LUCAS FREY

✉ lcsfrey@gmail.com   ☏ +1 (510) 386 - 8489   🌐 lcsfrey.xyz   ⌨ github.com/lcsfrey

EXPERIENCE

Machine Learning Engineer / Data Scientist
Lam Research

Jun 2019 – Present

Fremont, California

- Lead developer of a design optimization framework used to solve high dimensional optimization problems for internal and external stakeholders
- Contributed bugfixes and pull requests to the **Tensorflow** and **Ray Tune** open source repositories
- Collaborated with multidisciplinary, multinational team of research scientists and process engineers to discover solutions to high dimensional search problems
- Implemented a Bayesian/probabilistic deep learning framework to solve inverse optimization problems
- Reviewed all pull requests meant to merge changes to internal data science team's core code or branches
- Developed image processing and computer vision algorithms to solve complex image analysis problems
- Designed high and low-level system overviews of large-scale software
- Presented work at company-internal, international tech conference
- Attended deep learning conferences and stayed up to date on many advances in machine learning related to image segmentation and analysis

Data Science Intern
Lam Research

Jun 2018 – Jun 2019

Fremont, California

- Implemented computer vision algorithms for analyzing high volume, high magnification images of semiconductors
- Implemented GUI front-end to deploy automatic image analysis applications
- Developed **Convolutional Neural Networks (CNNs)** for image classification and segmentation
- Implemented image segmentation framework to aid in the development of algorithms to automate image analysis for process engineers.
- Presented talk on CNNs to a multi-disciplinary team of engineers

Computer Science Tutor
Self-Employed

Oct 2017 – Jun 2018

Corvallis, Oregon

- Developed personalized curriculum to teach high school student **C++** and **Java** programming
- Assisted student in achieving the highest score on the AP Computer Science Exam
- Taught concepts of pointers, stack vs heap, object orientation, parallelism, polymorphism, algorithms and data structures

WORK PROJECTS

All-In-One Data/Model/Design Optimization Web Application   Jan 2021 – Present
Lam Research

· Built powerful and intuitive web application for engineers to harness machine learning models and Bayesian strategies for design optimization
· Deployed application via individual **Docker** containers on **Azure** web clusters accessible via web URL
· Used in several high value engineering projects at company to speed up time-to-solution
· Implemented application and models in **Python** using **Plotly**, **Dash** and **Tensorflow**

Inverse Design Optimization Using Sequence Modeling   Jun 2019 – Present
Lam Research

· Developed scalable deep learning models to solve inverse design optimization problems
· Improved design iteration speed by utilizing prior knowledge of domain experts to boost model performance
· Managed code repository used by internal and external research partners
· Implemented particle swarm and gradient based optimization algorithms
· Implemented sparse models to improve robustness, accuracy, memory, and power usage
· Incorporated **Bayesian** methods for uncertainty estimation
· Utilized custom built cost functions to constrain and regularize the optimization process
· Implemented models in **Python** and **Jupyter Notebooks** using **Keras** and **Tensorflow**

Deep Learning Image Segmentation Pipeline   Jun 2018 – Jan 2020
Lam Research

· Developed pipeline for building, training, validating and deploying deep learning models
· Replicated results of academic journals on Dense, Inception, and Resnet variant CNNs and Unets
· Built **Generative Adversarial Networks (GANs)** such as Pix2PixHD for domain adaptation
· Achieved 97% pixel 6-fold cross-validation accuracy on noisy, high resolution images
· Implemented models in **Python** and **Jupyter Notebooks** using **Keras**, **Tensorflow** and **PyTorch**

Automated Computer Vision Tools   Jun 2018 – Jan 2020
Lam Research

· Developed defect detection, segmentation and measurement algorithms used by process engineers to analyze thousands of 1500x1500 scanning electron microscope images per week
· Designed front-end and back-end documents and diagrams for image analysis software systems
· Improved efficiency of engineers by automating image analysis, saving an estimate 10 hours per week
· Implemented solutions in **Python** using using **OpenCV**, **Keras** and **Tensorflow**

EDUCATION

Oregon State University   Sep 2016 – Jun 2019
Bachelor of Science   *Corvallis, Oregon*

Major Computer Science Applied in Machine Learning   Major GPA 3.67/4.0
Minor Mathematics   Overall GPA 3.58/4.0

