

# ZIFENG WANG

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## RESEARCH INTERESTS

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My research interests includes (1) continual (lifelong) learning, (2) data and parameter-efficient learning, (3) open set recognition / novel class discovery, (4) adversarial robustness and model compression, (5) novel deep learning applications in computer vision, natural language understanding, document understanding, healthcare, rf fingerprinting, etc. I believe continual learning is critical for achieving artificial general intelligence (AGI).

## EDUCATION

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### Northeastern University

Boston, MA

PhD Candidate in Computer Engineering, GPA: 4.0/4.0

Sep 2018 – May 2023 (expected)

- **Advisor:** Prof. Jennifer Dy
- **Thesis:** “Effective and Efficient Continual Learning”

### Tsinghua University

Beijing, China

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

July 2018

## WORK EXPERIENCE

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### Cloud AI Research, Google

Remote / Sunnyvale, CA

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

May 2022 – Jan 2023

- QueryForm: A zero-shot document entity extraction (DEE) Framework [[Arxiv](#)].
- Large-scale webpage-based pre-training for document understanding.

### Cloud AI Research, Google

Remote / Sunnyvale, CA

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

June 2021 – May 2022

- Proposed the first prompting-based continual learning framework.
  - Learning to prompt for continual learning [[CVPR22](#)].
  - DualPrompt [[ECCV22](#)].
- Open-sourced prompting-based continual learning framework in JAX [[GitHub](#), 200+ stars].

## ACADEMIC EXPERIENCE

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### Machine Learning Group, Northeastern University

Boston, MA

*Graduate Research Assistant; Advised by: Prof. Jennifer Dy*

Sep 2018 – Present

- Effective and efficient continual learning (CL):
  - Efficient CL via sparse training [[NeurIPS22](#)].
  - Unsupervised CL [[Neural Networks](#)].
  - Model pruning-based CL [[ICDM20](#)].
  - Organized multiple research subgroups and mentored younger PhD students on research projects.
- Robust learning of neural networks:
  - Preservation of adversarial robustness during model pruning [[ICDM22](#)].
  - Adversarial robustness via Hilbert-Schmidt Information Bottleneck [[NeurIPS21](#)].
  - Open-world class discovery [[ICDM20](#), [Best Paper Candidate](#)].
- Radiofrequency (RF) machine learning system:
  - Unseen radio detection [[IEEE DySPAN19](#), [Best Paper](#)].
  - RF fingerprinting edge devices [[IEEE TMC](#)].
  - Multimodal learning for sensor data ([IEEE TVT](#)).

## Channing Laboratory, Harvard Medical School

Boston, MA

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

Sep 2018 – Sep 2021

- Smoking prediction via isoform-aware RNA-seq deep learning models [[PLOS Computational Biology](#)].

## i-Vision Group, Tsinghua University

Beijing, China

Undergrad Research Assistant; Advised by: Prof. Jiwen Lu

Sep 2017 – Mar 2018

- Multi-object tracking via deep reinforcement learning [[ECCV18](#)].

## Vision & Learning Lab, University of Michigan

Ann Arbor, Michigan

Visiting Student; Advised by Prof. Jia Deng

July 2017 – Sep 2017

- End-to-End Hourglass model for instance segmentation.

## Data Science & Intelligence Lab, Tsinghua University

Beijing, China

Undergrad Research Assistant; Advised by Prof. Yong Li

Feb 2016 – July 2016

- Profiling customers by large-scale online shopping behaviors [[Multimedia Tools and Applications](#)].

## SELECTED PUBLICATIONS ([GOOGLE SCHOLAR](#))

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(\* indicates equal contribution)

### Preprints:

- [1] **Zifeng Wang**, Zheng Zhan, Yifan Gong, Yucui Shao, Stratis Ioannidis, Yanzhi Wang, Jennifer Dy. “DualHSIC: HSIC-Bottleneck and Alignment for Continual Learning.” *In Submission*.
- [2] **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*.
- [3] Tooba Imtiaz, Morgan Kohler, Jared Miller, **Zifeng Wang**, Mario Sznaier, Octavia Camps, Jennifer Dy. “SAIF: Sparse Adversarial and Interpretable Attack Framework” *Arxiv 2022*.

