

# Yao LU

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I am deeply passionate about contributing to research and production at the intersection of machine learning and systems. Throughout my academic and industry journey, I have engaged with various tiers of the technology landscape and acquired hands-on experience in the data layer, core systems, advanced cloud infrastructures, and a diverse range of AI applications.

## Working History

2023.9 – **Adjunct Assistant Professor @ School of Computing, National University of Singapore**

2023.9 – **Co-founder & CTO @ a stealth-mode startup**

2018.11 – 2023.8 **Researcher @ Microsoft Research, Redmond, WA, USA**

Data Systems Group, manager: Vivek Narasayya and Surajit Chaudhuri

Research at the intersection of data systems and machine learning. Topics include:

*1. Improving data systems for machine learning*

I worked on improving the system efficiency using (1) black-box optimizations, e.g., UDF re-ordering, auto-parallelism, auto-scheduling, multi-query optimization [T.1, W1], reinforcement learning [P.3], on data center and heterogeneous infrastructures (IoT) [P.1], and (2) gray-box optimization, e.g., plan rewrite using proxy models [P.5, P.8, P.9, A.2, T.1].

*2. Improving data systems using machine learning*

I worked on improving different components of existing data systems using ML models built on query history, structured tables, execution plans and telemetries. Relevant projects include pre-training summarization models of structured datasets for cardinality estimation [P., W.12, W.23], partition selection in answering big-data queries [P.7], and efficiently adapting ML models to data and workload drifts [P.2, A.1].

## Education

2013 – 2018 **PhD in Computer Science and Engineering**

University of Washington, Seattle, WA

Research area: Data systems for ML

Advisor: Linda Shapiro

Committee member: Magdalena Balazinska, Srikanth Kandula

2010 – 2013      **MSc in Computer Science**  
Fudan University, Shanghai, China  
Research area: Computer vision and ML

2006 – 2010      **BEng in Computer Science**  
Tongji University, Shanghai, China

## Publications

### Peer-Reviewed Conference Publications

- 2023      **P.1**      Yongji Wu, Matt Lentz, Danyang Zhuo, **Yao Lu**. Serving and Optimizing Machine Learning Workflows on Heterogeneous Infrastructures. International Conference on Very Large Data Bases (VLDB). Vancouver, BC, Canada. 2023.
- 2022      **P.2**      Beibin Li, **Yao Lu**, Srikanth Kandula. Warper: Efficiently Adapting Learned Cardinality Estimation Models to Data and Workload Drifts. ACM International Conference on Management of Data (SIGMOD). Philadelphia, PA, USA. 2022.
- P.3**      Pramod Chunduri, Jaeho Bang, **Yao Lu**, Joy Arulraj. Zeus: Efficiently Localizing Actions in Videos using Reinforcement Learning. ACM International Conference on Management of Data (SIGMOD). Philadelphia, PA, USA. 2022.
- P.4**      Zhihui Yang, Zuozhi Wang, Yicong Huang, Feng Gao, **Yao Lu**, Chen Li, X. Sean Wang. Demonstration of Accelerating Machine Learning Inference Queries with Correlative Proxy Models. International Conference on Very Large Data Bases (VLDB) Demo. Sydney, Australia. 2022.
- P.5**      Zhihui Yang, Zuozhi Wang, Yicong Huang, **Yao Lu**, Chen Li, X. Sean Wang. Correlative Cascades for Machine Learning Inference. International Conference on Very Large Data Bases (VLDB). Sydney, Australia. 2022.
- P.6**      **Yao Lu**, Srikanth Kandula, Arnd Christian Konig, Surajit Chaudhuri. Pre-training Summarization Models of Structured Datasets for Cardinality Estimation. International Conference on Very Large Data Bases (VLDB). Sydney, Australia. 2022.
- 2020      **P.7**      Kexin Rong, **Yao Lu**, Peter Bailis, Srikanth Kandula, Philip Levis. Approximate Partition Selection for Big-Data Workloads using Summary Statistics. International Conference on Very Large Data Bases (VLDB). Tokyo, Japan. 2020.
- 2018      **P.8**      **Yao Lu**, Aakanksha Chowdhery, Srikanth Kandula and Surajit Chaudhuri. Accelerating Machine Learning Inference with Probabilistic Predicates. ACM International Conference on Management of Data (SIGMOD). Houston, TX, USA. 2018. **Course**

Material in GT8803@GaTech, CS839@UW-Madison, CMPT8343@SFU.

