Viraj Prabhu

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RESEARCH INTERESTS

Label-efficient learning (transfer, active, self-supervised, and few-shot learning) and model robustness (domain adaptation and uncertainty estimation) for computer vision.

EDUCATION

Georgia Institute of Technology, Atlanta *2019 - 2023 (expected)*
Ph.D. in Computer Science, advised by Judy Hoffman

Georgia Institute of Technology, Atlanta *2017 - 2019*
Master of Science in Computer Science, advised by Devi Parikh
GPA: 4.0, Awarded M.S. Research Award

Birla Institute of Technology and Science, Pilani *2011 - 2015*
Bachelor of Engineering (with honors) in Computer Science

RESEARCH EXPERIENCE

Adaptive Learning Lab, Georgia Tech Fall 2019 - Present
Graduate Research Assistant, advised by Judy Hoffman *Atlanta, GA*

Developing data-efficient and reliable computer vision systems that can be deployed in the real world. Published several papers at top-tier venues including ICCV, NeurIPS, and BMVC.

NVIDIA Research Summer 2022
Research Intern, with Sanja Fidler *Toronto, ON*

Working on sim-to-real adaptation of object detection models for self-driving.

Salesforce Research Summer 2021
Research Intern, with Nikhil Naik *Palo Alto, CA*

Worked on adapting visual classifiers to unseen geographies.

Curai Summer 2018, 2019
Research Intern, with Anitha Kannan *Palo Alto, CA*

– Developed open-set machine learning algorithms for disease diagnosis from clinical case data. Presented at ML4H at NeurIPS '19.
– Developed few-shot learning approach for dermatological diagnosis. Published at MLHC '19.

Visual Intelligence Lab, Georgia Tech Fall 2017 - Spring 2019
Graduate Research Assistant, with Devi Parikh *Atlanta, GA*

Worked on human-in-the-loop evaluation of visual conversational agents, and of "interpretability" modalities proposed for such agents. Published work at HCOMP '17 and EMNLP '18.

Machine Learning and Perception Lab, Virginia Tech Fall 2016 - Spring 2017
Research Assistant, with Dhruv Batra *Blacksburg, VA*

Worked on equipping VQA models with mechanisms for detecting the relevance of questions, and with better compositional reasoning. Published at EMNLP '17.

Adobe Summer 2014
Research Intern, Adobe Presenter Video Express (PVX) *Bangalore, KA*

Designed and implemented fast graphcut-based segmentation algorithm for real-time background substitution in video. Transferred into *Magic Green Screen*, the marquee feature of PVX 11.

AWARDS & SERVICE

Lecturer at the Human-Centered AI for Computer Vision tutorial at CVPR 2022.
Co-organizer, Learning from Limited and Imperfect Data (L2ID) workshop at ECCV 2022.
Outstanding reviewer, NeurIPS 2021.
Outstanding reviewer, CVPR 2021.
M.S. Research Award, awarded by Georgia Tech's College of Computing (1 student annually).
Among *Top-30%* reviewers, NeurIPS 2018.
Reviewer, NeurIPS '18-'21, CVPR '18, '21-'22, ICLR '18,'20, ECCV '18, ACL '19, WACV '22.
1st, VTHacks 2017, Virginia Tech's annual hackathon. [Project].
1st, Google Hackathon, APOGEE 2014, for Snapify, an image-sharing app (from > 25 teams).
Subfinalist, LDV Entrepreneurial Computer Vision Challenge 2017, representing CloudCV.
2nd, Project Presentation, APOGEE 2013, for Try-On, a Kinect-based virtual dressing room app.
Awarded *Travel Scholarship*, for Google Summer of Code Mentor summit 2016, 2017.
Top-200 rank, BITSAT 2011, (from >120k applicants).
Awarded *Amul Vidya Shree* for *Top-100 rank* in ICSE 2009 (from >150k applicants).

