Ziqiang (Edmond) Feng

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OBJECTIVE

I am looking for industry positions with research opportunities on mobile-edge-cloud computing, distributed systems, big data systems, and intersection between these systems and computer vision/machine learning applications. I am interested in improving the efficiency, scalability, reliability, and usability of these systems by exploiting workload attributes, hardware attributes, and machine learning techniques.

EDUCATION

Ph.D in Computer Science, Carnegie Mellon University   *Expected: 05/2021*
Advisor: Mahadev Satyanarayanan (Satya)
Thesis: *Human-efficient Discovery of Edge-based Training Data for Visual Machine Learning*

M.Phil in Computing, Hong Kong Polytechnic University   *03/2016*
Advisor: Eric Lo
Thesis: *ByteSlice: Pushing the Envelop of Main Memory Data Processing with a New Storage Layout*

B.S in Computing, Hong Kong Polytechnic University   *08/2013*
Graduated with First Class Honours.

RESEARCH AND INDUSTRY EXPERIENCE

Carnegie Mellon University   *09/2016 – present*
Graduate Research Assistant   Advisor: Prof. Mahadev Satyanarayanan (Satya)

- Eureka: Edge-based Discovery of Training Data for Machine Learning (MLSys'18, SEC'18)

  - Designed and implemented Eureka, a system for interactive content-based search of rare target examples in visual data (image and video).
  - Exploited edge computing, early-discard and just-in-time machine learning to reduce human labeling effort and alleviate system bottleneck on the WAN.
  - Reduced human effort by two orders of magnitude compared to traditional labeling.
  - Video demo: https://youtu.be/Ajo0APnSV10
  - Extended the system to support searching of temporal events in untrimmed video data and showed up to 5x improvement.
  - https://github.com/cmusatyalab/opendiamond

- Improving Edge Elasticity via Decode Offload

  - Identified decoding as a scalability bottleneck in an emerging class of edge-enabled video analytics applications.
  - Explored and identified the storage subsystem as the optimal placement of HW accelerators based on thermal and data copying arguments.
  - Proposed a new storage abstraction that provides the benefit and meanwhile simplifying application development and enhancing portability.
  - Prototyped a decode-enabled storage via emulation and experimental evaluated up to 3.5x improvement of end-to-end application-level performance.

- Bandwidth-efficient Live Video Analytics for Drones via Edge Computing (SEC'18)

  - Optimized real-time video analytics on small drones by exploiting limited on-board processing, temporal locality, just-in-time machine learning, and context-awareness.

- LiveMap: Live Synthesis of Vehicle-Sourced Data Over 4G LTE (MSWiM'17)

  - A real-time simulation framework that allows a mix of real components and many simulated vehicular components to be tested together at scale.

Microsoft Research Redmond   *05/2018 – 08/2018*
Research Intern   Mentor: Dr. Eduardo Cuervo

- Adding DNN-based Object Detection to Windows Mixed Reality Applications

  ○ Offloaded GPU-based object detection to a cloudlet from a wearable MR headset.
  ○ Modified *TensorFlow* to support finer-grained GPU time sharing between multiple applications.

Hong Kong Polytechnic University   *09/2013 – 06/2016*
Graduate Research Assistant   Advisor: Prof. Eric Lo

- Architectural Conscious Main Memory Data Processing (ICDE'15, SIGMOD'15, SIGMOD'16)

  ○ Designed and implemented architecture-conscious database operators that exploits modern hardware: intra-word parallelism, SIMD parallelism, multi-core parallelism, hierarchical GPU cache, pre-fetching, etc.
  ○ ByteSlice: a SIMD-aware column store format: https://github.com/fzqneo/ByteSlic

- Thrifty: Massively Parallel Database as a Service (SIGMOD'15)

  ○ Offered Parallel Database as a Service (MPDBaaS) using the shared-process approach, as opposed to the VM approach used by popular cloud service like AWS.

Carnege Mellon University   *06/2015 – 08/2015*
Student Intern   Mentor: Prof. Andy Pavlo

- Peloton: The Self-Driving Database Management System

  ○ A tile-based main memory DB engine to support hybrid transactional-analytical processing (HTAP) workloads.
  ○ Designed and implemented several core database operators (scan, index, joins, etc.) and MVCC concurrency controls.
  ○ https://github.com/cmu-db/peloton

PUBLICATIONS

Google Scholar: https://scholar.google.com/citations?user=3ADT4qIAAAAJ

Referred papers:

[1] Shilpa George, Thomas Eiszler, Roger Iyengar, Haithem Turki, Ziqiang Feng, Junjue Wang, Padmanabhan Pillai, Mahadev Satyanarayanan. *OpenRTiST: End-to-End Benchmarking for Edge Computing.* IEEE Pervasive Computing 2020.

