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At Purdue University, I am a Ph.D. Candidate in the Robot Vision Lab (RVL) led by Prof. Avinash Kak. With 9 publications, I am interested in **deep learning** and **computer vision**, especially for **medical imaging**. Areas of Interest: Generative Modeling, Computational Pathology, CT, Robotics, AR/VR, Graphics.

Fangda Li

### **Education**

**Doctor of Philosophy** 0 Electrical and Computer Engineering, GPA: 4.00/4.0 Master of Science  $\cap$ Electrical and Computer Engineering, GPA: 3.53/4.0 **Bachelor of Science** Ο Electrical and Computer Engineering, GPA: 3.81/4.0 **Technical Expertise** Languages: Python (7+ years), C/C++, CUDA, Git Python Tools: NumPy, SciPy, Matplotlib, OpenMP

**Deep Learning**: PyTorch (6+ years), TensorFlow

# **Research Experience**

#### **Robot Vision Lab, Purdue University** 0

- PhD Candidate
- Designed a generative image-to-image translation framework that translates H&E-stained images into various IHC stains while accurately predicting the diagnosis-critical molecular representations. [pdf]
- By using a novel adaptive contrastive learning based objective, the training of the virtual IHC-restaining network is robust to the inevitable and often severe inconsistencies in groundtruth H&E-IHC image pairs.
- Designed a generative adversarial network for augmenting H&E-stained cell images with synthesized yet realistic stains that can help desensitize downstream application-specific models to stain variations. [pdf]
- By disentangling representations for cell morphology and stain while using a Laplacian Pyramid based architecture, the model can achieve transformation to arbitrary stains with high efficiency.
- Designed an end-to-end automated, real-time, machine learning-based semantic segmentation framework for automatic explosive recognition in 3D dual-energy X-ray CT images of airport passenger checked baggage.
- By using an ensemble of deep learning and boosting algorithms, the framework achieved state-of-the-art detection rates while maintaining low false alarm over a large-scale dataset (5k+ real-world baggage scans).
- Developed a GPU-accelerated model-based CT image reconstruction algorithm for dual-energy X-ray CT that outperformed state-of-the-art approaches in both signal-to-noise ratio and convergence speed. [pdf]
- Contributed to installing and maintaining an OpenStack cloud computing framework for all research at RVL.
- Developed a novel motion planning algorithm that leverages recursion and gradient descent to find efficient yet smooth trajectories for robot navigation in congested and narrow spaces. [pdf]
- Developed **computer graphics** software in OpenGL for 3D interactive apple tree pruning simulation. [pdf]

#### 10x Genomics, Inc.

0 Image Analyst Intern

- Developed a framework for performant nuclear instance segmentation in H&E-stained histological images.
- Designed and implemented generative adversarial networks for normalizing the wide range of variations among the H&E stain appearances.

#### Vipshop US, Inc.

Augmented Reality Intern

- Developed a true scale estimation module for monocular ORB-SLAM by integrating IMU inputs using Extended Kalman Filter on mobile devices.
- Conducted literature review on and implemented various algorithms for the Multi-Armed Bandit problem.

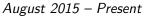
#### **Purdue University** 2017 – Fall 2023

**Purdue University** 2015 - 2017

**Purdue University** 2012 - 2015

Computer Vision: OpenCV, skimage, OpenGL

# West Lafayette, IN



San Jose, CA Mav 2017 - August 2017

Pleasanton, CA

May 2021 – August 2021

#### TNT, Leibniz University

- <sup>o</sup> Research Intern
  - Improved Random Forest for unbalanced datasets by integrating class importance and leaf weights. [pdf]
  - Proposed method achieved state-of-the-art on real-world face detection and traffic sign recognition datasets.

## **Selected Publications**

- Fangda Li, Zhiqiang Hu, Wen Chen, and Avinash Kak. "Adaptive Supervised PatchNCE Loss for Learning H&E-to-IHC Stain Translation with Inconsistent Groundtruth Image Pairs." International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2023.
- Fangda Li, Zhiqiang Hu, Wen Chen, and Avinash Kak. "A Laplacian Pyramid Based Generative H&E Stain Augmentation Network." IEEE Transactions on Medical Imaging (TMI), 2023.
- Fangda Li, Ankit Manerikar, and Avinash Kak. "A Two-Pathway Framework for Automatic Explosive Detection in Dual-Energy X-Ray CT Baggage Security Imagery." Internal Technical Report, 2021.
- Ankit Manerikar, **Fangda Li**, and Avinash C. Kak. "DEBISim: A Simulation Pipeline For Dual Energy CT-based Baggage Inspection Systems." Journal of X-Ray Science and Technology, 2021.
- Fangda Li, Ankit Manerikar, Tanmay Prakash, and Avinash Kak. "A Splitting-Based Iterative Algorithm For GPU-accelerated Statistical Dual-Energy X-Ray CT Reconstruction." IS&T Electronic Imaging: Computational Imaging VIII, 2020.
- Fangda Li, Ankit Manerikar, and Avinash Kak. "RMPD A Recursive Mid-Point Displacement Algorithm for Path Planning." In Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2018.

# **Teaching Experience**

0	Head TA, Deep Learning, ECE60146 Graduate level class on CNN, RNN, YOLO, Transformer, GAN, etc.	Purdue University Spring 2023
0	Head TA, Computer Vision, ECE664 Graduate level class on geometric computer vision, e.g. stereo reconstruction.	Purdue University Fall 2022
0	<b>Digital Systems Senior Design, ECE477</b> Senior undergrad level class on embedded system design and programming.	Purdue University 2019 – 2021

#### **Relevant Coursework**

- Computer Vision • Computational Models Digital Image Processing
- Deep Learning Convex Optimization Operating Systems
- Data Mining Sparse Modeling Multiple-View Geometry

# **Selected Course Projects**

<ul> <li>Python implementation of various CV algorithms from scratch:</li> </ul>			
Homography estimation for image mosaicking	omography estimation for image mosaicking Iterative Closest Point for point cloud alignment		
Levenberg–Marquardt algorithm	Zhang's algorithm for camera calibration		
Stereo-based scene reconstruction	PCA, LDA and cascaded AdaBoost for face detection		
<ul> <li>Python implementation of various ML algorithms from scratch:</li> </ul>			

Support Vector MachineBoosted Decision TreesRandom ForestK-MeansHierarchical ClusteringExpectation Maximization

 Implemented a ResNet-based framework using torch to automatically detect metastasized breast cancer on gigabyte-sized whole-slide microscopic images.