PUBLICATIONS

Book chapters

[16] **Few-Shot Learning for Dermatological Disease Diagnosis**
V. Prabhu, A. Kannan, M. Ravuri, M. Chablani, D. Sontag, X. Amatriain.
Meta Learning With Medical Imaging and Health Informatics Applications, Elsevier 2022

Preprints

[15] `AUGCO`**: Augmentation Consistency-guided Self-training for Source-free Domain Adaptive Semantic Segmentation** [Paper]
V. Prabhu*, S. Khare*, D. Kartik, J. Hoffman. (2021) (* = equal)

Conference Papers

[14] **Adapting Self-Supervised Vision Transformers by Probing Attention-Conditioned Masking Consistency** [Paper]
V. Prabhu*, S. Yenamandra*, A. Singh, J. Hoffman (* = equal)
Neural Information Processing Systems (NeurIPS) 2022.

[13] **Mitigating Bias in Visual Transformers via Targeted Alignment**
S. Sudhakar, **V. Prabhu**, A. Krishnakumar, J. Hoffman.
British Machine Vision Conference (BMVC) 2021.

[12] `UDIS`**: Unsupervised Discovery of Bias in Deep Visual Recognition Models**
A. Krishnakumar, **V. Prabhu**, S. Sudhakar, J. Hoffman
British Machine Vision Conference (BMVC) 2021.

[11] **SENTRY: Selective Entropy Optimization via Committee Consistency for Unsupervised Domain Adaptation** [Project Page]
V. Prabhu, S. Khare, D. Kartik, J. Hoffman.
International Conference on Computer Vision (ICCV) 2021.

[10] **Active Domain Adaptation via Clustering Uncertainty-weighted Embeddings** [Project Page]
V. Prabhu, A. Chandrasekaran, K. Saenko, J. Hoffman.
International Conference on Computer Vision (ICCV) 2021.

[9] **Few-Shot Learning for Dermatological Disease Diagnosis.** [Paper][Poster]
V. Prabhu, A. Kannan, M. Ravuri, M. Chablani, D. Sontag, X. Amatriain.
*Machine Learning and Healthcare Conference, 2019 (**Spotlight**).*

[8] **Do Explanations make VQA Models more Predictable to a Human?** [Paper]
A. Chandrasekaran*, **V. Prabhu***, D. Yadav*, P. Chattopadhyay*, D. Parikh.
Conference on Empirical Methods in Natural Language Processing (EMNLP) 2018. (* = equal)

[7] **The Promise of Premise: Harnessing Question Premises in Visual Question Answering.** [Paper]
A. Mahendru*, **V. Prabhu***, A. Mohapatra*, D. Batra, S. Lee.
Conference on Empirical Methods in Natural Language Processing (EMNLP) 2017.

[6] **Evaluating Visual Conversational Agents via Cooperative Human-AI Games.** [Paper]
P. Chattopadhyay*, D. Yadav*, **V. Prabhu**, A. Chandrasekaran, A. Das, S. Lee, D. Batra, D. Parikh.
AAAI Conference on Human Computation and Crowdsourcing (HCOMP) 2017.

Workshop Papers

[5] **Can domain adaptation make object recognition work for everyone?** [Paper]
V. Prabhu, R. Selvaraju, J. Hoffman, N. Naik.
Workshop on Learning with Limited Labeled Data, CVPR 2022.

[4] **Open Set Medical Diagnosis** [Paper]
V. Prabhu, A. Kannan, G. Tso, N. Katariya, M. Chablani, D. Sontag, X. Amatriain.
ML for Health Workshop, NeurIPS 2019.

[3] **Fabrik: An Online Collaborative Neural Network Editor.** [Paper]
U. Garg, **V. Prabhu**, D. Yadav, R. Ramrakhya, H. Agarwal, D. Batra.
Workshop on AI Systems, SOSP 2019.

[2] **Few-Shot Learning for Dermatological Disease Diagnosis.**
V. Prabhu, A. Kannan, M. Ravuri, M. Chablani, D. Sontag, X. Amatriain.
ML for Health Workshop, NeurIPS 2018.

[1] **It Takes Two to Tango: Towards Theory of AI's Mind.** [Paper]
A. Chandrasekaran*, D. Yadav*, P. Chattopadhyay*, **V. Prabhu***, D. Parikh.
*Chalearn Looking at People Workshop, CVPR 2017 (**Oral**).*

PROGRAMMING EXPERIENCE

CloudCV Summer 2016, 2017
Mentor, Google Summer of Code, Google Code-In *Blacksburg, VA*

Lead mentor for Fabrik (`github.com/Cloud-CV/Fabrik`), an open-source web platform to collaboratively build, visualize, and design neural networks in the browser. (**1000+ GitHub stars**)

Adobe Systems 2015 - 2016
Member of Technical Staff, Adobe Captivate Prime *Bangalore, KA*

Owner of Captivate Prime Android app for two release cycles. Developed features for offline playback, sync, and internationalization.