RELEVANT COURSEWORK & AWARDS

Core Courses
Computational Biology
Operating Systems (Comfortable in Unix)
Software Engineering (Methodologies & Testing)
Graph Theory
Linear Algebra
Statistics for Engineers
Analysis of Algorithms & Data Structure

Awards
President's List (2 terms)
Dean's List (3 terms)
Honor Roll (4 terms)
Capital Manor's Foundation Scholarship (2016)

ACADEMIC PROJECTS

Driverless Formula Racecar   Sep 2018 – Aug 2019
Github.com/lcsfrey/OSU-Driverless-Formula-Student

- Developed deep learning computer vision and localization systems for a fully autonomous racecar
- Trained neural networks for object detection using **Python** and **PyTorch**
- Experimented with state-of-the-art architectures including Single Shot Detectors and Faster-RCNN
- Developed software to visualize, compare, and benchmark models using **Tensorboard**
- Developed software to deploy object recognition models in the **Robot Operating System (ROS)**
- Deployed models on the **NVIDIA AGX Xavier** embedded device
- Refactored team's existing **S.L.A.M.** algorithm to support multithreading
- Achieved 8th out of 20th place at **Formula Student Germany 2019 Driverless Competition**
- Achieved 6th out of 20th place in the design competition at **Formula Student Germany 2019**

Traveling Salesman Problem (TSP) Algorithms   Aug 2017 – Mar 2018
Github.com/lcsfrey/TSP_Algorithms

- Implemented genetic and multithreaded heuristic graph algorithms to approximate the TSP
- Outperformed entire class of 30 in 7 out of 7 in both speed and accuracy on competition test cases
- Implemented augmented reality graph overlay to display graph over drawings of graph nodes
- Continued development outside of class building GUI to display graph algorithms
- Implemented algorithms in **C++**, GUI in **Qt Creator**

Aces Up Solitaire Game   Oct 2017 – Dec 2017
Github.com/lcsfrey/Aces-Up

- Worked on an agile development team of 4 completing multiple 2-week sprints over the term
- Utilized **Git** version control and a branch workflow to maintain the integrity of project files
- Developed front-end and back-end systems in both mobile and desktop versions using **Java**, **HTML**, **CSS**, **JavaScript**, and the **Ninja Web Framework**

EXTRA-CURRICULARS

Artificial Intelligence / Machine Learning Club

· Discussed AI/ML related problems, architectures, and other topics
· Gave talks on state-of-the-art architectures deep learning architectures

Formula Racing Club

· Discussed solutions to autonomous problems involving path planning, mapping, and localization
· Participated in the Formula Student Germany and Formula Student Spain driverless racing competitions
· Presented weekly progress on driverless formula racecar project

Robotics Club

· Led team of 6 on yearlong projects to develop robots to compete in the FIRST Tech Challenge
· State finalists and two-time regional champions in competitions of 30+ teams each
· Developed autonomous systems to complete tasks utilizing touch, light, IR and rotation sensors
· Volunteered at local middle school teaching children how to build and program Lego NXT robots

PERSONAL PROJECTS

Super Mario Reinforcement Learning Agent
Github.com/lcsfrey/Reinforcement-Learning-Mario

· Implemented Recurrent CNN-LSTM in **PyTorch** for action prediction
· Built using **Python**, **PyTorch**, and **OpenAI Gym**

Foveated Active Learning Convolutional Neural Network (CNN)
Github.com/lcsfrey/Active_Learning_Pytorch

· Implemented CNN in **PyTorch** for sparse prediction of foveated images to mimic human eye
· Built using **Python**, **PyTorch**, and **OpenCV**

Augmented Reality Graph Algorithm
Github.com/lcsfrey/openCV_modules

· Created augmented reality computer vision algorithm that draws paths through graphs on paper
· Built using **Python** and **OpenCV**, **pybind11**, and **C++**

Security Camera
Github.com/lcsfrey/openCV_modules

· Developed motion sensitive camera that can highlight movement in frame and write footage to files
· Built using **Python** and **OpenCV**

TECHNICAL STRENGTHS

Computer Languages	C/C++, Python, Java
Software & Tools	OpenCV, pybind11, ROS, Git, Tensorflow, Keras, Tensorboard, PyTorch, Jupyter Lab/Notebook, Matplotlib, Pandas, Qt, Voila, Ray Tune
Applied Fields	Image Segmentation, Object Detection, Metrology, Automation, Hyperparameter Optimization, Design Optimization