Thanh M. Vu

(484) 542-5404 | tvu@cs.unc.edu | thanhmvu.com | thanhmvu | Google Scholar

Education

Ph.D. in Computer Science @ University of North Carolina at Chapel Hill — Aug 2018 – Exp. Jul 2023

- Coursework: 3D Computer Vision, ML, Semi-Supervised Learning, Generative Models, Parallel Computing, Real-Time Systems

B.S. in Computer Science & Minor in Mathematics @ Lafayette College | GPA: 3.97/4.00 — Aug 2014 – May 2018

Skills

- **Programming Languages:** Python, C++, Java, C, C#, HTML, CSS/SASS, JavaScript, SQL, Matlab, R
- **Deep Learning Tools:** PyTorch, TensorFlow, Caffe, CUDA, Google Cloud Platform
- **Technologies:** NumPy, OpenCV, Unity3D, Android, Git, Confluence, Jira, MVC, JSP, jQuery, MVC, Spring, AJAX, JSP
- **Leadership:** Vice President @TEDxLaf ('16-'17). Project Lead: AI for Things ('17), United Way DB ('16), MiniFacebook ('16)

Experience

AI Resident @ Google X | Mineral.ai — May 2021 – Present

Managers: Baochen Sun, Yueqi Li. Mentors: Bodi Yuan, Chunfeng Wen, Yanqi Zhou — Mountain View, CA

- Received recognition from the CTO of Mineral.ai, Alphabet's newest company, and 6 contract renewal offers since 2021
- Led 4 Computer Vision projects, producing novel solutions with production impact, 2 papers, and 2 pending US patents

Object Detection & Domain Adaptation:

- Developed a patent-pending data mixing method that significantly boosts object detection performance and robustness through its versatility and ease of adoption, achieving a new state-of-the-art in domain adaptation applications
- Proposed a production-friendly solution for agriculture using Generative Adversarial Network, inspiring a follow-up study
- Identified a -15% accuracy drop due to a scale shift issue and evaluated multiscale training and FPN effectiveness

Neural Architecture Search & Multi-Task Learning:

- Collaborated with Google Brain to create a scalable, patent-pending framework that improves segmentation and depth estimation on edge devices with limited resources, using hardware-aware multi-task architecture search
- Attained superior accuracy while using only 1/10th the computation compared to state-of-the-art approaches
- Reduced on-device latency for semantic segmentation in agricultural applications by 30% in production models

PhD Research Assistant @ UNC 3D Vision Lab — Aug 2018 – Present

Adviser: Dr. Jan-Michael Frahm — Chapel Hill, NC

- **Adjustable CNNs**: Designed an adjustable neural architecture that enables fine-grained trade-offs between speed and accuracy depending on available budgets during inference. Outperformed previous state-of-the-art methods by 78%
- **Real-time Self-Driving**: Led the computer vision efforts in a team of 9 to develop real-time algorithms for autonomous vehicles, e.g., Schedulability trade-offs in multi-object tracking and Redesigning object detection CNN for time sensitivity

AR Engineer Intern @ Lenovo — Jun 2020 – Jul 2020

Team: Cloud & Software Engineering Lab — Morrisville, NC

- Developed enterprise AR apps for the A6 headset using image tracking and Unity, exceeding customer expectation

Software Engineer Intern @ Amazon — May 2017 – Aug 2017

Team: Digital Book Store — Seattle, WA

- Implemented a Kindle app's feature that allows over 100M users access to more search results with 50% fewer clicks

Research Assistant @ Lafayette College May 2015 – May 2018

Advisers: Dr. Amir Sadovnik, Dr. Chun Wai Liew Easton, PA

- **Visual Similarity**: Designed a Triplet network to hierarchically learn the aesthetic fashion compatibility of clothing items
- **Object Detection**: Designed an object detection-based poster retrieval system that outperformed SIFT-based methods
- **Mobile Recognition**: Developed on-device building recognition for mobile platforms using OpenCV's feature extraction

