

ZIFENG WANG

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EDUCATION

Northeastern University Boston, MA

PhD Candidate in Computer Engineering, GPA: 4.0/4.0 Sep 2018 – May 2023 (expected)

- **Research interest:** Machine Learning, including *Continual/Lifelong learning*; *Data&Parameter-efficient adaptation for large language models*; *Adversarial robustness*; ML applications in CV, NLP, health, etc.

Tsinghua University Beijing, China

Bachelor of Engineering in Electronic Engineering, GPA: 92/100 (*top 5% out of 233*) July 2018

WORK EXPERIENCE

Cloud AI Research, Google Remote / Sunnyvale, CA

QueryForm: Zero-shot Document Entity Extraction (DEE) May 2022 – Jan 2023

Research Intern; Advised by: Zizhao Zhang, Vincent Perot, Jacob Devlin

- Designed QueryForm, a novel prompting-based framework with large language models (LLM) for zero-shot DEE which sets new state-of-the-art performance on research and production-level benchmarks.
- Proposed a large-scale weakly supervised pre-training approach for LLM with public webpages.
- *Research impact:* First-authored research paper [under submission](#) to a top-tier NLP conference; Patent filed.
- *Production impact:* QueryForm greatly improves zero-shot DEE performance on Google Document AI benchmarks by at most 47%+ in F1 score and has been checked into production codebase.

Prompting-based Continual Learning (CL) June 2021 – May 2022

Research Intern; Advised by: Zizhao Zhang, Chen-Yu Lee

- Proposed two novel CL methods: *Learning to Prompt (L2P)*, where the backbone model is prompted dynamically to solve tasks sequentially. *DualPrompt* further improves upon L2P by human-learning inspired complementary prompting system. Both methods are pioneer works that *first* explore prompting-based CL and achieve state-of-the-art performance on multiple benchmarks.
- Developed a complex continual learning framework in JAX, open-sourced on GitHub with 200+ stars.
- *Research impact:* L2P and DualPrompt are published at [CVPR22](#) and [ECCV22](#), respectively; Patent filed.
- *Production impact:* L2P leads to significant improvement in Google Document AI sequential learning tasks by 50%- in forgetting, 2-4%+ in F1 score, and up to 3x data efficiency.

ACADEMIC EXPERIENCE

Machine Learning Group, Northeastern University Boston, MA

Research Assistant; Advised by: Prof. Jennifer Dy, Prof. Stratis Ioannidis, Prof. Yanzhi Wang

Effective and Efficient Continual Learning (CL) Dec 2019 – Present

- Proposed novel, state-of-the-art methods that cover multiple aspects in CL, including model pruning-based CL ([ICDM20](#)), unsupervised CL ([Neural Networks](#)), and efficient CL via sparsity ([NeurIPS22](#)), etc.
- Organized multiple research subgroups and mentored younger PhD students on research projects.

Robust Learning of Neural Networks Dec 2019 - Aug 2022

- Explored how neural networks can learn in a robust way under different scenarios, including open-world class discovery ([ICDM20](#)), adversarial robustness via Hilbert-Schmidt Information Bottleneck ([NeurIPS21](#)), and preservation of adversarial robustness during model pruning ([ICDM22](#)), etc.

Radiofrequency (RF) Machine Learning System Sep 2018 - June 2020

- Proposed novel ML techniques for RF fingerprinting, including unseen radio detection ([IEEE DySPAN19](#)), RF fingerprinting edge devices ([IEEE TMC](#)), and multimodal learning for sensor data ([IEEE TVT](#)), etc.
- Developed a software library for massive scale (*10k+ classes, 7TB data*) radiofrequency signal classification in Python with TensorFlow.

Channing Laboratory, Harvard Medical School

Boston, MA

Collaborator; Advised by: Dr. Peter J. Castaldi, Prof. Jennifer Dy

Sep 2018 – Sep 2021

- Proposed a novel deep learning model which incorporates biological domain knowledge for patients' smoking status prediction using RNAseq data, achieved state-of-the-art accuracy and better interpretability.
- First-authored a journal paper published in [PLOS Computational Biology](#).
- Collaborated with doctors and presented results to researchers with biology backgrounds.

i-Vision Group, Tsinghua University

Beijing, China

Undergrad Research Assistant; Advised by: Prof. Jiwen Lu

Sep 2017 – Mar 2018

- Developed a novel algorithm for multi-object tracking in video clips via a deep reinforcement learning with state-of-the-art performance.
- Coauthored a paper published in [ECCV18](#).