- P.9** Yao Lu, Srikanth Kandula and Surajit Chaudhuri. Interactive Demonstration of Probabilistic Predicates. ACM International Conference on Management of Data (SIGMOD) Demo. Houston, TX, USA. 2018. **Best Demonstration Award**.
- P.10** Haonan Qiu, Yingbin Zheng, Hao Ye, Yao Lu, Feng Wang, Liang He. Precise Temporal Action Localization by Evolving Temporal Proposals. ACM International Conference on Multimedia Retrieval (ICMR). Yokohama, Japan. 2018.
- 2017 **P.11** Siwei Lyu and Yao Lu et al. UA-DETRAC 2017: Report of AVSS2017 & IWT4S Challenge on Advanced Traffic Monitoring. IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS). Lecce, Italy. 2017.
- P.12** Li Wang, Yao Lu, Hong Wang, Yingbin Zheng, Hao Ye and Xiangyang Xue. Evolving Boxes for Fast Vehicle Detection. IEEE International Conference on Multimedia and Expo (ICME). Hongkong, China. 2017. **Platinum Best Paper Award**.
- P.13** Yao Lu and Linda Shapiro. Closing the Loop for Object Proposals and Edge Detection. The Thirty-First AAAI Conference on Artificial Intelligence (AAAI). San Francisco, CA, USA. 2017.
- 2016 **P.14** Yao Lu, Xue Bai, Linda Shapiro, Jue Wang. Coherent Parametric Contours for Interactive Video Object Segmentation. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR). Las Vegas, USA. 2016. **Shipped to Adobe After Effects**.
- P.15** Yao Lu, Aakanksha Chowdhery, Srikanth Kandula. Optasia: A Relational Platform for Efficient Large-Scale Video Analytics. ACM Symposium on Cloud Computing (SoCC). Santa Clara, CA, USA. 2016.
- 2012 **P.16** Yao Lu, Wei Zhang, Ke Zhang, Xiangyang Xue. Semantic Context Learning with Large-Scale Weakly-Labeled Image Set. ACM Conference on Information and Knowledge Management (CIKM). Hawaii, HI, USA, 2012.
- P.17** Yao Lu, Wei Zhang, Chen Jin, Xiangyang Xue. Learning Attention Map from Images. IEEE International Conference on Computer Vision and Pattern Recognition (CVPR). Providence, RI, USA. 2012.
- 2011 **P.18** Wei Zhang, Yao Lu, Xiangyang Xue, Jianping Fan. Automatic Image Annotation with Weakly Labeled Datasets. ACM Multimedia. Scottsdale, AZ, USA. 2011.
- P.19** Xiangyang Xue, Wei Zhang, Jie Zhang, Bin Wu, Jianping Fan, Yao Lu. Correlative Multi-Label Multi-Instance Image Annotation. 13th International Conference on Computer Vision (ICCV). Barcelona, Spain. 2011.
- P.20** Yao Lu, Wei Zhang, Hong Lu, Xiangyang Xue. Salient Object Detection using Concavity Context. 13th IEEE International Conference on Computer Vision (ICCV). Barcelona,

Spain. 2011.

## Patents

- 2021      **A.1**      **Yao Lu**, Srikanth Kandula. Adapting Learned Cardinality Estimators to Data and Workload Drifts. US Patent App. #17/566,996.
- 2019      **A.2**      Surajit Chaudhuri, Srikanth Kandula, **Yao Lu**. Accelerating Machine Learning Inference with Probabilistic Predicates. US Patent App. #16/003,495.
- 2017      **A.3**      Xue Bai, Jue Wang, **Yao Lu**. Flexible Video Object Boundary Tracking. US Patent #9,569,866.

