Weiyun Jiang

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Education

Rice University (Expected June 2027)
Doctor of Philosophy, Electrical and Computer Engineering
GPA: 4.00/4.00

Stanford University (2020 - 2022)
Master of Science, Electrical Engineering
GPA: 4.01/4.00

University of California, Santa Barbara (2016 - 2020)
Bachelor of Science, Electrical Engineering
Outstanding Undergraduate EE Student Award
GPA: 3.99/4.00, *summa cum laude*

Skills & Relevant Courses

Programming: Python, C++/C, C#, Unity, Blender, MATLAB, Verilog, Arduino, Eagle and LaTeX.
Courses: Machine Learning; Artificial Intelligence: Principles and Techniques; Computer Organization and Systems; Natural Language Processing with Deep Learning; Computational Imaging and Display; Convolutional Neural Networks for Visual Recognition; Computational Methods for Biomedical Image Analysis and Interpretation; Deep Generative Models; Introduction to Computer Graphics and Imaging; Mixed-Reality in Medicine.

Research Experience

Rice Computational Imaging Lab **August 2022 – Present**
Research Assistant
Advisor: Prof. Ashok Veeraraghavan

- Developed an unsupervised approach for imaging through atmospheric and water turbulence.
- Designed an atmospheric turbulence simulator with temporal correlation for videos .

Stanford Computational Imaging Lab **March 2021 – September 2021**
Research Assistant
Advisor: Prof. Gordon Wetzstein

- Leveraged FiLM-based priors to solve general ill-posed inverse problems.
- Designed a novel implicit neural network, local FiLM-ed SIREN to solve image inpainting.
- Investigated the ability of implicit neural network to learn priors using GAN loss.
- Achieved higher PSNR than baseline CNN and U-Net methods.

UCSB Uncertainty and Big Data Analysis Lab **June 2018 – September 2020**
Research Assistant
Advisor: Prof. Zheng Zhang

- Accelerated sparse Tucker tensor decomposition on a hybrid FPGA-CPU platform.
- Designed a high-level synthesis FPGA implementation for sparse Tucker decomposition.
- Replaced the conventional singular value decomposition with QR decomposition with column pivoting to reduce the data storage cost and to speed up the computation.
- Achieved 23.6× ∼ 1091× speedup and over 95% energy savings on the tested real-world tensor datasets over CPU.

Awards

Outstanding Senior of Class 2020 in College of Engineering (one awardee selected from the EE program)
Edmund M. Dupree Distinguished Fellow of ECE Department (2022-2023)

Industry Experience

Moffett AI **November 2020 – January 2021**
Software Engineering Intern
Palo Alto, CA

- Generated test cases of various deep learning operations and state-of-the-art language and image classification models for FPGA verifications.
- Wrote shell scripts and Python codes to automate the whole testing framework for C model debugging.

Publications

ConVRT: Consistent Video Restoration Through Turbulence with Test-time Optimization of Neural Video Representations. Haoming Cai, Jingxi Chen, Brandon Y Feng, Weiyun Jiang, Mingyang Xie, Kevin Zhang, Ashok Veeraraghavan, Christopher Metzler. Submitted to CVPR 2024.

NeRT: Implicit Neural Representations for Unsupervised Atmospheric Turbulence Mitigation. Weiyun Jiang, Vivek Boominathan, and Ashok Veeraraghavan. *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops* (2023).

Sparse Tucker Tensor Decomposition on a Hybrid FPGA-CPU Platform. Weiyun Jiang, Kaiqi Zhang, Colin Yu Lin, Feng Xing, and Zheng Zhang. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (2020).

Elephant-Human Conflict Mitigation: An Autonomous UAV Approach with Custom Hardware. Weiyun Jiang, Alexis Yang, and Yogananda Isukapalli. *International Telemetering Conference* (2021).

Course Projects

Computational Imaging and Display Course **January 2021 – March 2021**
Super-Resolution with SIREN-based Local Implicit Image Functions (LIIF)

- Investigated the performances of ReLU-based LIIF and SIREN-based LIIF on single image super-resolution.
- Replaced the ReLU activation functions in MLP with Sine activation functions.
- Explored the bottlenecks of current deep learning methods for super-resolution.

Mixed-Reality in Medicine Course **September 2021 – November 2021**
Augmented Reality Guidance of Cryosurgery

- Visualized the tip of the needle inside patient's body using HoloLens and Opti-track system.
- Displayed MRI images at the location of the needle placement in real-time.

Convolutional Neural Networks for Visual Recognition Course **March 2021 – June 2021**
Monocular Depth Estimation with Swin Transformer and U-Net

- Implemented adaptive bins method with Swin transformer to estimate monocular depth.
- Investigated the effect of pretraining, data augmentation, encoder variant, transformer variant.
- Achieved a threshold accuracy, β_3 of 0.94 and RMS error of 0.784.

Natural Language Processing with Deep Learning Course **January 2021 – March 2021**
Machine Comprehension with Answer-Pointer Inspired QANet and BiDAF

- Proposed Answer-Pointer Inspired QANet and BiDAF, where the output layers of these two networks are replaced with special designed Answer Pointer layers.
- Improved baseline BiDAF model with ReLU MLP fusion functions and character-level embedding.
- Achieves significantly improvements using ensemble learning with a combination of answer-pointer inspired QANet and enhanced BiDAF.

Computer Organization and System Course **September 2020 – November 2020**
Heap Allocators

- Explored performance trade-offs on different heap allocators for heap memory allocations.
- Implemented malloc, realloc, and free for both implicit free and explicit free heap allocators in C.

Digital Image Processing Course **September 2019 – November 2019**

Image/Video Re-Targeting Methods

- Retargeted images/videos into smaller sizes with maximum amount of original visual information and least amount of new visual artifacts.
- Implemented seam carving algorithm for content-aware image resizing in MATLAB.
- Summarized visual data in images and videos via patch-based bidirectional similarity.
- Performed nearest-neighbor search using "PatchMatch" algorithm.

Senior Computer Engineering Capstone Course **September 2019 – November 2019**

A Vision-Based Autonomous Drone System

- Led a team of four undergraduates to solve elephant-human conflicts in Africa and Asia.
- Aimed to inhabit elephant crop-raiding behaviors via the help of autonomous drones.
- Implemented Single Shot MultiBox Detector (SSD) and Kalman filter on NVIDIA Jetson Nano for real-time object detection and tracking.
- Designed PCB of GPS trackers based on Xbee modules and GPS modules.