TEJAS GOKHALE

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RESEARCH INTERESTS

I work on computer vision, machine learning, and natural language processing – very often at their wonderful intersection. My focus is *"semantic vision"*, i.e. building systems that assign meaning to scenes captured by cameras, with a mission to improve the robustness and reliability of AI systems. My domain expertise lies in devising adversarial machine learning algorithms for tackling situations such as domain shift, semantic shift, signal corruptions, etc. as well as learning to discover useful data transformations that can improve the diversity of training data. I am also interested in developing frameworks for benchmarking and analyzing the robustness, reliability, and generalizability of semantic vision systems.

EDUCATION

Doctor of Philosophy, Arizona State University 2018–present
School of Computing and Augmented Intelligence
Advisors: Yezhou Yang, Chitta Baral

Master of Science, Carnegie Mellon University 2017
Department of Electrical and Computer Engineering
Advisor: Aswin C. Sankaranarayanan

Bachelor of Engineering (Honours), Birla Institute of Technology and Science 2015
Department of Electrical and Electronics Engineering

RESEARCH EMPLOYMENT

Microsoft Research Summer 2022
Research Intern, Adaptive Systems and Interaction Group
Mentors: Hamid Palangi (+Besa Nushi, Vibhav Vineet, Eric Horvitz)

Lawrence Livermore National Laboratory Summer 2021
Research Scholar, Machine Intelligence Group
Mentor: Rushil Anirudh (+Jay Thiagarajan, Bhavya Kailkhura)

Lawrence Livermore National Laboratory Summer 2020
Research Scholar, Machine Intelligence Group
Mentor: Rushil Anirudh (+Jay Thiagarajan, Bhavya Kailkhura)

Snapchat Research Summer 2018
Research Intern, Computational Imaging Group
Mentor: Guru Krishnan & Shree Nayar

Carnegie Mellon University 2017–2018
Graduate Student Researcher, ECE Department
Advisor: Aswin Sankaranarayanan

PUBLICATIONS

My work has been published at premier AI venues such as AAAI (h5-index: 180); computer vision conferences: ICCV (h5-index: 239), ECCV (h5-index: 186), WACV (h5-index: 76); natural language processing conferences: ACL (h5-index: 169), EMNLP (h5-index: 154), NAACL (h5-index: 105). As of 2022/10/19, my work has been cited 194 times (h-index=7).

⊙ Conference Proceedings

(5 ACL, 2 AAAI, 2 EMNLP, 1 ECCV, 1 ICCV, 1 NAACL, 1 WACV)

[C1] *Improving Diversity with Adversarially Learned Transformations for Domain Generalization*
T. Gokhale, R. Anirudh, J. Thiagarajan, B. Kailkhura, C. Baral, Y. Yang
https://arxiv.org/abs/2206.07736 — to appear in WACV 2023

[C2] *CRIPP-VQA: Counterfactual Reasoning about Implicit Physical Properties via Video Question Answering*
M. Patel, **T. Gokhale**, C. Baral, Y. Yang — to appear in EMNLP 2022

[C3] *Semantically Distributed Robust Optimization for Vision-and-Language Inference*
T. Gokhale, A. Chaudhary, P. Banerjee, C. Baral, Y. Yang
https://arxiv.org/abs/2110.07165 — ACL Findings 2022

[C4] *Generalized but not Robust? Comparing the Effects of Data Modification Methods on Out-of-Domain Generalization and Adversarial Robustness*
T. Gokhale, S. Mishra, M. Luo, B. Sachdeva, C. Baral
https://arxiv.org/abs/2203.07653 — ACL Findings 2022

[C5] *Unsupervised Natural Language Inference Using PHL Triplet Generation*
N. Varshney, P. Banerjee, **T. Gokhale**, C. Baral
https://arxiv.org/abs/2110.08438 — ACL Findings 2022

[C6] *To Find Waldo You Need Contextual Cues: Debiasing Who's Waldo*
Y. Luo, P. Banerjee, **T. Gokhale**, Y. Yang, C. Baral
https://arxiv.org/abs/2203.16682 — ACL 2022

[C7] *Improving Biomedical Information Retrieval with Neural Retrievers*
M. Luo, A. Mitra, **T. Gokhale**, C. Baral
https://arxiv.org/abs/2201.07745 — AAAI 2022

