

Kuldeep Purohit

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Education

INDIAN INSTITUTE OF TECHNOLOGY MADRAS
 MS+PHD | DEPARTMENT OF ELECTRICAL ENGINEERING
 Image Processing and Computer Vision Lab

Research Advisor: Prof. A.N.Rajagopalan
 Completed May 2020 | India

INDIAN INSTITUTE OF TECHNOLOGY MANDI
 B.TECH | DEPARTMENT OF ELECTRICAL ENGINEERING
 Completed 2013 | India

Skills

PROGRAMMING

Python • MATLAB • \LaTeX

Familiar:

C/C++ • Lua

LIBRARIES

PyTorch • Tensorflow • Keras

Familiar:

Torch • MatConvNet • OpenCV

Service

BOOK REVIEWER

"Autonomous driving and driver assistance system", CRC Press 2020

JOURNAL REVIEWER

IEEE Transactions on PAMI

IEEE Transactions on Image Processing

IEEE Transactions on Multimedia

IJCV (Springer)

Neurocomputing (Elsevier)

IEEE Transactions on CSVT

JOSA-A

Optics Express

CONFERENCE REVIEWER

AAAI 2021, 2022

CVPR 2021

NeurIPS 2021 (Sub-reviewer)

ICVGIP 2018

ICAPR 2017

Teaching Assistant

Deep Learning for Imaging

Image Signal Processing

Introduction to Electrical Engineering

Experience

PHIAR, CALIFORNIA, USA | AI RESEARCH SCIENTIST

October 2021 – Present

- Working with AI team for research and development of Computer Vision models for Augmented Reality based Autonomous Navigation System.
- Developing end-to-end DL pipeline, including data labeling, data processing, float model training, quantization and on-device deployment and benchmarking.

MICHIGAN STATE UNIVERSITY | POSTDOCTORAL RESEARCH ASSOCIATE

June 2020 – September 2021 | Computer Science Department, MSU, MI, USA

- Research with Prof Vishnu Boddeti on designing efficient deep learning architectures for various computer vision tasks including image restoration.

FUJITSU AI (VIA CLOUDY SOFT, USA) | CONSULTANT (ML ENGINEER)

December 2020 – March 2021

- Developed a learning-based tool SENSEI for optimally augmenting the data used for training computer vision models, improving speed, accuracy, and robustness.

IMAGE PROCESSING AND COMPUTER VISION LAB, IIT MADRAS |

GRADUATE RESEARCH ASSISTANT

2014 – May 2020 | IIT MADRAS, India

- Research on efficient model design for **computer vision** tasks including image restoration and scene understanding in presence of various degradations.
- 13 Primary authored and 15 co-authored publications including 2 CVPR, 1 ICCV, 1 AAAI, 3 ICIP, 4 Journals, and 15 CVPR/ICCV/ECCV workshop proceedings.

KLA-TENCOR | RESEARCH INTERN

Dec 2016 - May 2017 | Chennai, India

- Developed a model for 3D surface reconstruction from scanning electron microscope (SEM) images using priors for fault detection in semiconductors.
- Developed a visual quality enhancement scheme for improving noisy SEM images.

CENTER FOR ARTIFICIAL INTELLIGENCE AND ROBOTICS,

DRDO | RESEARCH INTERN

Dec 2011 – Jan 2012 | Bangalore, India

- Developed a vehicle detection and tracking system for UAV based surveillance.

Awards and achievements

2021	Media Coverage	Research featured on Ministry of Education and News Websites
2020	K R Award	Excellence in Research Award by IIT Madras
2020	Travel grant	Awarded by ACM and AAAI for presenting a paper in AAAI, USA
2020	Media Coverage	Work featured in QS-GEN Magazine (Global ranking agency QS)
2020	Invited Talk	Presented at Vision India Tracks of NCVPRIPG and ICVGIP.
2019	Travel grant	Awarded by Google for giving an oral presentation in CVPR, USA
2019	Runner-up	Bokeh Effect and image Super-resolution Challenges, ICCV
2019	Winner	Image Colorization Challenge, CVPR
2019	Finalist	Several Image Restoration Challenges in CVPR, ICCV and ECCV
2019	Travel grant	From IIT Madras to present my work at ICCV, Korea
2018	Best Paper Award	(Runner Up) at the Computer Vision Conference ICVGIP, India
2017	Finalist Team	The Annual Intelligent Ground Vehicle Competition (IGVC), USA
2017	13 th /4000	Hackerearth Deep Learning Challenge on Image Classification
2016	Top 0.3%	(National) Graduate Aptitude Test in Engineering (GATE)
2012	Scholarship	Awarded annually to meritorious under-graduates by IIT Mandi.
2009	Top 1%	(National) IIT- Joint Entrance Examination (IIT-JEE)