## Doctoral Thesis

- 2018      **T.1**      **Yao Lu**. Building and Accelerating a Declarative Platform for Machine Learning Model Serving. Doctoral Dissertation. University of Washington. 2018.

## Posters, Workshop Papers and Technical Reports

- 2023      **W.1**      Gaurav. Kakkar, et al. EVA: An End-to-End Exploratory Video Analytics System. Proceedings of the 7th Workshop on Data Management for End-to-End Machine Learning. (DEEM). 2023.
- 2021      **W.2**      Beibin Li, **Yao Lu**, Chi Wang, Srikanth Kandula. Q-error Bounds of Random Uniform Sampling for Cardinality Estimation. MSR Technical report MSR-TR-2021-29.
- 2017      **W.3**      Yao Peng, Hao Ye, Yining Lin, Yixin Bao, Zhijian Zhao, Haonan Qiu, **Yao Lu**, Li Wang, Yingbin Zheng. Large-Scale Video Classification with Elastic Streaming Sequential Data Processing System. ACM Multimedia Workshop on Large-Scale Video Classification Challenge (LSVC). Mountain View, USA. 2017.
- 2016      **W.4**      **Yao Lu**, Aakanksha Chowdhery, and Srikanth Kandula, VisFlow: A Declarative Platform for Parallelizing Large-Scale Vision Programs. The 4th International Workshop on Large Scale Visual Recognition and Retrieval (CVPR Workshop), Las Vegas, USA, 2016.

## Manuscripts and Pre-prints

- 2018      **M.1**      Li Wang, Weiyuan Shao, **Yao Lu**, Hao Ye, Jian Pu, Yingbin Zheng. Crowd Counting with Density Adaption Networks. arXiv preprint 2018. arXiv:1806.10040.

## Prior Working Experiences

- 2017      **Research Intern @ Microsoft Research**, Redmond, WA, USA  
DMX Group, mentored by Srikanth Kandula and Christian Konig  
Worked on ML-based cardinality estimation.
- 2016      **Research Intern @ Microsoft Research Asia**, Beijing, China  
Systems and Networking Group, worked on ML workload optimization. Project led to a best SIGMOD demo award and production impact in Azure Cosmos DB.

- 2016      **Research Intern @ Microsoft Research**, Redmond, WA, USA  
Mobility and Networking Group, worked on object tracking algorithms in videos.
- 2015      **Research Intern @ Microsoft Research**, Redmond, WA, USA  
Mobility and Networking Group, worked on systems for ML. Project led to publications and production impact in Azure Cosmos DB.
- 2014      **Research Intern @ Adobe Research**, Seattle WA, USA  
Creative Technology Lab, worked on video object segmentation. Project shipped to Adobe After Effects as the rigid mask tracker and face tracker.
- 2010-2015      **Research Assistant @ Fudan University** Media Lab, Shanghai, China *w/ Xiangyang Xue*  
**Research Assistant @ University of Washington**, Seattle WA, USA *w/ Linda Shapiro*  
Worked on ML algorithms and applications in computer vision. Topics include image and video segmentation, object detection, image labeling, and action detection in videos.
- 2009      **Software Development Engineer Intern @ Microsoft MSN China**, Shanghai, China

## Selected Awards

- 2023      VLDB Distinguished Reviewer
- 2018      ACM SIGMOD Best Demonstration Award
- 2017      IEEE ICME Platinum Best Paper Award
- 2014      University of Washington Royalty Research Fund Scholarship
- 2012      Chinese National Graduate Scholarship
- 2012      Google Innovation Scholarship
- 2011      Tencent Scholarship

## Invited Talks

- 2023      **Towards Intelligent Data Systems**  
Colloquium talk at Princeton University. Host: Kai Li  
University of Sydney. Host: Joachim Gudmundsson  
National University of Singapore. Host: Xiaokui Xiao
- 2022      **Pre-trained Models in Databases**  
Database seminar talk at UC Berkeley SkyLab. Hosts: Tiemo Bang and Joeseeph Hellerstein  
Systems seminar talk at Stanford University. Hosts: Johann Hauswald and Christos Kozyrakis  
Systems & database seminar talk at Duke University. Hosts: Danyang Zhuo and Jun Yang  
Database seminar talk at Georgia Tech. Hosts: Joy Arulraj and Sham Navathe
- 2019      **Cardinality Estimation: Is Machine Learning a Silver Bullet?**

