG Electrodes to Human Cortex: A Geometry-based Technique. *Journal of neuroscience methods*, 64-73. 2016.

> Brang D, Towle VL, Suzuki S, Hillyard SA, Di Tusa S, Dai Z, Wu S, Tao J, Grabowecy M. Peripheral sounds rapidly activate visual cortex: evidence from electroencephalography. *Journal of Neurophysiology*,

3023-3028. 2015.

> Towle VL, Minama Reddy GK, Dai Z, Zhang W, Brang D, Hunter S, Kohrman MH, Marcucilli CJ, Tao J, Rossi MA, Frim DM, Byrne RW. Chasing Language Through the Brain: Three Successive Parallel Networks. Society for the Neurobiology of Language Conference, 2014.

Presentations

- > Dai FZ, Walter MR. Finite Time Analysis of Potential-based Reward Shaping. Reinforcement Learning and Decision Making (RLDM), 2019. **[Student travel fellowship]**
- > Vasiljevic I, Kolkin N, Luo R, Wang H, Dai FZ, Daniele AF, Mostajabi M, Basart S, Walter MR, Shakhnarovich G. DIODE: A Dense Indoor and Outdoor DEpth Dataset. 3D Scene Understanding for Vision, Graphics, and Robotics workshop at Computer Vision and Pattern Recognition (CVPR), 2019.
- > Dai FZ, Walter MR. Finite Time Analysis of Potential-based Reward Shaping. Midwest Machine Learning Symposium (MMLS), 2019.
- > Dai FZ, Cai Z. Towards Near-imperceptible Steganographic Text. Midwest Machine Learning Symposium (MMLS), 2019.
- > Dai FZ, Cai Z. Towards Near-imperceptible Steganographic Text. Midwest Speech and Language Days (MSLD), 2019.
- > Dai FZ and others at RIPL @ TTIC. Rubik's cube solving robot. National robotics week special exhibit at the Museum of Science and Industry, 2019.
- > Dai FZ, Walter MR. Reward-adjusted Diameters and Their Conditioning by Potential-based Reward Shaping. Learning by Instruction workshop at Neural Information Processing Systems (NeurIPS), 2018.
- > Dai FZ and others at RIPL @ TTIC. Checkers-playing robot. National robotics week special exhibit at the Museum of Science and Industry, 2018.
- > Schaff C*, Dai FZ*, Walter MR. Towards Active Imitation Learning. Learning from Demonstrations in High-Dimensional Feature Spaces workshop at Robotics: Science and Systems conference (RSS), 2017. **[Student travel grant award]**
- > Dai FZ, Walter MR. Notepad-Augmented Environments in Reinforcement Learning. Midwest Machine Learning Symposium, 2017.
- > Dai FZ, Walter MR. Notepad-Augmented Environments in Reinforcement Learning. Midwest Robotics workshop, 2017.
- > Dai FZ, Cai Z. Glyph-based Visual Chinese Character Embedding. Midwest Speech and Language Days, 2017.
- > Dai FZ, Nettsheim G. Simulation and Modeling of the Anode of the Proposed Large-Area Picosecond Photo-Detector. Chicago Area Undergraduate Research Symposium, 2011.

Service to the community

- > Secondary reviewer. Artificial Intelligence and Statistics (AISTATS), 2020.
- > Primary reviewer. International Conference on Learning Representations (ICLR), 2019.

- > Secondary reviewer. Neural Information Processing Systems conference (NeurIPS), 2019.
- > Primary reviewer. International Journal of Robotics Research (IJRR), 2018.
- > Primary reviewer. International Conference on Learning Representations (ICLR), 2018.
- > Primary reviewer. International Symposium on Robotics Research (ISRR), 2017.
- > Secondary reviewer. Neural Information Processing Systems conference (NIPS), 2017.
- > Primary reviewer. Spatial-Semantic Representations in Robotics workshop at Robotics: Science and Systems conference (RSS), 2017.

Experience

Abstractive Summarization Consulting, Waymark Inc, Detroit, MI

Consultant, Jan 2018 - Feb 2018

- > Prototyped and advised on an abstractive summarization system.

Teaching assistant to Duckietown, Toyota Technological Institute at Chicago, Chicago, IL

Teaching assistant, October 2017 - December 2017

- > Created material for the hands-on self-driving robotics course.
- > Provided assistance to students.

