

Unnat Jain

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| CONTACT INFORMATION | Ph.D. Student, Dept. of Computer Science University of Illinois at Urbana-Champaign | unnatjain@gmail.com https://unnat.github.io/ |
| RESEARCH INTERESTS | Embodied agents; multi-agent systems; vision and language; reinforcement learning; robotic vision | |
| EDUCATION | University of Illinois at Urbana Champaign Ph.D., Computer Science, 2018 - Present 4.0/4.0 M.S., Computer Science, 2016 - 2018 4.0/4.0 Indian Institute of Technology (IIT), Kanpur, India 9.7/10.0 B.Tech - M.Tech (Dual Degree), Electrical Engineering, 2011-16 | |
| PUBLICATIONS | <ol style="list-style-type: none">6. <u>Audio-Visual Embodied Navigation</u> C. Chen*, U. Jain*, C. Schissler, S. Gari, Z. Al-Halah, V. Ithapu, P. Robinson, K. Grauman <i>arXiv preprint, 2019</i> [project][arxiv]5. <u>TABVCR: Tags and Attributes for Visual Commonsense Reasoning</u> J. Lin, U. Jain, A.G. Schwing <i>Neural Information Processing Systems (NeurIPS), 2019</i> [project][arxiv]4. <u>Two Body Problem: Collaborative Visual Task Completion</u> U. Jain*, L. Weihs*, R. Kolve, M. Rastegari, S. Lazebnik, A. Farhadi, A. Schwing, A. Kembhavi <i>Computer Vision and Pattern Recognition (CVPR), 2019 (Oral talk)</i> [project][arxiv]3. <u>Two can play this Game: Visual Dialog with Discriminative Question Generation and Answering</u> U. Jain, S. Lazebnik and A.G. Schwing <i>Computer Vision and Pattern Recognition (CVPR), 2018</i> [arxiv]2. <u>Creativity: Generating Diverse Questions using Variational Autoencoders</u> U. Jain*, Z. Zhang* and A.G. Schwing <i>Computer Vision and Pattern Recognition (CVPR), 2017 (Spotlight talk)</i> [arxiv]1. <u>Compact Environment-Invariant Codes for Robust Visual Place Recognition</u> U. Jain, V. Nambodiri and G. Pandey <i>Conference on Computer and Robot Vision (CRV), 2017</i> [arxiv] | |
| AWARDS | <ul style="list-style-type: none">• Qualcomm Innovation Fellowship 2019 Finalists [’19]• Amazon Graduate Research Symposium: Invited talk on <i>Two Body Problem</i> (video) [’19]• Best Talk Award: AI in action session of CSL Student Conference [’19]• Best thesis at CS@Illinois (David J. Kuck Outstanding MS Thesis Award) [’19]• Siebel Scholars: \$35k awarded to 90 graduate students from select 16 schools worldwide [’17]• Conference Travel Grant: Awarded by the College of Engineering, UIUC [’17]• Director’s Gold Medal, IIT Kanpur: Best all round achievement and leadership [’16]• Cadence’s Gold Medal, IIT Kanpur: Best master’s thesis in all engineering departments [’16]• Best presentation, Advances in Deep Learning course: Student tutorial on Deep RL [’17]• Best presentation, Indo-European Winter Academy: Student tutorial on Image Processing [’14]• Member of Indian student contingent to Japanese government’s JENESYS 2.0 program. [’14]• Summer Undergraduate Research Grant for Excellence, IIT Kanpur: For sophomore research [’13]• India Scholarship Award, IET: 2nd prize in over 5000 nationwide applicants [’13]• OPJEMS National Scholarship: Awarded to 70 undergraduates from select Indian institutes [’12]• Scholarship for Higher Education by Ministry of Human Resources an Development [’11] | |
| REFERENCES | <p>Alexander Schwing, <i>Assistant Professor, UIUC</i> — aschwing@illinois.edu <i>[PhD co-adviser]</i></p> <p>Svetlana Lazebnik, <i>Associate Professor, UIUC</i> — slazebni@illinois.edu <i>[PhD co-adviser]</i></p> <p>Vinay Nambodiri, <i>Assistant Professor, IIT Kanpur</i> — vinaypn@iitk.ac.in <i>[UG adviser]</i></p> <p>Kristen Grauman, <i>Professor, UT Austin</i> — grauman@cs.utexas.edu <i>[Intern guide]</i></p> | |

