Farley Lai

Engineer/Researcher

Santa Clara, CA, USA

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Work Experience

NEC Laboratories America, Inc.

Princeton, NJ and San Jose, CA

From Sr. Associate Researcher to Researcher — *Aug. 2017 - Mar. 2022*

- 2022 SOTA video retrieval using self-supervised representation learning with cascade positive example mining on UCF101/HMDB51
- 2022 SOTA group activity recognition using ONLY keypoints on the Volleyball dataset with improvement up to 5.4%
- 2021 SOTA compositional reasoning about object permanence on the Cater dataset with Top-1 73.2%
- Designed and deployed a real-time multi-stream action recognition framework for a retail surveillance POC
- Designed and deployed a customizable rule based engine in regular languages to support compositional action detection
- 2020 SOTA multi-person tracking in the PoseTrack challenge
- 2019 contextual grounding outperforming previous SOTA on Flickr30K Entities by 1.67%
- Proposed a novel visual entailment task and dataset with baseline 71.16%, engaging the community with followup research
- Proposed a multi-context approach to unsupervised manufacturing defect detection, improving from 60% to more than 80%
- 4 US patents issued, 12 in application

Computer Science, University of Iowa

Iowa City, IA

Research Assistant — *June. 2016*

- Compile-time energy predictions with error < 9% for mobile sensing apps including activity recognition and speaker identification

NEC Laboratories America, Inc.

Princeton, NJ

Research Assistant - Internship — *Spring, 2016*

- Designed hybrid data and model parallel deep neural networks as well as alternative direction method of multipliers (ADMM) for large-scale distributed deep learning in Lua/C++/OpenMP
- Speedup from 145 images/s on one machine baseline to 1500 images/s on on a cluster of eight 16-core machines@2.2GHz over InfiniBand
- Memory savings by up to 67% with hybrid model parallelism evaluated with CFAR-10 on a VGG variant

Computer Science, University of Iowa

Iowa City, IA

Research and Teaching Assistant — *2011 - 2015*

- Optimized the memory management of stream programs through code analysis with experimental results outperforming the MIT StreamIt by up to 8.7X in various benchmarks while saving memory usage by up to 96%
- Developed CSense, a stream processing toolkit for Android, that ensures leak and race free as well as integration with MATLAB code through JNI, boosts performance by up to 19X, and reduces 45% CPU usage compared with baseline
- Developed mobile sensing applications based on CSense including AudioSense to capture listening context for hearing aid, ActiSense to recognize human activities and SpeakerIdentifier to identify speakers in conversations
- Giving two full-length lectures on filesystems in CS:3620 Operating Systems

Uniform Industrial Corporation

New Taipei City, Taiwan

Project Leader and Advanced Engineer — *2004 - 2009*

- Practiced eXtreme Programming to lead a project of developing multi-channel video management software in MFC for Windows and browser ActiveX/DirectShow plugins in a one-month tight schedule
- Developed an embedded Perl web server to improve rendering server pages from seconds to the blink of an eye for video conferencing products, and a video player adapted from VLC displaying private event information for IP surveillance cameras
- Independently assigned to transpire Magnetic Ink Character Recognition sources from Moto68K assembly to C for U.S. check readers

Education

University of Iowa (UIowa)

Iowa City, IA

Ph.D. and MCS in Computer Science with 3.83 cGPA — *2011 - 2017*

- Relevant courses: knowledge discovery, pattern recognition, big data technologies, artificial intelligence, distributed systems
- Engineering courses: image processing, signal processing, formal methods

Nation Central University (NCU)

Taoyuan, Taiwan

M.S. in Computer Science and Information Engineering with 4.0 GPA — *2002 - 2004*

- Relevant courses: cluster analysis, neural networks, distributed fault-tolerance computing, network security

Skills

- Programming: Python, C/C++, Java/Scala/Groovy, Lua, MATLAB
- Toolkits: PyTorch, TensorFlow, Spark, GASPI/GPI, OpenMP, Gradle, Conda, Docker
- AWS: Kinesis Video/Data Streams, ECS, Lambda, Cognito
- Development: Android, Linux, Windows

Publications

COMPOSER: Compositional Learning of Group Activity in Videos *Under reivew*

Honglu Zhou, Asim Kadav, Aviv Shamsian, Shijie Geng, Farley Lai, Long Zhao, Ting Liu, Mubbasir Kapadia, Hans Peter Graf *2022*

Self-supervised Video Representation Learning with Cascade Positive Retrieval *L3D-IVU@CVPR*

Cheng-En Wu, Farley Lai, Yu Hen Hu, Asim Kadav *2022*

Hopper: Multi-hop Transformer for Spatiotemporal Reasoning *ICLR*

H. Zhou, A. Kadav, Farley Lai, A. Niculescu-Mizil, M. Renqiang Min, M. Kapadia, Hans Peter Graf *2021*

15 Keypoints Is All You Need *CVPR*

Michael Snower, Asim Kadav, Farley Lai, Hans Peter Graf *2020*

Contextual Grounding of Natural Language Phrases in Images *ViGIL@NeurIPS*

Farley Lai, Ning Xie, Derek Doran, Asim Kadav *2019*

Visual Entailment Task for Visually-Grounded Language Learning *ViGIL@NeurIPS*

Ning Xie, Farley Lai, Derek Doran, Asim Kadav *2018*

Workload Shaping Energy Optimizations with Predictable Performance for Mobile Sensing *IoTDI*

Farley Lai, Marjan Radi, Octav Chipara, William G. Griswold *2018*

Stream Processing Optimizations for Mobile Sensing Applications *PhD Dissertation@UIowa*

Farley Lai, Octav Chipara *2017*

Static Memory Management for Efficient Mobile Sensing Applications *EMSOFT*

Farley Lai, Daniel Schmidt, Octav Chipara *2015*

CSense: A Stream-Processing Toolkit for High-Rate Mobile Sensing Applications *IPSN*

Farley Lai, Syed Shabih Hasan, Austin Laugesen, Octav Chipara *2014*

AudioSense: Enabling Real-time Evaluation of Hearing Aid Technology In-Situ *CBMS*

Syed Shabih Hasan, Farley Lai, Octav Chipara, Yi-Hsien Wu *2013*

Optimal Alternators with Reduced Space Complexity *Master Thesis@NCU*

Farley Lai, Shing-Tssan Huang *2004*

- Proved a theorem on distributed mutual exclusion and scheduling fairness