[C8] *Weakly Supervised Relative Spatial Reasoning for Visual Question Answering*
P. Banerjee, **T. Gokhale**, Y. Yang, C. Baral
https://arxiv.org/abs/2109.01934 — ICCV 2021

[C9] *WeaQA: Weak Supervision via Captions for Visual Question Answering*
P. Banerjee, **T. Gokhale**, Y. Yang, C. Baral
https://arxiv.org/abs/2012.02356 — ACL Findings 2021

[C10] *Self-Supervised Test-Time Learning for Reading Comprehension*
P. Banerjee, **T. Gokhale**, C. Baral
https://arxiv.org/abs/2103.11263 — NAACL 2021

[C11] *Attribute-Guided Adversarial Training for Robustness to Natural Perturbations*
T. Gokhale, R. Anirudh, B. Kailkhura, J. Thiagarajan, C. Baral, Y. Yang
https://arxiv.org/abs/2012.01806 — AAAI 2021

[C12] *Mutant: A Training Paradigm for Out-of-Distribution Generalization in Visual Question Answering*
T. Gokhale, P. Banerjee, C. Baral, Y. Yang
https://arxiv.org/abs/2009.08566 EMNLP 2021

[C13] *Video2commonsense: Generating commonsense descriptions to enrich video captioning*
Z. Fang*, **T. Gokhale***, P. Banerjee, C. Baral, Y. Yang
https://arxiv.org/abs/2003.05162 EMNLP 2021

[C14] *VQA-LOL: Visual question answering under the lens of logic*
T. Gokhale, P. Banerjee, C. Baral, Y. Yang
https://arxiv.org/abs/2002.08325 ECCV 2020

⊙ Workshop Proceedings *(2 CVPR)*

[W1] *Halluci-Net: Scene Completion by Exploiting Object Co-occurrence Relationships*
K. Kulkarni, **T. Gokhale**, R. Singh, P. Turaga, A. Sankaranarayanan
https://arxiv.org/abs/2004.08614 AI for Content Creation @ CVPR 2021

[W2] *Cooking With Blocks: A Recipe for Visual Reasoning on Image-Pairs*
T. Gokhale, S. Sampat, Z. Fang, Y. Yang, C. Baral
Long version: https://arxiv.org/abs/1905.12042 Vision Meets Cognition @ CVPR'19

⊙ Preprints

[P1] *Poisoning of Image Classifiers via Selective Batch Sampling*
E. Wisdom, **T. Gokhale**, Y. Yang in review

[P2] *Domain Interpolation Sensitivity for Characterizing Distribution Shift*
J. Feinglass, **T. Gokhale**, C. Baral, Y. Yang in review

⊙ Book Manuscript

[B1] *Advances in Multi-Modal Information Retrieval*
(In Preparation) for Springer Nature Synthesis Lectures on Computer Vision

⊙ Grant Writing

I am actively involved in conceptualizing and writing grant proposals with my advisors. This proposed work builds upon contributions made by my PhD thesis. Note: I am not a PI on these grants.

[1] *Environment-driven Conceptual Learning*
PI: Chitta Baral *Submitted to DARPA, 2022*

[2] *Decentralized Authorship Attribution*
PI: Chitta Baral *Submitted to IARPA, 2022*

[3] *An Active Approach for Data Engineering to Improve Vision-Language Tasks*
PI: Yezhou Yang, Co-PI: Chitta Baral *Funded by NSF, 2021*

INVITED TALKS

Oct'22, *(Invited Talk)* "Robust Semantic Vision" — University of Illinois at Chicago
Oct'22, *(Invited Talk)* "Benchmarking Spatial Relationships in Text-to-Image Generation" — Microsoft Research
Mar'22, *(Guest Lecture)* "Introduction to Generalization in Semantic Vision" — ASU CSE 598
Sep'21, *(Invited)* "Robust Visual Understanding", — ASU ML Club
Aug'19, "Vision Beyond Pixels", IJCAI Doctoral Consortium, — IJCAI 2019, Macao
Jul'19, "Reasoning about Objects and Actions via Block-Play", — Telluride 2019
Apr'18, *(Invited)* "Deep Learning Methods in Imaging and Computer Vision", — BITS Goa

