Amita Kamath

PhD Applicant · Natural Language Processing · Computer Vision · Machine Learning
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EDUCATION

Stanford University 2017 – 2020
M.S. in Computer Science (Specialization: Artificial Intelligence) GPA: 3.99
Awarded Distinction in Research. Advisor: Prof. Percy Liang

National Institute of Technology Karnataka (NITK), Surathkal, India 2013 – 2017
B.Tech. in Computer Science and Engineering GPA: 9.54
Gold medalist (Dept. Rank 1). Advisor: Prof. Mohit Tahiliani

RESEARCH EXPERIENCE

Allen Institute for Artificial Intelligence October 2020 – Present
Research Resident, advised by Aniruddha Kembhavi

⋆ **Webly Supervised Concept Expansion for General Purpose Vision Models**
- Curated 40K queries and obtained 1M image-query pairs from search engine data (for only $150!) and converted them to a VQA-style dataset.
- Used this web data to introduce over 10K new concepts (including tail ones, e.g. "hyacinth") to three general purpose vision models and studied how the models transferred them to tasks such as captioning and localization.
- Showed that the web data helps models obtain impressive zero-shot performance on action- and attribute- focused datasets. [**under submission at CVPR 2022**]

⋆ **Towards General Purpose Vision Systems**
- Co-created an end-to-end, task-agnostic vision-language model and an evaluation that tests model generality in terms of: (1) flexibility of architecture, (2) ability to transfer knowledge between tasks, and (3) ability to learn new tasks quickly.
- Conducted detailed analyses of the model performance on the new evaluation benchmark, identifying multiple kinds of transfer of knowledge between tasks. [**under submission at CVPR 2022**]

Stanford University September 2018 – June 2020
Graduate Research Assistant, advised by Prof. Percy Liang

⋆ **Selective Question Answering under Domain Shift**
- Proposed a novel setting encapsulating the practical necessity of knowing when to abstain on test data that differs from the training data.
- Showed that QA models are overconfident on out-of-domain (OOD) examples relative to in-domain examples, leading to poor performance in mixed settings.
- Explored multiple selective prediction methods, showing that OOD data from a different distribution can improve accuracy significantly when used to train a calibrator [**ACL 2020**].

⋆ **Semi-automated Generation of Diverse Unanswerable Questions**
- Determined that existing methods to generate unanswerable questions were costly or lacked diversity.
- Proposed a new "perturb, judge, train" pipeline to generate diverse unanswerable questions using BERT, with only a small number of labeled examples.

University of British Columbia May 2016 – December 2016
Mitacs Summer Research Fellow, advised by Prof. Karthik Pattabiraman

⋆ **Dynamic Invariant Detection for Cyber-Physical System Security**
- Mined dynamic system properties using Association Rule Mining and related techniques.
- Co-created an Intrusion Detection System for cyber-physical systems based on these invariants, reducing false positives by 31% and false negatives by 93% [**FSE 2017**].

Indian Institute of Science May 2015 – December 2015
IAS Summer Research Fellow, advised by J. Lakshmi and Prof. S. K. Nandy

⋆ **Secure Virtualization on a Network-on-Chip**
- Completed a detailed security analysis of a novel Network-on-Chip (NoC) architecture for secure virtualization under a wide variety of virtual workloads.
- Suggested protocols to be followed by architecture components to prevent various NoC attacks.
- Upgraded the NoC design so it could be implemented on an FPGA.

WORK EXPERIENCE

Amazon AI June 2020 – September 2020
Applied Science Intern, advised by Saab Mansour

- Created a test-bed for Intent Classification and Slot Labeling under two realistic forms of distribution shift: (1) from synthetic data to real data, and (2) between different data collection methods.
- Explored methods to improve performance of state-of-the-art models on this test-bed, including modified pretraining, modified training losses, and self-training.

Nutanix June 2018 – September 2018
Software Engineering Intern, advised by Bala Neerumalla

- Built an orchestration service for Cloud Security.
- Proposed and initiated work on an Intrusion Detection System based on Association Rule Mining of system logs.

PUBLICATIONS

* denotes equal contribution

- Amita Kamath*, Christopher Clark*, Tanmay Gupta*, Eric Kolve, Derek Hoiem, Aniruddha Kembhavi. **Webly Supervised Concept Expansion for General Purpose Vision Models**, Under submission at *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.
- Tanmay Gupta, Amita Kamath, Aniruddha Kembhavi, Derek Hoiem. **Towards General Purpose Vision Systems: An End-to-End, Task-Agnostic Vision-Language Architecture**, Under submission at *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.
- Amita Kamath, Robin Jia, Percy Liang. **Selective Question Answering under Domain Shift**, *Association of Computational Linguistics (ACL)*, 2020.
- Amita Kamath. **Selective Prediction under Domain Shift for Question Answering**, Masters Thesis advised by Prof. Percy Liang and Prof. Christopher Manning. 2020.
- [Undergraduate] Maryam Aliabadi, Amita Kamath, Julien Gascon-Samson, Karthik Pattabiraman. **ARTINALI: Dynamic Invariant Detection for Cyber-Physical System Security**, *ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE)*, 2017.