Publications

- **T Vu**, B Sun, B Yuan, A Ngai, Y Li, JM Frahm. "*LossMix: Simplify and Generalize Mixup for Object Detection and Beyond.*" arXiv preprint arXiv:2303.10343, 2023.
- **T Vu**, Y Zhao, C Wen, Y Li, JM Frahm. "*Toward Edge-Efficient Dense Predictions with Synergistic Multi-Task NAS .*" WACV, 2023.
- T Amert, M Yang, S Voronov, S Nandi, **T Vu**, JH Anderson, FD Smith. "*The price of schedulability in cyclic workloads: The history-vs.-response-time-vs.-accuracy trade-off.*" Journal of Systems Architecture, 2021.
- **T Vu**, M Eder, T Price, JM Frahm. "*Any-Width Networks.*" CVPRW, 2020.
- T Amert, M Yang, S Nandi, **T Vu**, JH Anderson, FD Smith. "*The Price of Schedulability in Multi-Object Tracking: The History-vs.-Accuracy Trade-Off.*" ISORC, 2020.
- M Eder, T Price, **T Vu**, A Bapat, JM Frahm. "*Mapped Convolutions.*" arXiv preprint arXiv:1906.11096, 2019.
- M Yang, S Wang, J Bakita, **T Vu**, FD Smith, JH Anderson, JM Frahm. "*Re-thinking CNN Frameworks for Time-Sensitive Autonomous-Driving Applications: Addressing an Industrial Challenge.*" RTAS, 2019.
- **T Vu**. "*Learning Visual Compatibility: An Improved Method for Visual Compatibility Embedding.*" Undergraduate Thesis, 2018.
- A Sadovnik, W Gharbi, **T Vu**, A Gallagher. "*Finding your lookalike: Measuring face similarity rather than identity.*" CVPRW, 2018.
- **T Vu**, A Sadovnik. "*Robust Automatic Poster Recognition.*" EXCEL Scholars Technical Report, 2017.
- **T Vu**, D Piros, A Sadovnik. "*How your phone recognizes your home: An investigation of mobile object recognition.*" NCUR, 2016.

Patents

- **T Vu**, B Sun, B Yuan, A Ngai, Y Li. *Improving Cross-Domain Adaptive Teacher for Object Detection with Joint Intra-Domain and Inter-Domain Mixing*. Pending US Patent Application, 2022.
- **T Vu**, Y Zhao, C Wen, Y Li, Z Yuan. *Joint Training of Network Architecture Search and Multi-Task Dense Prediction Models For Edge Deployment*. Pending US Patent Application, 2022.

Projects

- **AI for Things**: Led a team of 5 to deliver 4 case-study projects designing Artificial Intelligence-based solutions for personalized tour guide, multi-robot navigation inside restaurants, health monitoring for the elderly, and multi-camera person search [url]
- **Bachmann House 3D Model**: Built a web interface rendering 1.5B+ LIDAR-scanned 3D points of Easton city's oldest standing building using Potree, webGL, and Three.js. Presented at the Undergrad. Research Conf. in German Studies 2016 [poster] [vid]
- **Database for United Way**: Led a team of 4 to create a database & web interface for 200K+ K-12 data points using PostgreSQL, Ruby on Rails, and D3.js. Best app among 6 teams. Exceeded client expectation of United Way of the Greater Lehigh Valley [url]
- **MiniFacebook**: Led a team of 3 to create a user-centered social platform that supports blogging, tweeting, instant messaging, and group communication, providing both text-based and graphical user interfaces. Awarded best app among 5 teams [url]

Awards & Services

- **Conference Reviewer:** ECCV 2020, CVPR 2022, ECCV 2022, WACV 2023, CVPR 2023, ICCV 2023
- **Teaching and Tutoring:** CRLA-Certified Tutor ('15–'18), CS TA ('16, '17), Drop-in CS Tutor ('16–'18), Calculus Tutor ('16–'18)
- **Awards:** UNC Travel Grant ('23), 2nd Place ACM ICPC Mid-Atlantic ('16), PBK ('18), PME ('18), UPE ('17), EXCEL Scholar ('15–'17)