

Zhongtian (Falcon) Dai

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Education

Toyota Technological Institute at Chicago, Chicago, IL

Ph.D. in Computer Science (expected in 2021), 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

- > -, Walter MR. Loop Estimator for Discounted Values in Markov Reward Processes. In submission, 2019.
- > -. Word2vec Conjecture and A Limitative Result. In submission, 2019.
- > Vasiljevic I, Kolkin N, Zhang S, Luo R, Wang H, -, Daniele AF, Mostajabi M, Basart S, Walter MR, Shakhnarovich G. DIODE: A Dense Indoor and Outdoor DEpth Dataset. In submission, 2019.

Publications

- > -, Walter MR. Maximum Expected Hitting Cost of a Markov Decision Process and Informativeness of Rewards. *Neural Information Processing Systems (NeurIPS)*, 2019.
- > -, Cai Z. Towards Near-imperceptible Steganographic Text. *Association for Computational Linguistics (ACL)*, 2019. **[Nominated for best paper awards]**
- > Gehrmann S, -, Elder H, Rush AM. End-to-End Content and Plan Selection for Natural Language Generation. *International Conference on Natural Language Generation (INLG)*, 2018.
- > -*, 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, -, Zheng W, Issa N. "Mapping Cortical Function with Event-Related Electrocorticography," in *Functional Mapping of the Cerebral Cortex*, ed. Richard W. Byrne. (Springer, 2016), 91-104.
- > Brang D, -, 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, -, Wu S, Tao J, Grabowecky M. Peripheral sounds rapidly activate visual cortex: evidence from electrocorticography. *Journal of Neurophysiology*,

3023-3028. 2015.

> Towle VL, Minama Reddy GK, -, 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

> -, Walter MR. Loop Estimators for Discounted Values in Markov Reward Processes. Poster session at Algorithmic Learning Theory (ALT), 2020.

> -, Walter MR. Maximum Expected Hitting Cost of a Markov Decision Process and Informativeness of Rewards. Poster session at Algorithmic Learning Theory (ALT), 2020.

> -, 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, -, 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.

> -, Walter MR. Finite Time Analysis of Potential-based Reward Shaping. Midwest Machine Learning Symposium (MMLS), 2019.

> -, Cai Z. Towards Near-imperceptible Steganographic Text. Midwest Machine Learning Symposium (MMLS), 2019.

> -, Cai Z. Towards Near-imperceptible Steganographic Text. Midwest Speech and Language Days (MSLD), 2019.

> - and others at RIPL @ TTIC. Rubik's cube solving robot. National robotics week special exhibit at the Museum of Science and Industry, 2019.

> -, Walter MR. Reward-adjusted Diameters and Their Conditioning by Potential-based Reward Shaping. Learning by Instruction workshop at Neural Information Processing Systems (NeurIPS), 2018.

> - and others at RIPL @ TTIC. Checkers-playing robot. National robotics week special exhibit at the Museum of Science and Industry, 2018.

> Schaff C*, -*, 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]

> -, Walter MR. Notepad-Augmented Environments in Reinforcement Learning. Midwest Machine Learning Symposium, 2017.

> -, Walter MR. Notepad-Augmented Environments in Reinforcement Learning. Midwest Robotics workshop, 2017.

> -, Cai Z. Glyph-based Visual Chinese Character Embedding. Midwest Speech and Language Days, 2017.

> -, 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

- > Primary reviewer. Association for Computational Linguistics (ACL), 2020.
- > Primary reviewer. International Joint Conference on Artificial Intelligence (IJCAI), 2020.
- > 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 (of Professor Kevin Gimpel and Professor Mohit Bansal), June 2014 - December 2014

- > 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 (to Professor Vernon L. Towle), November 2012 – December 2014

- > Studied language processing via electrocorticographic data.
- > 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 (to Professor James Evans), October 2012 – December 2013

- > Built a 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.
- > Featured on MIT-CSAIL news.

Summer Research Experience in Physics, University of Chicago, IL

Technical Support for *Quantum Computing Project* (Professor David Schuster) and *Photon Detector Project* (Professor Henry Frisch), 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
- > Ranked 164th 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.