Rawal Khirodkar

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EDUCATION

Carnegie Mellon University, School of Computer Science Pittsburgh, PA
Master of Science, Robotics, GPA: 4.0/4.0 May 2019

Indian Institute of Technology Bombay Mumbai, India
Bachelor of Technology with Honors in Computer Science, Minor in Mathematics, GPA: 8.94/10 August 2017
Junior & Senior year GPA: 9.34/10

PUBLICATIONS

Adversarial Domain Randomization July - Nov 2018
Rawal Khirodkar, D.Yoo, Kris Kitani, Under review CVPR 2019, arXiv:1812.00491 *CMU*
· A theoretical perspective on effectiveness of domain randomization and it's comparison with domain adaptation.
· Proposed an adversarial algorithm addressing various drawbacks of domain randomization like effectiveness with few samples.
· Evaluations on image classification, object detection and depth estimation on CLEVR, Syn2Real and VIRAT datasets.

Domain Randomization for Scene Specific Object Detection & Pose Estimation July - Sept 2018
Rawal Khirodkar, D.Yoo, Kris Kitani, WACV 2019, arXiv:1811.05939 *CMU*
· Designed a surveillance scene simulator using Unreal Engine, capable of generating pixel accurate annotations like instance segmentation, depth, surface normal maps, 3D location and pose.
· Bridged the reality gap by randomizing lighting, textures, distractors, shapes of the objects in the scene.
· Modified Faster-RCNN to predict pose, whose synthetic only training performed better than using limited real data.

RESEARCH EXPERIENCE

Muscle Gym: A step towards Natural Locomotion Jan - March 2018
Guide: Prof. Chris Atkeson, Collaborators: Seungmoon Song *CMU*
· Modelled muscle dynamics explicitly in Mujoco simulator for all OpenAI Gym models.
· Proximal Policy Optimization (PPO) trained agents closely resemble natural gait and are robust to terrain perturbations.

Low Resolution Online Face Recognition Aug 2016 - May 2017
Undergraduate Thesis, Guide: Prof. Ganesh Ramakrishnan *IITB*
· Developed a low resolution face recognition model using shared multi-view feature representations from VGG-Face.
· External error correcting signals like biometric authentications are used to improve the model with time.

Traffic Rule Infraction Detection in the Wild Aug - Nov 2016
Guide: Prof. Bhaskar Raman & Prof. Siddhartha Chaudhari *IITB*
· Implemented detection and tracking of traffic lights in streams from vehicle cameras using CNNs and correlation filters.
· Designed LSTM and Fully Convolutional Neural Network (FCN) for real-time (200 ms per frame) infraction detection.

RELEVANT ACADEMIC PROJECTS

Can REINFORCE help in Unsupervised Image Classification? Fall 2017
Introduction to Computer Vision, Prof. Srinivasa Narasimhan *CMU*
· Used input image's perceptual comparison with per class template as a reward signal to perform classification.
· 72.3% accuracy on MNIST and 65.35% accuracy on CIFAR-10 with training from scratch using REINFORCE.

A Game of Carrom with Reinforcement Learning Fall, 2016
Foundations of Intelligent and Learning Agents, Prof. Shivaram Kalyanakrishnan *IITB*
· Implemented Deep Deterministic Policy Gradients (DDPG) to play single player carrom game (pocket coins, queen & cover).
· Learning for over 1000 games resulted in the agent pocketing all coins under 40 moves on average.

Interpreting the effect of prior z: A Case Study on Generating Faces using GANs Fall, 2016
Advanced Machine Learning, Prof. Sunita Sarawagi *IITB*
· Implemented Deep Convolutional Generative Adversarial Network (DCGAN) for face generation.
· Studied changes in generation w.r.t 1) choice of prior distribution, 2) interpolation and 3) structured walk in z space.

