Thanh M. Vu

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Education

Ph.D. in Computer Science — University of North Carolina at Chapel Hill — Expected 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 — 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 @ Mineral.ai, Google X — May 2021 – Present

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

- Led 4 computer vision projects that yielded novel solutions, direct production impacts, 4 company-wide presentations, 2 research papers, 2 pending US Patents, recognition from Mineral's CTO, and 6 contract renewal offers

Domain Adaptation (DA) for Object Detection:

- Proposed a generalized mixup formulation and domain mixing strategies for adaptive teacher-student distillation
- Surpassed prior works to set a new state of the art in DA for object detection and submitted a US Patent application
- Explored GAN's potential for agriculture use cases and proposed a prod-friendly solution that inspired a follow-up study
- Discovered a scale shift issue that degraded accuracy by -15% and studied the effectiveness of multiscale training & FPN
- Received recognition and a contract renewal offer from the CTO of Mineral.ai for the domain adaptation work in 2022

Neural Architecture Search (NAS) and Multi-Task Learning (MTL) for Dense Predictions:

- Collaborated with Google Brain and developed a scalable framework leveraging joint hardware-aware NAS and MTL to improve dense prediction tasks, such as segmentation and depth estimation, on resource-constrained edge platforms
- Achieved superior accuracy compared to state-of-the-art methods with only 1/10th of the computation (patent pending)
- Cut the on-device latency of production models for semantic segmentation in agricultural applications by 30%

PhD Research Assistant @ 3D Computer Vision Lab, UNC — 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 applications using image tracking, Unity, and the A6 headset. Exceeded customer expectations

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. *Improving Adaptive Teacher for Detection with Cross-Domain Mixup*. In submission.
- **T Vu**, Y Zhao, C Wen, Y Li, JM Frahm. *Toward Edge-Efficient Dense Predictions with Synergistic Multi-Task Neural Architecture Search*. WACV'23.
- 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'21.
- **T Vu**, M Eder, T Price, JM Frahm. *Any-Width Networks*. CVPRW'20.
- 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'20.
- M Eder, T Price, **T Vu**, A Bapat, JM Frahm. *Mapped Convolutions*. arXiv:1906.11096, '19.
- 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'19.
- **T Vu**. *Learning Visual Compatibility: An Improved Method for Visual Compatibility Embedding*. Undergraduate Thesis '18.
- A Sadovnik, W Gharbi, **T Vu**, A Gallagher. *Finding your lookalike: Measuring face similarity rather than face identity*. CVPRW'18.
- **T Vu**, A Sadovnik. *Robust Automatic Poster Recognition*. Technical report for EXCEL Scholars Program, '17.
- **T Vu**, D Piros, A Sadovnik. *How your phone recognizes your home: An investigation of mobile object recognition*. NCUR'16.

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 Review:** ECCV 2020, CVPR 2022, ECCV 2022, WACV 2023, CVPR 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)