TEACHING

Teaching Assistant, Arizona State University
CSE310: Data Structures & Algorithms — Spring 2020, ASU
CSE408: Multimedia Information Systems, — Spring 2019, ASU
CSE110: Introduction to Programming, — Fall 2018, ASU

Guest Lecturer, Arizona State University
CSE598, Perception in Robotics — Spring 2022
CSE408, Multimedia Information Systems — Spring 2019, ASU

Course Development
CSE591: Frontier Topics in Vision & Language [YouTube] [website] Spring 2021
I was part of the team that designed this class as a series of (weekly) invited seminars, followed by paper reading, discussion, and brainstorming in the classroom.

Student Instructor, CTE: Advanced Image Processing, — Spring 2015, BITS Pilani

MENTORING

PhD Students
Ethan Wisdom (see publication [P1]) — Ph.D. CS [current]

MS (Thesis) Students
Maitreya Patel (see publication [C2]) — M.S. CS [current]
Huiliang Shao, — M.S. CE 2022 [current]
Abhishek Chaudhary (see publication [C3]) — M.S. CS 2021 [thesis]

Capstone Mentor, mentored five B.S. CS students in projects on vision & language — AY 2019-20

Project Mentor, CSE598 - Perception in Robotics, ASU — Spring 2022

Project Mentor, CSE576 - Natural Language Processing, ASU — Fall 2018

SERVICE / LEADERSHIP

Program Committee / Conference Reviewer
NeurIPS: Advances in Neural Information Processing Systems — 2022
ICLR: International Conference on Learning Representations — 2022
AAAI: AAAI Conference on Artificial Intelligence — 2021–2023
ECCV: European Conference on Computer Vision — 2022

EMNLP: Conference on Empirical Methods in Natural Language Processing 2021–2022
ACL: Annual Meeting of the Association for Computational Linguistics 2021–2022
NAACL: North American Chapter of the Association for Computational Linguistics 2021–2022
WACV: IEEE Winter Conference on Applications of Computer Vision 2021–2023
ICRA: International Conference on Robotics and Automation 2019–2023
IROS: IEEE/RSJ International Conference on Intelligent Robots and Systems 2022

Journal Reviewer
RA-L: IEEE Robotics and Automation Letter 2020
MVAP: Springer Machine Vision and Applications 2020

Workshop Organizer CVPR 2022
ODRUM: Workshop on Open-Domain Retrieval under Multi-Modal Settings, [Website] [YouTube]

Organizer, 2021 Frontiers of V&L Seminar Series, [Website], [YouTube] ASU
Founder, Summer Vision Reading Group, [Website], multi-university initiative

Volunteer, 2019 Southwest Robotics Symposium, Tempe AZ
Volunteer, International Conference on Machine Learning 2020, Virtual
Advisor, ASU Machine Learning Club, ASU
Award Reviewer, GPSA Teaching Award Reviewer ASU
Mentor, Graduate Student Mentorship Program, ASU
Student Mentor, Peer Mentorship Program BITS Pilani

AWARDS AND RECOGNITION

Research Excellence Award, ASU GPSA 2022
NeurIPS Top Reviewer NeurIPS 2022
CVPR 2022 Doctoral Consortium CVPR 2022
ICLR Best Reviewer ICLR 2022
SCAI Doctoral Fellowship (ASU), 2020-2022
Engineering Graduate Fellowship, (ASU Engineering), 2020
Graduate College Travel Award, (ASU), for CVPR 2022, ICCV 2021, EMNLP 2020, ECCV 2020
IJCAI 2019 Doctoral Consortium, IJCAI 2019
Inducted, IEEE Eta Kappa Nu, Sigma Chapter, CMU, 2017
National Talent Scholarship (Govt. of India), 2007–2015

REFERENCES

Yezhou Yang	Associate Professor	Arizona State University	yz.yang@asu.edu
Chitta Baral	Professor	Arizona State University	chitta@asu.edu
Rushil Anirudh	Research Scientist	Lawrence Livermore National Laboratory	anirudh1@llnl.gov
Eric Horvitz	Chief Scientific Officer	Microsoft	horvitz@microsoft.com
Heni Ben Amor	Associate Professor	Arizona State University	hbenamor@asu.edu