### Conference Papers:

- [4] **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*.
- [5] **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*.
- [6] **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*.
- [7] Tong Jian\*, **Zifeng Wang\***, Yanzhi Wang, Jennifer Dy, Stratis Ioannidis. “Pruning Adversarially Robust Neural Networks without Adversarial Examples”. *ICDM 2022*.
- [8] **Zifeng Wang\***, Tong Jian\*, Aria Masoomi, Stratis Ioannidis and Jennifer Dy. “Revisiting Hilbert-Schmidt Information Bottleneck for Adversarial Robustness”. *NeurIPS 2021*.
- [9] **Zifeng Wang\***, Tong Jian\*, Kaushik Chowdhury, Yanzhi Wang, Jennifer Dy, and Stratis Ioannidis. “Learn-Prune-Share for Lifelong Learning”. *ICDM 2020*.
- [10] **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**.
- [11] Aria Masoomi, Chieh Wu, Tingting Zhao, **Zifeng Wang**, Peter Castaldi, Jennifer Dy. “Instance-wise Feature Grouping”. *NeurIPS 2020*.
- [12] 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**.
- [13] Liangliang Ren, Jiwen Lu, **Zifeng Wang**, Qi Tian, Jie Zhou. “Collaborative Deep Reinforcement Learning for Multi-Object Tracking”. *ECCV 2018*.

### Journal Papers:

- [14] **Zifeng Wang**, Aria Masoomi, Zhonghui Xu, Adel Boueiz, Sool Lee, Tingting Zhao, Russell Bowler, Michael Cho, Edwin K. Silverman, Craig Hersh, Jennifer Dy, Peter J. Castaldi “Improved Prediction of Smoking Status via Isoform-Aware RNAseq Deep Learning Models”. *PLoS computational biology* 17 (10), e1009433.

- [15] Tingting Zhao\*, **Zifeng Wang\***, Aria Masoomi, Jennifer Dy. “Deep Bayesian Unsupervised Lifelong Learning”. *Neural Networks* 149, 95-106.
- [16] Batool Salehi, Guillem Reus-Muns, Debashri Roy, **Zifeng Wang**, Tong Jian, Jennifer Dy, Stratis Ioannidis, Kaushik Chowdhury. “Deep Learning on Multimodal Sensor Data at the Wireless Edge for Vehicular Network”. *IEEE Transactions on Vehicular Technology*, 71 (7), 7639-7655.
- [17] Tong Jian, Yifan Gong, Zheng Zhan, Runbin Shi, Nasim Soltani, **Zifeng Wang**, Jennifer Dy, Kaushik Chowdhury, Yanzhi Wang, Stratis Ioannidis. “Radio Frequency Fingerprinting on the Edge”. *IEEE Transactions on Mobile Computing* 21.11 (2021): 4078-4093.
- [18] Tong Jian, Bruno Costa Rendon, Emmanuel Ojuba, Nasim Soltani, **Zifeng Wang**, Kunal Sankhe, Andrey Gritsenko, Jennifer Dy, Kaushik Chowdhury, Stratis Ioannidis. “Deep Learning for RF Fingerprinting: A Massive Experimental Study”. *IEEE Internet of Things Magazine* 3 (1), 50-57.
- [19] Huan Yan, **Zifeng Wang**, Tzu-Heng Lin, Yong Li, and Depeng Jin. “Profiling users by online shopping behaviors.” *Multimedia Tools and Applications* 77 (2018): 21935-21945.

## HONERS AND AWARDS

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<b>Scholar Award</b> , NeurIPS 2022	New Orleans, LA
<b>Best Paper Candidate</b> , ICDM 2020	Sorrento, Italy
<b>Best Paper Award</b> , IEEE DySPAN 2019	Newark, NJ
<b>Travel Award</b> , NeurIPS 2019	Vancouver, Canada
<b>Dean’s Fellowship</b> , Northeastern University, 2018	Boston, MA
<b>Outstanding Undergraduate Scholarship</b> , Tsinghua University, 2016	Beijing, China

## ACADEMIC SERVICES

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### Conference Reviewer:

- Annual Conference on Neural Information Processing Systems (NeurIPS) 2021-22
- International Conference on Machine Learning (ICML) 2021-23
- International Conference on Learning Representations (ICLR) 2022-23
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2022-23
- Association for Computational Linguistics Rolling Review (ACL ARR) 2022
- SIAM International Conference on Data Mining (SDM) 2023

### Journal Reviewer:

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Transactions on Machine Learning Research (TMLR)
- Neural Networks

## INVITED TALKS

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- *SparCL: Sparse Continual Learning on the Edge*
  - ContinualAI, Remote, Feb 2022
- *QueryForm: A Simple Zero-shot Form Entity Query Framework*
  - Google Cloud AI Research, Sunnyvale, CA, Nov 2022
- *Prompting-based Continual Learning*
  - The AI Talks, Nanyang Technological University, Remote, Mar 2022
  - ContinualAI, Remote, Sep 2022
  - Google Cloud AI Research, Sunnyvale, CA, May 2022
- *Revisiting Hilbert-Schmidt Information Bottleneck for Adversarial Robustness*
  - INFORMS Annual Meeting, Indianapolis, IN, Oct 2022
  - AI Times, Tsinghua University, Remote, June 2022

## TECHNICAL SKILLS

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- Software: PyTorch, JAX, TensorFlow, scikit-learn, Apache Spark, Apache Hadoop.
- Programming Languages: Python, C/C++, JAVA, MATLAB.