Anshul Shah

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Education

Johns Hopkins University **2020–2023(Expected)**
Ph.D in Computer Science
Advisor : Prof. Rama Chellappa
Transferred from UMD College Park

University of Maryland, College Park **2018–2020**
M.S. in Computer Science *4.0/4.0*
Advisor : Prof. Rama Chellappa

Indian Institute of Technology Madras **2013–2018**
B.Tech.(with Honors) & M.Tech. in Electrical Engineering *9.39/10*
Minor in Robotics
Advisor : Prof. A.N. Rajagopalan
Semester Abroad : Czech Technical University in Prague (Fall'17)

Research Interests

Multimodal Video Understanding, Pose-based Action Recognition, Self-Supervised Learning, Contrastive Learning, ML for Health, Synthetic body & face models, Multimodal fusion, Sequence modeling

Research Internships

Apple (Machine Learning Research) **Mar'23-*Ongoing***
Mentors : Raviteja Vemulapalli, Gierad Laput, Anurag Ranjan, Karren Yang *Multimodal Synthesis and Learning*

Microsoft Research (Mixed Reality) **Jun'22-Aug'22**
Mentors : Harpreet Sawhney, Benjamin Lundell *Multimodal Face Avatar Tracking*
- Developed an analysis-by-synthesis approach to drive realistic face avatars from novel multi-sensor inputs.
- Submitted a patent application with a plan to submit the research to an upcoming graphics conference.

Microsoft Research (Mixed Reality) **Jun'21-Aug'21**
Mentors : Harpreet Sawhney, Bugra Tekin, Amol Ambardekar, Benjamin Lundell *Self-supervised Procedure Learning*
- An SSL-based approach to learn representations for procedural videos with access to multiple on-device and vision derived modalities.
- Problem motivated by the usecase of automatic guide creation for HoloLens. Work to be presented at ICCV'23.

Mitsubishi Electric Research Laboratories (MERL) **Jun'20-Aug'20**
Mentor : Anoop Cherian *Contrastive Learning & Video Representation Learning*
- Proposed a contrastive learning objective motivated by SVMs which inherently tackles false and hard negatives leading to faster convergence.
- Shown to be beneficial in many SSL-representation learning tasks including image, video, graph and skeleton. Paper presented at AAAI-22.

IBM Research, India **May'16-Jul'16**
Mentors : Pratyush Kumar, Ashok Ponkumar, Amith Singhee *Virtual Cognitive Mirror*
- Developed algorithms to detect key-feature in a frontal image to enable plausible placement of a jewelry item.
- Part of an effort to enable virtual try-on to improvise jewelry buying experience for various big retailers. Patent was filed and approved.

Matrix ComSec R&D, India **May'15-Jul'15**
Mentor : Kaushal Kansara *Surveillance Camera Video Enhancement*
- Implemented various algorithms on the Texas Instruments DM38x media processor for IP camera video enhancement

Peer-reviewed Publications

STEPs: Self-Supervised Key Step Extraction from Unlabeled Procedural Videos (*ICCV 2023*)
Anshul Shah, *Benjamin Lundell, Harpreet Sawhney, Rama Chellappa*

HaLP: Hallucinating Latent Positives for Skeleton-based Self-Supervised Learning of Actions (*CVPR 2023*)
Anshul Shah, *Aniket Roy*[†], *Ketul Shah*[†], *Shlok Mishra, David Jacobs, Anoop Cherian, Rama Chellappa*

Max-Margin Contrastive Learning (*AAAI 2022*)
Anshul Shah[†], *Suvrit Sra, Rama Chellappa, Anoop Cherian*[†]

Pose and Joint-Aware Action Recognition (*WACV 2022*)
Anshul Shah, *Shlok Mishra, Ankan Bansal, Jun-Cheng Chen, Rama Chellappa, Abhinav Shrivastava*

Few shot Learning with hard Mixup (*NeurIPS 2022*)
Aniket Roy, ***Anshul Shah***, *Ketul Shah, Prithviraj Dhar, Anoop Cherian, Rama Chellappa*

Object-Aware Cropping for Self-Supervised Learning (*TMLR 2022, CoLLA 2023*)
*Shlok Mishra, **Anshul Shah**, Ankan Bansal, Abhyuday Jagannatha, Abhishek Sharma, David Jacobs, Dilip Krishnan*