AIDB workshop talk @ VLDB

2018      **Machine Learning on Big-Data Systems**

Alibaba Research. Hosts: Bolin Ding and Jingren Zhou

IBM Research Almaden. Hosts: Berthold Reinwald and Fatma Ozcan

Google Research. Host: Cong Yu

Salesforce Research. Hosts: Caiming Xiong

Microsoft Research. Hosts: Yinan Li and Christian Konig

## Teaching Experiences

### Teaching Assistant

2018 Sum      **CSE344 Introduction to Data Management**, University of Washington

Undergraduate course. Instructor: Kevin Zatloukal

2018 Win      **CSE515 Statistical Methods in Computer Science**, University of Washington

Graduate course. Instructor: Pedro Domingos

2018 Spr      **CSE455 Computer Vision**, University of Washington

Undergraduate course. Instructor: Linda Shapiro

2017 Win      **CSE455 Computer Vision**, University of Washington

Undergraduate course. Instructor: Linda Shapiro

2017 Aut      **CSE546 Machine Learning**, University of Washington

Graduate course. Instructor: Kevin Jamieson

2017 Spr      **CSE576 Computer Vision**, University of Washington

Undergraduate course. Instructor: Linda Shapiro

2016 Spr      **UW CSE547 Machine Learning and Big Data**, University of Washington

Graduate course. Instructor: Sham Kakade

2015 Win      **CSE455 Computer Vision**, University of Washington

Undergraduate course. Instructor: Linda Shapiro

2014 Spr      **CSE415 Introduction to AI**, University of Washington

Graduate course. Instructor: Linda Shapiro

2011 Spr      **COMP120004 Linear Algebra**, Fudan University

Undergraduate course. Instructor: Wei Zhang

## Mentoring Experiences

### Intern Mentoring

2022      **Weiyuan Wu** (PhD student at Simon Fraser University)

Microsoft Research Intern: ML for query optimization

2022      **Md Mahmudulla Hassan** (PhD student at UTexas at El Paso)

Microsoft Bing Intern: ML for anomaly detection

2021-now **Yongji Wu** (PhD student at Duke University)  
Co-advised with Danyang Zhuo and Matthew Lentz: Systems for ML

2020 **Beibin Li** (PhD student at University of Washington)  
Microsoft Research Intern: ML for CE and workload modeling

2019 **Kexin Rong** (PhD student at Stanford University)  
Microsoft Research Intern, co-mentored with Srikanth Kandla: ML for AQP

2019 **Xiao Huang** (PhD student at Texas A&M University)  
Microsoft Research Intern: ML for cardinality estimation

2019-2022 **Zhihui Yang** (PhD student at Fudan and UC Irvine)  
Co-advised with Chen Li and X. Sean Wang: ML workload optimization

2019-now **Pramod Chunduri** (PhD student at Georgia Tech)  
Co-advised with Joy Arulraj: Video data management systems

### Doctoral Thesis Committee Member

2022 **Beibin Li**, Computer Science and Engineering, University of Washington

## Professional Services

### Artificial Intelligence / Computer Vision:

**Program Committee Member:** IEEE MIPR 2018 – 2023, AAAI 2019 – 2024, IEEE/CVF CVPR 2019 – 2023, IEEE ICCV 2019, ACM Multimedia Asia 2019, 2021, IEEE WACV 2020 – 2024, ACCV 2020, 2022, IEEE ECCV 2020, 2022

**Journal Reviewing:** Neurocomputing 2017-now, The Visual Computer 2017-2021, Pattern Recognition 2018-2021, Computer Vision and Image Understanding 2023

### Databases / Systems:

**Program Committee Member:** SMDB Workshop 2020-2021, AIDB Workshop 2020–2023, VLDB 2023, 2024

**Journal Reviewing:** The VLDB Journal 2022-now.