[2] Mahadev Satyanarayanan, Thomas Eiszler, Jan Harkes, Haithem Turki, Ziqiang Feng. *Edge Computing for Legacy Applications.* IEEE Pervasive Computing 2020.

[3] Junjue Wang, Ziqiang Feng, Shilpa George, Roger Iyengar, Padmanabhan Pillai, Mahadev Satyanarayanan. *Towards Scalable Edge-Native Applications.* ACM/IEEE Symposium on Edge Computing (**SEC**'19).

[4] Ziqiang Feng, Shilpa George, Jan Harkes, Padmanabhan Pillai, Roberta Klatzky, Mahadev Satyanarayanan. *Edge-based Discovery of Training Data for Machine Learning.* **SEC**'18.

[5] Junjue Wang, Ziqiang Feng, Zhuo Chen, Shilpa George, Mihir Bala, Padmanabhan Pillai, Shao-Wen Yang, Mahadev Satyanarayanan. *Bandwidth-efficient Live Video Analytics for Drones via Edge Computing.* **SEC**'18.

[6] Ziqiang Feng, Junjue Wang, Jan Harkes, Padmanabhan Pillai, Mahadev Satyanarayanan. *EVA: An Efficient System for Exploratory Video Analysis* (poster). **MLSys**'18.

[7] Wenlu Hu, Ziqiang Feng, Zhuo Chen, Jan Harkes, Padmanabhan Pillai, Mahadev Satyanarayanan. *Live Synthesis of Vehicle-Sourced Data Over 4G LTE.* ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (**MSWiM**'17).

[8] Wenjian Xu, Ziqiang Feng, Eric Lo. *Fast Multi-Column Sorting in Main-Memory Column-Stores*. ACM SIG on Management of Data (**SIGMOD**'16).

[9] Ziqiang Feng, Eric Lo, Ben Kao, Wenjian Xu. *ByteSlice: Pushing the Envelop of Main Memory Data Processing with a New Storage Layout*. **SIGMOD**'15.

[10] Ziqiang Feng, Eric Lo. *Accelerating Aggregation using Intra-cycle Parallelism*. IEEE International Conference on Data Engineering (**ICDE**'15).

[11] Petrie Wong, Andy He, Ziqiang Feng, Wenjian Xu, Eric Lo. *Thrifty: Offering Parallel Database as a Service using the Shared-Process Approach*. **SIGMOD**'15, Demo.

[12] Petrie Wong, Ziqiang Feng, Wenjian Xu, Eric Lo, Ben Kao. *TLB Misses — the Missing Issue of Adaptive Radix Tree?* International Workshop on Data Management on New Hardware (**DaMoN**'15).

Books:

[13] Ziqiang Feng, Bo Tang. Article: *What is Edge Computing?*. In book: *One Hundred Thousand Whys in High-Tech*. Editor: SUSTech. Guangdong Sci & Tech Press. (Chinese: 十万个高科技为什么)

HONORS AND AWARDS

- **Croucher Doctoral Scholarship** (7 recipients), Croucher Foundation, Hong Kong, 2017 – 2019
- **ACM/IEEE SEC'18** Student Travel Grant
- **ACM SIGMOD'15** Student Travel Grant
- **IEEE ICDE'15** Student Travel Grant
- CMU US-China IEA **New Venture Competition**, Third Place, 04/2019
- **Siemens FutureMakers Challenge**, Winner team ($140k research grant) , 03/2018
- **Full Academic Scholarship for Outstanding Entrance Student**, Hong Kong Polytechnic University (HKPU), 2008 – 2013
- Final Year Project **Technological Achievement Award**, HKPU, 06/2013
- **Dean's Honors List** of Outstanding Students, HKPU, 06/2009

TECHNICAL SKILLS

- **Cloud computing and distributed systems**: Amazon AWS (EC2, S3, EMR, DynamoDB), Ansible, KVM, Docker, ZeroMQ
- **Programming language:** proficient in C, C++, Python; familiar with Java, Scala, MATLAB
- **Big data/database**: Hadoop, Spark, PostgreSQL, MonetDB, MySQL, Redis
- **Machine learning/deep learning**: TensorFlow, PyTorch, Scikit-learn
- **Parallel programming**: pthreads, OpenMP, SIMD (SSE/AVX)

REFERENCES

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