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| TEACHING | <p>Graduate Teaching Assistant: 4 semesters at UIUC, 2 semesters at IIT Kanpur (<i>Aug'15 - Dec'17</i>)</p> <ul style="list-style-type: none"> • IIT Kanpur: Probability and Statistics (MTH203) & Digital Communication Lab (EE673) • UIUC: Computer Vision (CS543), Intro. to Computing (CS101) & Numerical Methods (CS357) <p>[Excellent TA Award]</p> <p>Senior Academic Mentor, Counselling Service, IIT Kanpur: 4 semesters (<i>Aug'12 - May'14</i>)</p> <ul style="list-style-type: none"> • Conducted remedial classes for CS and EE courses for peers needing academic help |
| ML INTERNSHIPS | <p>Facebook AI Research (FAIR): Embodied vision, Menlo Park, CA (<i>May - Dec 2019</i>) <i>Guide: Kristen Grauman</i> (Ongoing) Exploring aspects of embodied vision within AI Habitat.</p> <p>Allen Institute for AI (AI2): Visual Navigation, Seattle, WA (<i>May - Jul 2018</i>) <i>Collaboration: Ali Farhadi, Ani Kembhavi, Luca Weihs and Mohammad Rastegari</i> Studied the problem of learning to collaborate in visual environments and demonstrated the benefits of learned explicit and implicit communication to aid task completion. Compared performance of collaborative tasks in photo-realistic visual environments to an analogous grid-world environment, to establish that the former are more challenging. Presented a statistical interpretation of the communication strategy learned by the agents.</p> <p>Uber ATG: Autonomous Driving, Pittsburgh, PA (<i>May - Jul 2017</i>) [NDA restricted] Worked on optimization techniques and different loss functions to boost performance of in-house machine learning tools. Improved object segmentation algorithms operating on lidar points data. Worked on ML tools like gradient boosting, Kalman Filters, RNNs, optical flow, at industrial scale. Multi-threaded heavy computational steps for Uber's autonomy code stack to reduce perception inference time by 12% .</p> <p>FreshGravity: Visual Search for e-commerce, Santa Clara, CA (<i>May - Jul 2016</i>) Improved search performance by borrowing ideas from own research (CRV'17 paper) by applying supervised hashing methods to visual search.</p> |
| SHORT PROJECTS | <p>Pedestrian Detection based Autonomous Braking (<i>Mar - May 2017</i>) <i>Guide: David Forsyth (CS), UIUC</i> YOLO@UIUC Auto-braking News Github Implemented YOLO and SSD object detectors on a live camera feed. Utilized Robot Operating System (ROS) to enable these detectors over car's camera feed in real-time. Estimated approximate depth of detected pedestrians using basic homography. Worked with team to implement a autonomous system which initiates smooth braking if pedestrian is detected in accident prone zone.</p> <p>Deep RL agent for 2048 (<i>Mar - May 2017</i>) <i>Guide: Svetlana Lazebnik (CS), UIUC</i> Github Report Built an AI agent capable of successfully completing the 2048 game. DQN was difficult to train from scratch if random weight initialization was used. A deep CNN was trained to learn an A* algorithm for 2048 (expectimax search for a depth of 3 steps). Curriculum learning based training helped this CNN to mimic the A* algorithm. Using this CNN as initialization for DQN, robust convergence to optimal policy was achieved.</p> <p>Improving font-free OCR systems (<i>May - Jul 2015</i>) <i>Guide: Erik Learned-Miller (CS), UMass Amherst</i> This project was a font-free alternative to traditional OCR systems. We formulated OCR as a substitution cipher problem, building on Erik Learned-Miller's work on font-free OCR. A robust frequency-weighted lexicon was built by parsing articles of English Wikipedia. Using this wiki-lexicon, the maximum likelihood solution of the OCR cipher problem was calculated.</p> |
| SOCIAL INITIATIVES | <p>Head of Social Initiatives, Techkriti'14 (IIT Kanpur's technical festival) (<i>Aug'13 - Aug'14</i>) Led a team of volunteers to organize the following events of social impact:</p> <ul style="list-style-type: none"> • Flood relief drive for state of Uttarakhand, collaborating with 'Goonj' NGO • Nationwide competition to promote blogging for social awareness - 'Blog for a Cause' • Fulfill-a-wish drive for Subhash Care Home Orphanage, Kanpur on Christmas Day. |

Core team member, Svagatagami NGO

(Jul'13 - Jan'14)

- Worked closely with children having intellectual disability at Sankalp Day Care Center, Kanpur
- Manufactured '*Blow-quest*', an oral motor therapy solution for Sialorrhea (involuntary drooling)
- Awarded **Social Impact Prize** for '*Blow-quest*' at Entrepreneurship Summit IIT Kanpur

Peer Educator, Save the Children NGO

(Jul'08 - Jan'10)

- Volunteered in project "Creating educational opportunities for street children in Kolkata".
- Taught classes to children in slums and to child labourers, after school hours.
- The project got 500 school dropouts back to vernacular schools.