Khabri: CSE IITB's Enquiry Chatbot Fall, 2015
Artificial Intelligence, Prof. G. Sivakumar *IITB*
· Designed a Markov Chain Chatbot to answer domain specific student queries about ongoing courses and college events.
· Khabri was written using NLTK, PyAIML and served all students for one long year through a web portal built in Django.

SCHOLARSHIPS & AWARDS

- Rajarshri Shahu Maharaj Scholarship for Higher Studies - top 25 students in India 2018
- Indian National Physics (INPhO) Olympiad - top 100 students in India 2013
- Homi Bhaba Scholarship - West India topper, 10,000 applicants 2012
- Maharashtra Talent Search Examination (MTSE) Scholarship, - top 1% applicants 2010
- National Talent Search Examination (NTSE) Scholarship, - top 5% applicants 2009

CONFERENCE REVIEWING DUTIES

- International Conference on Computer Vision (ICCV), 2019
- Asian Conference on Computer Vision (ACCV), 2018
- Conference on Computer Vision and Pattern Recognition (CVPR), 2018

PROFESSIONAL EXPERIENCE

Can Deep Learning speedup Oil Field Simulations? Summer, 2017
Schlumberger, Research Intern, Mentor: Shubham Mishra *India*
· Augmented state-of-the-art oil field simulators with learning models, resulting in 40% speedup in latency.

Semantic Pattern Generation Summer, 2016
Samsung (S-Voice Group), Software Engineering Intern, Mentor: Vrajesh Sejpal *India*
· Developed a lexical parser and compiler for a customized programming language using ANTLR in Java.
· The work contributed to Bixby and was introduced in Samsung's flagship phone Galaxy S8.

Spatial Decomposition of 3D Mesh Summer, 2015
Autodesk, Software Engineering Intern, Mentor: Manish Agrawal *India*
· Contributed to 123D Design (now Fusion 360) iOS app facilitating 2D deconstruction and reconstruction of 3D mesh models.

TEACHING EXPERIENCE

- 16-831: Statistical Techniques in Robotics, Prof. Kris Kitani — Spring 2019, CMU
- 10-601: Machine Learning, Prof. Matt Gormley — Fall 2018, CMU
- 16-720: Computer Vision, Prof. Kris Kitani — Spring 2018, CMU
- CS-101: Introduction to Computer Science, Prof. Sunita Sarwagi — Spring 2017, IITB
- CS-101: Introduction to Computer Science, Prof. Bernard Menezes — Fall 2016, IITB
- CS-226: Digital Logic Design, Prof. Ashutosh Trivedi — Spring 2016, IITB

TECHNICAL SKILLS

Programming Languages	Python, C++/C, MATLAB
Framework & Tools	Unreal Engine, Blender, Unity, Mujoco, Pytorch, Tensorflow, Caffe

RELEVANT COURSES

16-720 Computer Vision, CMU	10-703 Deep RL and Control, CMU
10-701 Introduction to Machine Learning, CMU	CS-726, Advanced Machine Learning, IITB
CS-747 Foundations of Intelligent and Learning Agents, IITB	CS-435, Linear Optimization, IITB

POSITIONS OF RESPONSIBILITY

- Senior Student Mentor, Institute Mentorship Programme, IITB, 2017
- Volunteer, Abhyuday NGO, IITB, 2016 & 2017
- Department Alumni Secretary for Computer Science Department, IITB, 2014

EXTRA-CURRICULAR

- Authored adaptation of 'Zero Meter Diving Team' by Jim Sheperd into Movie Screen Play with Prof. Alka Hingorani.
- Reviewed more than 10 all time classic movies for Insight, IITB's student circular.
- 'Netra', our assistive service for visually challenged people won best product by Desai Sethi Centre for Entrepreneurship.
- Completed course on Script Writing, IITB, 2016.
- Volunteered for more than 50 high school lectures at Adarsh Vidyalaya, India.
- Runner up in Microsoft Hackathon Code.Fun.Do, 2015
- Completed a year long Guitar course at IITB, 2013
- Won Chess State Championship, 2010