SHASHANK **TRIPATHI**

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EDUCATION

Carnegie Mellon University, School of Computer Science — Pittsburgh, PA
Master of Science in Computer Vision (MSCV) — Dec 2018
GPA: 4.15/4.33, Advised by Prof. Kris Kitani

Birla Institute of Technology and Science (BITS), Pilani — Hyderabad, India
Bachelor of Engineering with Honors in Electronics and Communication Engineering, Minor in Finance — July 2016
GPA: 9.16/10 (top 2% among 1500 students, Merit scholarship recipient)

PUBLICATIONS

· ***PoseNet3D: Learning Temporally Consistent 3D Human Pose via Knowledge Distillation***
S Tripathi, S Ranade, A Tyagi, A Agarwal. *in submission CVPR 2020* https://cvml.page.link/pose

· ***Learning to Generate Synthetic Data via Compositing***
S Tripathi, S Chandra, A Agarwal, A Tyagi, J Rehg, V. Chari. *CVPR 2019* https://cvml.page.link/learn

· ***C2F: Coarse-to-fine Vision Control System for Automated Microassembly***
S Tripathi, D Jain, H Sharma. *Nanotechnology and Nanoscience Asia, 2018* https://cvml.page.link/c2f

· ***Sub-cortical morphology and voxel based features for Alzheimer's disease classification***
S Tripathi, SH Nozadi, M Shakeri, S Kadoury. *ISBI 2017* https://cvml.page.link/shape

· ***Deep spectral-based shape features for Alzheimer's Disease classification***
M Shakeri, H Lombaert, S Tripathi, S Kadoury. *MICCAI-SESAMI, 2016* https://cvml.page.link/spec

RESEARCH EXPERIENCE

PoseNet3D: Learning Temporally Consistent 3D Human Pose via Knowledge Distillation from Unsupervised Teacher — Feb 2019 – Nov 2019
Collaborators: Dr. Amit Agarwal, Dr. Ambrish Tyagi — *Amazon Lab126*

· Proposed self-consistency and adversarial losses to train a novel unsupervised teacher model to estimate 3D human pose from RGB videos
· Weak supervision from the teacher was used to train a student model for estimating SMPL body mesh
· Solved issues such as occlusion, domain-gap and temporal jitter leading to realistic and smooth 3D sequence reconstructions on multiple in-the-wild video datasets

Learning to Generate Synthetic Data via Compositing — May 2018 – Nov 2018
Advisors: Prof. James Rehg, Dr. Amit Agrawal, Dr. Ambrish Tyagi — *Amazon Lab126*

· Proposed a network for generating novel composite images that retain scene context and realism
· Developed algorithms for efficient training of object detection and image classification models on synthetic composite data, using an online hard-positive mining approach
· Improved baseline Faster-RCNN mAP by 3.5% and baseline SSD mAP by 2.7% on various datasets.

ClassPaths: Weakly supervised class-specific subnets for faster-inference — Dec 2017 – Dec 2018
Advisors: Prof. Kris Kitani, Dr. Ambrish Tyagi, Dr. Varsha Hedau — *CMU*

· Exploited class-wise parameter redundancy and activation map sparsity for finding class-specific subnets (ClassPaths) for faster inference
· Proposed an auxiliary supervisor network trained on a multi-loss formulation to jointly optimize accuracy, sparsity, pair-wise selectivity and quantization on the learned class-specific subnets
· Deep-networks employing ClassPaths achieved similar performance as a full capacity network, with 40%-60% FLOPS reduction during inference

Deep Spectral-based Shape Features for Alzheimer's Disease Classification — Feb 2016 – Jul 2016
Undergraduate Thesis, Advisor: Dr. Samuel Kadoury — *Univ. of Montreal*

· Developed an unsupervised framework for classification of Alzheimer's disease patients using noisy T1-weighted MRI brain images
· Proposed a combination of grey-matter voxel-based intensity variations and 3D structural (shape) features parameterized with a spherical-harmonics representation
· Results presented near state-of-the-art accuracies (>89%) – outperformed conventional MRI shape-based strategies by 22%-27%

C2F: Coarse-to-Fine Vision Control System for Automated Microassembly — May 2014 – Dec 2014
Advisor: Dr. H D Sharma — *Central Electronics Engineering Research Institute, Pilani*

· Developed a completely automated, visual-servoing based closed loop system to perform 3D micromanipulation and microassembly tasks
· Solved challenges around object recognition/tracking, scene understanding, path planning and obstacle avoidance