HONERS AND AWARDS

Best Paper Candidate, ICDM 2020

Sorrento, Italy

Best Paper Award, IEEE DySPAN 2019

Newark, NJ

Dean's Fellowship, Northeastern University, 2018

Boston, MA

Outstanding Undergraduate Scholarship, Tsinghua University, 2016

Beijing, China

SELECTED PUBLICATIONS ([GOOGLE SCHOLAR](#))

- **Zifeng Wang**, Zizhao Zhang, Jacob Devlin, Chen-Yu Lee, Guolong Su, Hao Zhang, Jennifer Dy, Vincent Perot, Tomas Pfister. "QueryForm: A Simple Zero-shot Form Entity Query Framework." Arxiv 2022.
- **Zifeng Wang***, Zheng Zhan*, Yifan Gong, Geng Yuan, Wei Niu, Tong Jian, Bin Ren, Stratis Ioannidis, Yanzhi Wang, and Jennifer Dy. "SparCL: Sparse Continual Learning on the Edge." NeurIPS 2022.
- **Zifeng Wang**, Zizhao Zhang, Sayna Ebrahimi, Ruoxi Sun, Han Zhang, Chen-Yu Lee, Xiaoqi Ren, Guolong Su, Vincent Perot, Jennifer Dy, Tomas Pfister. "DualPrompt: Complementary Prompting for Rehearsal-free Continual Learning". ECCV 2022.
- **Zifeng Wang**, Zizhao Zhang, Chen-Yu Lee, Han Zhang, Ruoxi Sun, Xiaoqi Ren, Guolong Su, Vincent Perot, Jennifer Dy, Tomas Pfister. "Learning to Prompt for Continual Learning". CVPR 2022.
- Tong Jian*, **Zifeng Wang***, Yanzhi Wang, Jennifer Dy, Stratis Ioannidis. "Pruning Adversarially Robust Neural Networks without Adversarial Examples". ICDM 2022.
- **Zifeng Wang**, Tong Jian, Aria Masoomi, Stratis Ioannidis and Jennifer Dy. "Revisiting Hilbert-Schmidt Information Bottleneck for Adversarial Robustness". NeurIPS 2021.
- **Zifeng Wang***, Tong Jian*, Kaushik Chowdhury, Yanzhi Wang, Jennifer Dy, and Stratis Ioannidis. "Learn-Prune-Share for Lifelong Learning". ICDM 2020.
- **Zifeng Wang**, Batool Salehi, Andrey Gritsenko, Kaushik Chowdhury, Stratis Ioannidis, and Jennifer Dy. "Open-World Class Discovery with Kernel Networks". ICDM 2020. **Best Paper Candidate**.
- Tingting Zhao*, **Zifeng Wang***, Aria Masoomi, Jennifer Dy. "Deep Bayesian Unsupervised Lifelong Learning". Neural Networks 149, 95-106.
- **Zifeng Wang**, Aria Masoomi, et al. "Improved Prediction of Smoking Status via Isoform-Aware RNAseq Deep Learning Models". PLoS computational biology 17 (10), e1009433.
- Aria Masoomi, Chieh Wu, Tingting Zhao, **Zifeng Wang**, Peter Castaldi, Jennifer Dy. "Instance-wise Feature Grouping". NeurIPS 2020.
- Andrey Gritsenko*, **Zifeng Wang***, Jennifer Dy, Kaushik Chowdhury, and Stratis Ioannidis. "Finding a 'New' Needle in the Haystack: Unseen Radio Detection in Large Populations Using Deep Learning". DySPAN 2019, **Best Paper Award**.
- Liangliang Ren, Jiwen Lu, **Zifeng Wang**, et al. "Collaborative Deep Reinforcement Learning for Multi-Object Tracking". ECCV 2018.

SKILLS & SERVICE

- Research: Machine Learning, Computer Vision, Natural Language Understanding, AI-related Applications.
- Software: PyTorch, JAX, TensorFlow, scikit-learn, Apache Spark, Apache Hadoop.
- Programming Languages: Python, C/C++, JAVA, MATLAB.
- Service: Reviewer for top machine learning publications (NeurIPS, ICML, ICLR, CVPR, etc).