Research in Abstractive Summarization, Harvard University, Cambridge, MA

Visiting Research Intern (hosted by Professor Alexander Rush), July 2017 - September 2017

- > Re-implemented state-of-the-art methods in paragraph-to-sentence summarization.
- > Maintained the open-sourced OpenNMT-py repository.

Data Science and Analytics, Strikingly Inc, Shanghai, China

Data Scientist, February 2015 - August 2015

- > Designed and implemented a data analytics infrastructure.
- > Designed an improved web analytics implementation workflow.
- > Analyzed user behaviors, user acquisition campaigns, user referral programs.
- > Defined business growth/health metrics and implemented monitoring dashboards.
- > Interviewed and recruited data scientists and data engineers.

Application of Artificial Neural Network in NLP, Toyota Technological Institute at Chicago, Chicago, IL

Student Visitor, June 2014 - December 2014

- > Studied under the mentorship of Professor Kevin Gimpel and Professor Mohit Bansal.
- > Read and reviewed relevant academic articles.
- > Implemented a neural network library in Python (optimized with NumPy).

Neurological Research, Towle Lab, University of Chicago, Chicago, IL

Research Assistant, November 2012 - December 2014

- > Studied language processing via electrocorticographic data under the supervision of Professor Vernon L. Towle.

- > Developed novel methods for registering intracranial electrodes.
- > Implemented state-of-the-art medical image analysis and visualization software.

Sociological Research, Knowledge Lab, University of Chicago, Chicago, IL

Research Assistant, October 2012 – December 2013

- > Built a new machine learning pipeline to predict sociological attributes from Google StreetView images.
- > Built a web application for collecting graph-structured information from users.
- > Analyzed author networks induced by co-authorship and citations.

TwIThink, a startup project, Chicago, IL and Cambridge, MA

Co-founder, April 2011 – January, 2014

- > Won web track in MIT-CHIEF Business Plan Contest at Massachusetts Institute of Technology
- > Built a prototype twithinks.com to visualize the Twitter users' reactions to 2012 presidential election.
- > Initiated and completed [#ivoted map](#) on election day which received 20K pageviews within 6 hours.

Summer Research Experience in Physics, University of Chicago, IL

Technical Support for Quantum Computing Project and Photon Detector Project, June 2009 – September 2009, June 2010 – September 2010, June 2011 – September 2011

- > Modeled the secondary electron emission process, implemented simulation programs, and analyzed experiment signal data.
- > Learnt basic signal processing and printed circuit board design.
- > built a custom spectrum analyzer and coded a custom GUI program.

Computer Science Department and Mathematics Department, University of Chicago, IL

Teaching Assistant for Mobile Computing, Introduction to Programming (C++), *Grader for Introduction to Scientific Computing and Honors Calculus*, October 2010 – November 2011

- > Graded more than 30 students' work per week with detailed corrections, comments and guidance.

Honors

- > Best app award at an invited hackathon in Shanghai, for a social chat app prototype, 2015
- > 2nd place in BattleHack hackathon in Chicago, for a facial recognition-assisted social payment app, 2014
- > Top 200 contestant on Kaggle, 2013
- > Co-founder of the Engineering Society at the University of Chicago, 2010
- > 23rd team (out of 138 teams) at International Collegiate Programming Contest (ICPC) regional, 2010
- > Self-studied and scored 5/5 on 9 AP subjects, 2007
- > 2nd place at Alamo regional Science & Engineering Fair; Honorable Mention at Texas state, 2007

Skills

- > Programming languages: python, javascript, C, C++, CUDA, java, prolog, scheme, SQL.

- > "Big data" software stack: Scikit-Learn, Spark, ElasticSearch, Hadoop, Pandas, IPython.
- > Web development: React, D3js, WebGL, HTML5, CSS3, Node.js, PostgreSQL, MongoDB.
- > Software acquaintance: Atom editor, Tmux, Docker, Eclipse, Git, Mathematica, Octave/Matlab, LaTeX, OS X, Linux.
- > API's and web services: Amazon Web Services, DigitalOcean, Google Cloud Platform, Mixpanel API, Twitter API, WeChat API.
- > Fluent in Mandarin and Cantonese.

Interests

- > Personal: rock climbing, photography, cooking, drawing, fixing electronics.
- > Academic: cognition, quantum mechanics, logic.