Alrik Firl

Education

2016–2018 **Master of Science, Computer Science**, *Oregon State University*, GPA: 3.97.
Minor: Risk and Uncertainty Quantification in Earth Systems.
Thesis: Video Analysis: Techniques for Semi-Supervised Video Object Instance Segmentation and Tracking-by-Detection in the Wild.

2007–2011 **Bachelor of Science, Computer Science**, *University of California, San Diego*.

Professional Experience

7/2019 – Present **Senior Software Engineer**, *HOVER Inc.*

- **Cloud and Mobile Machine Learning:**
  - Developed custom distributed ML model serving service, able to run locally and in k8s on GCP. Capable of serving models from arbitrary frameworks on CPU or GPU. Supports all internal HOVER production Computer Vision workflows.
  - Wrote algorithm & implemented cloud endpoint for assessing image quality for 3D reconstruction purposes. Invoked on every user photo capture session within production HOVER Android & iOS apps.
  - Wrote iOS framework in Swift & C++ with CoreML models to give real-time user guidance to facilitate data acquisition for 3D reconstruction. Operates on streaming video and runs in production within HOVER app; pilot analysis showed reduction in first-time user capture fail rates by 40%.
  - Won internal *HOVER Values* award for exceptional performance.

8/2018 – 7/2019 **Staff Software Engineer**, *Wise.io, from GE Digital*.

- **Proprietary Machine Learning Toolkit:**
  - Responsible for writing efficient data structures and frameworks in Python & C++ to support scalable and fault-tolerant data science pipelines. Used in production on large scale industrial AI applications within GE.
  - Wrote tensor support, enabling arbitrary dimensional data storage and handling for industrial asset data, a key feature for streamlining deep learning capabilities.
  - Designed and implemented memory-efficient, asynchronous tensor caching to support GIL-free lazy-loading of tensors in parallel.
  - Wrote extensive tests and integrated with internal CI/CD pipelines.
  - Received the highest possible performance-based annual bonus, indicating exemplary performance.

7/2012 – 9/2016 **Software Engineer**, *UtopiaCompression*.

- **Real-time Maritime Anomaly Detection in an Embedded Environment:**
  - Implemented, parallelized, and optimized C++ proprietary detection and tracking software system to run in real time on the Movidius Myriad2, a low-power embedded multiprocessor Vision Processing Unit.
  - Wrote multithreaded system simulator in C++ to allow for development and debugging on a Linux desktop.
  - Wrote automated regression test framework using Python and bash scripting.
  - Wrote the software from project inception to production, conducted demos both in-lab and on-board a motorboat for stakeholders.
  - Software released as 1st generation ClearCruise™ in FLIR M132 and M232 thermal cameras.
- **Applied Computer Vision R&D Projects:**
  - Implemented and optimized proprietary detection algorithm for panoramic infrared video data in C++. Optimized sections of the algorithm to run on the GPU using OpenCL.
  - Wrote command and control software for interfacing with experimental panoramic infrared camera over Ethernet.
  - Implemented and optimized novel, high-performance perception-lossless compression algorithm in C++.
  - Designed and implemented a multithreaded framework for concurrent video processing and fusion of multiple heterogeneous video sources; scaled up to processing 24 concurrent input video sources on a single system.
  - Implemented algorithm suite for performing X-ray CT reconstruction using C++ and MATLAB. Optimized components to run on the GPU with CUDA.
  - Implemented components of an incremental learning system infrastructure in MATLAB and C++ for semi-supervised automatic underwater mine recognition on sonar data.

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9/2009 – 7/2012 **Software Developer**, *UCSD Cortical Systems and Behavior Laboratory*.
- Wrote core experiment software, integrating neural and behavioral experiments into a parallel, interactive unified system in C++ and MATLAB.
- Wrote GUI-based tools to acquire, denoise, recognize, and extract events in audio data to automate experiment post-processing and analysis.

6/2011 – 9/2011 **Software Intern**, *Integrity Applications Incorporated*.
- Wrote multithreaded framework in C++ using CUDA, OpenGL, and FFmpeg to perform hardware accelerated processing on streaming and non-streaming video.
- Obtained 2 – 10x speedups over previous software in use.

Teaching Experience

Fall, Winter 2016 **Teaching Assistant**, *Software Engineering II (CS 362 Ecampus)*, Oregon State University School of Electrical Engineering and Computer Science.

Spring 2017 **Teaching Assistant**, *Parallel Programming (CS 475 / 575)*, Oregon State University School of Electrical Engineering and Computer Science.

Publications

[1] Amirreza Shaban, Alrik Firl, Ahmad Humayun, Jialin Yuan, Xinyao Wang, Peng Lei, Nikhil Dhanda, Byron Boots, James M Rehg, and Fuxin Li. Multiple-instance video segmentation with sequence-specific object proposals. In *CVPR Workshops*, volume 14, 2017.

[2] Sameer Sheorey, Alrik Firl, Hai Wei, and Jesse Mee. Adaptive prediction with switched models. In *Data Compression Conference (DCC)*, 2015.

Awards

2017-2018 **NSF Research Traineeship (NRT): Risk and Uncertainty Quantification in Marine Science**, NSF-funded transdisciplinary research project and training program, with focus on combining mathematics, statistics, and computer science with environmental and social sciences to improve study, protection, and management of ocean systems.
- Wrote dockerized open source video annotation toolset and data cleaning scripts. Software and documentation available at: https://bitbucket.org/alrikai/fishlabeler.
- Implemented and trained a deep tracking-by-detection system for groundfish off the Oregon coast using generated beamtrawl dataset.
- Received full tuition scholarship and stipend for 2017-2018 academic year.

Skills

Languages C++, Python, Swift, CUDA, OpenCL, Bash

Libraries and Tools Tensorflow, PyTorch, CoreML, NumPy, OpenCV

Areas of Expertise Computer Vision, Deep Learning, Image Processing, Machine Learning, Parallelism and Concurrency, GPGPU, Algorithms, Data Structures, Software Architecture

Github https://github.com/alrikai

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