Bringing Alive Blurred Moments (*CVPR 2019 Oral*)
*Kuldeep Purohit, **Anshul Shah**, A N Rajagopalan*

Learning Visual Representations for Transfer Learning by Suppressing Texture (*BMVC 2022*)
*Shlok Mishra, **Anshul Shah**, Ankan Bansal, Abhinav Shrivastava, Abhishek Sharma, David Jacobs*

Multi-View Action Recognition using Contrastive Learning (*WACV 2023*)
*Ketul Shah, **Anshul Shah**, Chun Pong Lau, Celso de Melo, Rama Chellappa*

Learning Based Single Image Blur Detection and Segmentation (*ICIP 2018*)
*Kuldeep Purohit, **Anshul Shah**, A N Rajagopalan*

Attention Driven Vehicle Re-identification and Unsupervised Anomaly Detection for Traffic Understanding (*CVPRW 2019*)
*Pirazh Khorramshahi, Neehar Peri, Amit Kumar, **Anshul Shah** and Rama Chellappa*

† Equal Contribution

Works under preparation/ submission

Video Understanding for Early Diagnosis of Autism Spectrum Disorder
***A. Shah**, S. Ray, J. Stenum, B. Hicks, J. Morrel, R. Roemmich, R. Reetzke, R. Landa, R. Chellappa*
- Leading the action recognition effort in a multi-disciplinary team involving vision researchers, speech pathologists and movement scientists.
- Preliminary findings were presented at INSAR (International Society of Autism Research) 2023 held in Stockholm.

Temporal Max-Margin Contrastive Learning
***Anshul Shah**, Anoop Cherian, Rama Chellappa*
- Derived a temporal extension to MMCL which can simultaneously optimize for contrastive learning and temporal ordering.

Margin-based Pooling for Video Representation Learning
***Anshul Shah**, Shlok Mishra, Rama Chellappa, Anoop Cherian*
- A plug-and-play spatio-temporal pooling module to improve complex action recognition.

Cap2Aug: Caption guided Image data Augmentation
*Aniket Roy, **Anshul Shah**†, Ketul Shah†, Anirban Roy, Rama Chellappa*
- Leverage pre-trained captioning models and diffusion models to augment training data for various learning tasks.

Ground-to-Air Generalization for Action Recognition via Synthesis
*Ketul Shah, **Anshul Shah**, Arun Reddy, Aniket Roy, Arushi Sinha, Celso de Melo, Rama Chellappa*
- An approach to generate and use synthetic data for action recognition from aerial viewpoints.

DiffNat: Fine-tuning text-to-image diffusion model with natural image statistics
*Aniket Roy, Maitreya Suin, **Anshul Shah**, Prithviraj Dhar, Ketul Shah, Rama Chellappa*
- Proposed an image kurtosis loss to improve training of text-to-image diffusion models.

Selected Achievements

- Recipient of **Amazon Fellowship** (2022-23) as a part of JHU + Amazon initiative for Interactive AI.
- Selected as a member of **ICCV 2023 Doctoral Consortium** to be held in Paris.
- Was named a **Highlighted reviewer for ICLR'22**.
- Awarded Kolluri Memorial Prize for **best Academic record** in Electrical Engineering at IIT Madras (3rd Year).
- Received **Student Scholarship** for attending **AAAI-2022**.

Patents

Hybrid virtual and physical jewelry shopping experience, US10810647B2
Mohit Jain, Pratyush Kumar, Megha Nawhal, Ashok Pon Kumar, Anshul Shah, Gyanendra Sharma, Amith Singhee

Multimodal three-dimensional face modeling and tracking for generating expressive avatars, Patent Filed
H. Sawhney, B. Lundell, A. Shah, C. Hewitt, T. Baltrusaitis, M. Radojevic, K. Grujcic, I. Stojiljkovic, P. McIlroy, J. Jadidian, C. Cristian

Teaching and Mentoring Experience

- Course Assistant - Machine Perception, Johns Hopkins University, Aug'22-Dec'22
- Teaching Assistant - Image Signal Processing & Physics I, IIT Madras, Jun'17-May'18
- Project Mentor - Centre for Innovation, IIT Madras, Aug'15-Jan'16

Reviewing

ICLR'[23,22], AAAI'[23,21,20], NeurIPS'[23,22,21,20], WACV'[23,22], ICML'[23,22,21], CVPR'23, ICCV'23, ECCV'20, TMLR[23,22]