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. My domain expertise lies in devising adversarial machine learning algorithms to improve the robustness of semantic vision systems, under 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 and benchmarks for analyzing and evaluating 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

PUBLICATIONS

My work has been published at several 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).

⊙ 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] *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

[C3] *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

[C4] *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

[C5] *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

[C6] *Improving Biomedical Information Retrieval with Neural Retrievers*
M. Luo, A. Mitra, **T. Gokhale**, C. Baral
https://arxiv.org/abs/2201.07745   AAAI 2022

[C7] *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

[C8] *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

[C9] *Self-Supervised Test-Time Learning for Reading Comprehension*
P. Banerjee, **T. Gokhale**, C. Baral
https://arxiv.org/abs/2103.11263   NAACL 2021

[C10] *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

[C11] *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

[C12] *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

[C13] *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] *Counterfactual Reasoning about Implicit Physical Properties via Video Question Answering*
   M. Patel, **T. Gokhale**, C. Baral, Y. Yang

<div align="right">in review</div>

[P3] *Domain Interpolation Sensitivity for Characterizing Distribution Shift*
   J. Feinglass, **T. Gokhale**, C. Baral, Y. Yang

<div align="right">in review</div>

⊙ 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.

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

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

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

ST Microelectronics India   Fall 2014
Intern, High Speed Links Group

INVITED TALKS

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, Ph.D. CS [current]

MS (Thesis) Students
    Maitreya Patel, M.S. CS [current]
    Huiliang Shao, M.S. CE 2022 [current]
    Abhishek Chaudhary, 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 2021–2022
    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   2019–2022
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

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),   Jan 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