· Results led to a ~75% reduction in setup and run time as compared to manual operation, while mitigating any risk of collision during grasp-and-drop experiments

ACADEMIC PROJECTS

Learning Scene Saliency Maps Using Superpixel-augmented Convolutional Neural Networks Aug 2017 – Dec 2017

· Extracted SLIC superpixel segmentations in input images and defined a range and color separation vector as input to a Siamese Convolutional Neural Network (CNN)

· Trained the network on the ECSSD saliency dataset. Superpixels allow for significant speedup (4x) in training while capturing a larger spatial context, leading to more precise saliency maps

Towards Integrating Model Dynamics for Sample Efficient Reinforcement Learning Jan 2017 – May 2017

· Developed a principled approach for solving sample inefficiency issues while deploying model-free reinforcement learning in real environments

· Learned a dynamics model of the world by assuming domain-specific priors on real-world episodes. Used the learned dynamics model to augment real-world episodes as the training progressed

· Established that augmenting real-world data using an approximate world-model tends to be significantly more sample efficient than naïve model-free reinforcement learning

SCHOLARSHIPS AND AWARDS

- IISc Bangalore Summer Research Fellowship – top 20 across India 2015
- *Best Technical Association Award,* BITS-Pilani 2014
- Tournament Winner, Cricket, Arena'13 National Sports Festival 2013
- Undergraduate MERIT scholarship, BITS Pilani – top 2% students 2012
- Founder President's Scholarship, Amity International – School topper for 6 years 2011
- Junior Science Talent Search Examination (JSTSE) Scholarship – Ranked 22 in 20,000 applicants 2008

ACADEMIC DUTIES

Reviewer – European Conference on Computer Vision (ECCV), 2020 (invited)
Reviewer – Conference on Computer Vision and Pattern recognition (CVPR), 2020 (invited)
Reviewer – Association for the Advancement of Artificial Intelligence (AAAI), 2020

TEACHING EXPERIENCE

Teaching Assistant – 16-720: Computer Vision, Prof. Kris Kitani Fall 2018, CMU
Head Teaching Assistant – 16-385: Computer Vision, Prof. Ioannis Gkioulekas Summer 2018, CMU

PROFESSIONAL EXPERIENCE

Amazon Lab126 Sunnyvale, USA
Applied Scientist Feb 2019 – Present
Improved 3D human activity reconstruction from 2D videos for enhancing action recognition/detection

Amazon Lab126 Cupertino, USA
Applied Scientist Intern May 2018 – Aug 2018
Worked on task-aware generation of synthetic image composites for training deep networks

Franklin Templeton Investments Hyderabad, India
Summer Intern | Project: Financial Modelling for Tactical Asset Allocation May 2015 – Aug 2015
Built machine-learning models for capturing statistical associations like lead-lag correlation and one directional causality which achieved a 12% improvement in hit-rate for forecasting yield-spreads (US-OAS)

TECHNICAL SKILLS

Programming Languages Python, C++/C, MATLAB
Tools and Frameworks Pytorch, Tensorflow, Caffe, Blender, Unity

RELEVANT COURSES

16-826 Visual Learning and Recognition, CMU
16-822 Geometry Based Methods in Vision, CMU
16-720 Computer Vision, CMU
10-601 Introduction to Machine Learning, CMU
16-811 Mathematical Fundamentals for Robotics, CMU

LEADERSHIP

- Member, External Affairs Committee (Graduate Student Assembly), CMU
- Secretary, Electrical and Electronics Association, BITS Pilani
  Led a team of 37 members. Organised 25 major events, 6 during the technical festival
- Computer Vision Mentor**,** Student Mentorship Program (SMP), BITS Pilani
  Conducted evening classes for teaching 30 junior batch students
- Represented BITS Pilani cricket team in inter-college cricket tournaments and sports festivals
- Organizer of National Seminar on Indian Space Technology (NSIST-2014)

EXTRA-CURRICULAR

- Teaching volunteer at Nirmaan – BITS Pilani | www.nirmaan.org Mar 2014 – Dec 2015
- Teaching volunteer at LaSalle Boys and Girls Club, Montreal | www.bgclasalle.com Mar 2016 – Jul 2016
- Teaching volunteer at Amitasha – Teaching the girl child | www.amity.edu/amitasha Mar 2009 – Mar 2010