- [Undergraduate] Amita Kamath, Chirag Jamadagni, Kevin Mathew, Abhijith Anilkumar, Mohit Tahiliani. **GCPiN: Group Caching for Privacy in Named Data Networking**, *IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, 2017.
- [Undergraduate] Amita Kamath, Chirag Jamadagni, K Chandrasekaran. **VirtTorrent: BitTorrent for Inter-VM File Distribution**, *International Conference on IoT and Cloud Computing (ICC)*, 2016.
- [Undergraduate] Dhruv Chand, Sunil Nayak, K Bhat, Shivani Parikh, Yuvraj Singh, Amita Kamath. **A mobile application for Women's Safety: WoSApp**, *IEEE Region 10 Conference (TENCON)*, 2015.

TEACHING EXPERIENCE

- Head Teaching Assistant for Stanford CS221 (Artificial Intelligence), Summer 2019, with instructor Robin Jia. Managed a team of 6 TAs and 100+ students, taught sections, held office hours, and mentored several students.
- Teaching Assistant for Stanford CS224n (NLP with Deep Learning), Winter 2020, with Prof. Christopher Manning. Worked with a team of 23 TAs for 450+ students, taught sections, held office hours, and mentored 10+ student course project teams.
- Teaching Assistant for Stanford CS224n (NLP with Deep Learning), Winter 2019, with Prof. Christopher Manning. Worked with a team of 20 TAs for 400+ students to develop new assignments and re-implement existing assignment code in PyTorch. Held office hours and mentored 10+ student course project teams.
- Teaching Assistant for Stanford CS221 (Artificial Intelligence), Autumn 2018, with Prof. Percy Liang. Worked with a team of 15 TAs for 400+ students to refine course assignments. Held office hours and mentored 10+ student course project teams.

PROFESSIONAL AND DEPARTMENT SERVICE

- Reviewer at NeurIPS 2021 Workshop on Distribution Shifts (DistShift 2021)
- Student Member of the Stanford MSCS Admissions Committee, 2019. Reviewed student applications and discussed with faculty on the committee to select the incoming MS students.
- Organizer of the weekly NLP Reading Group, Fall 2019, attended by graduate students and faculty of the Stanford NLP Group.

AWARDS

- Top 3 Projects Award, Stanford CS224n (NLP with Deep Learning) 2018. My teammate and I studied adversarial attacks on Question Answering systems and devised methods to improve robustness against the same. Awarded 2nd Prize out of 145+ projects.
- Stanford-CISPA Research Fellowship, 2018. To perform work on Reinforcement Learning for web security.
- Mitacs Globalink Summer Research Fellowship, 2016. This fellowship is awarded by the Government of Canada to the top 5% of 10,000+ student applicants from developing countries based on academic performance and research potential, to perform research in top Canadian universities.
- Indian Academies of Science (IAS) Summer Research Fellowship, 2015. This fellowship is awarded to the top 5% of 25,000+ student applicants based on outstanding academic performance, to perform research in top Indian universities.

- Highest SGPA and CGPA awards, 2015-17. Awarded by the Department of Computer Science, NITK to the student with highest semester/cumulative GPA.
- Selected as one of 10 student volunteers from across the country for COMSNETS 2017, the top networks conference in India.
- INSPIRE, SPDC, DASA scholarships, 2010-2017. Awarded by the Government of India for outstanding academic performance.
- MaRRS Spelling Bee: Second place in national and international levels, 2012. Top 10 places in national and international levels, 2009-2010. Awarded scholarships for each.

SKILLS

Programming	Python, PyTorch, Tensorflow, C, C++ (proficient) Javascript, Java, MATLAB, HTML (basic)
Languages	English, Konkani (native) Hindi, Kannada, French (basic)
Extra-curricular	Social Dancing (performed in Stanford's The Nutcracker, 2019) Art (Creative Coordinator of Artists' Forum, NITK, 2017) Handicrafts (Guinness World Record [group] for largest crocheted blanket, 2016) Creative Writing (published two short stories through Scholastic)

RELEVANT COURSEWORK

Undergraduate	Data Structures and Algorithms, Design and Analysis of Algorithms, Continuous and Discrete Math, Discrete Mathematical Structures, Computer Networks, Distributed Systems, Advanced Data Structures, Artificial Intelligence
Graduate	Artificial Intelligence, Machine Learning, NLP with Deep Learning, CNNs for Visual Recognition, Deep Generative Models, Cryptography, Natural Language Understanding, Information Retrieval and Web Search, Mining Massive Datasets