Tonbo Imaging Fall 2016 - Spring 2017
R&D Intern *Bangalore, KA*

Automated Calibration: Developed algorithm for automated calibration of company cameras using a collimator and AprilTag target setup, reducing calibration error by 6%.

Boresighting: Developed a boresighting algorithm to precisely align a weapon's muzzle and sighting system with a target at 10m to 100m for TDS-BRS, Tonbo's video precision boresight tool.

CEERI Pilani Spring 2014
Project Assistant with Jagdish Raheja *Pilani, RA*

Built Kinect-based teleconferencing app that detected and displayed the current speaker.

MENTORING

Shivam Khare (Master's student, Georgia Tech)
Deeksha Kartik (Master's student, Georgia Tech)
Sruthi Sudhakar (Bachelor's student, Georgia Tech)
Arvind Krishnakumar (Master's student, Georgia Tech)
Sriram Yenamandra (Master's student, Georgia Tech)
Aaditya Singh (Master's student, Georgia Tech)
Utsav Garg (Bachelor's student, NUS)
Gaurav Gupta (Bachelor's student, IIT BHU)

TEACHING EXPERIENCE

Head Teaching Assistant, Intro to Computer Vision Spring 2021
Course Instructor: Judy Hoffman *Georgia Tech*

Worked with instructor and team of 5 TA's to conduct the course. Also responsible for designing homeworks, weekly office hours, and grading.

Teaching Assistant, Deep Learning Fall 2019
Course Instructor: Dhruv Batra *Georgia Tech*

Taught lecture on Reinforcement Learning (Slides). Held weekly hours, and graded homeworks.

Teaching Assistant, Intro to Machine Learning Fall 2016
Course Instructor: Stefan Lee *Virginia Tech*

Created homework machine learning challenges on Kaggle, and graded homeworks.

OTHER PROJECTS

Learning Cooperative Visual Dialog Agents via Deep Reinforcement Learning

PyTorch implementation **(160+ GitHub stars)** of Das & Kottur et al, ICCV '17. Used as starting point for starter code for 2018 Visual Dialog challenge. (`github.com/batra-mlp-lab/visdial-rl`)

Learning Active Learning Policies for Visual Recognition [Report]
Course Project, Adaptive Control and Reinforcement Learning *Spring 2019*

Explored strategies to learn active learning policies for visual recognition via reinforcement learning.

Visual Dialog Models that Rollout a Mental Model of their Interlocutors [Poster]
Course Project, Deep Learning *Fall 2017*

Explored self-play strategies based on dialog rollouts to develop cooperative visual dialog agents.

Exploring Weak Supervision and Generative Models for Semantic Segmentation [Report]
Course Project, Probabilistic Graphical Models *Spring 2018*

– Explored weakly supervised semantic segmentation using localization cues from GradCAM.
– Studied semantic segmentation via deep probabilistic generative models.

SELECTED COURSEWORK

Graduate: Adaptive Control and Reinforcement Learning, Advanced Machine Learning, Probabilistic Graphical Models, Machine Learning, Deep Learning, Computer Vision, Computability & Algorithms, Information Visualization, High-dimensional Data Analytics
Undergraduate: Pattern Recognition, Information Retrieval, Parallel Computing, Operating Systems, Advanced Algorithms, Computer Architecture, Computer Networks

PROGRAMMING SKILLS

Languages: Python, Lua, C/C++, Java, JavaScript, MATLAB, Shell
Technologies: PyTorch, Keras, LaTeX, HTML/CSS, ReactJS, EmberJS, Android

REFERENCES

- Prof. Judy Hoffman, Georgia Tech (email: judy@gatech.edu)
- Prof. Devi Parikh, Georgia Tech (email: parikh@gatech.edu)
- Prof. Dhruv Batra, Georgia Tech (email: dbatra@gatech.edu)
- Dr. Anitha Kannan, Curai (email: anitha@curai.com)
- Prof. Stefan Lee, Oregon State University (email: leestef@oregonstate.edu)