Coursework

POST-GRADUATE LEVEL

Deep Learning
Machine Learning for Computer Vision
Digital Video Processing
Image Signal Processing
Digital Signal Processing
Applied Linear Algebra
Probability Foundations
Fundamentals of Linear Optimization
Pattern Recognition

Additional Projects

AUTONOMOUS BOT

The Annual Intelligent Ground Vehicle Competition (IGVC), USA (2017)

- Our team (Team Abhiyaan, IIT Madras) designed a fully autonomous ground vehicle.
- Designed Computer Vision module for real-time lane detection and obstacle segmentation.

VISION BASED SIGN LANGUAGE TRANSLATION SYSTEM

B.Tech Project, IIT Mandi (2012)

- Developed a learning based approach to perform hand-gesture recognition using a depth-aware camera (Kinect).
- Trained a Convolutional Neural Network on American Sign Language (ASL) Fingerspelling dataset to classify hand gestures.

Conferences attended

ICCV 2021, Virtual
CVPR 2020, Virtual
AAAI 2020, New York, USA
ICCV 2019, Seoul, Korea
CVPR 2019, California, USA
ICIP 2016, Arizona, USA
ICVGIP 2016, IIT Guwahati
NCC 2016, IIT Madras
ICVGIP 2014, IISc Bangalore

References

Dr. Vishnu Boddeti

Professor, vishnu@msu.edu
Michigan State University

Dr. A N Rajagopalan

Professor, raju@ee.iitm.ac.in
Indian Institute of Technology Madras

Dr. Kaushik Mitra

Professor, kmitra@ee.iitm.ac.in
Indian Institute of Technology Madras

Publications (Google Scholar Link)

- "Spatially-Adaptive Image Restoration using Distortion-Guided Networks", IEEE International Conference on Computer Vision (ICCV) 2021.
- "Distillation-guided Image Inpainting", IEEE International Conference on Computer Vision (ICCV) 2021.
- "Spatially-Attentive Hierarchical Network for Adaptive Motion Deblurring", IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2020.
- "Region-Adaptive Dense Network for Efficient Motion Deblurring", AAAI Conference on Artificial Intelligence (AAAI), New York, USA, Feb 2020
- "Bringing Alive Blurred Moments", IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Long Beach, CA, USA, June 2019. (Oral)
- "Degradation Aware Approach to Image Restoration Using Knowledge Distillation", IEEE Journal of Selected Topics in Signal Processing (JSTSP), 2020.
- "Planar geometry and latent scene recovery from a single motion blurred image", Machine Vision and Applications Journal, 2021.
- "Depth-guided Dense Dynamic Filtering Network for Bokeh Effect Rendering", IEEE International Conference on Computer Vision (ICCV Workshop), 2019.
- "Mixed-Dense Connection Networks for Image and Video Super-Resolution", Elsevier Neurocomputing, October 2019.
- "Multi-level Weighted Enhancement for Underwater Image Dehazing", Journal of the Optical Society of America A (JOSA-A), June, 2019.
- "Efficient Motion Deblurring with Feature Transformation and Spatial Attention", IEEE International Conference on Image Processing (ICIP), 2019.
- "Scale-Recurrent Multi-residual Dense Network for Image Super-Resolution", In the Springer European Conference on Computer Vision (ECCV Workshop) on Perceptual Image Restoration and Manipulation, 2018.
- "Color Image Super Resolution in Real Noise," In ACM Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), December 2018.
- "Learning based Blur Detection and Segmentation," In IEEE International Conference on Image Processing (ICIP), September 2018.
- "Mosaicing Deep Underwater Imagery," In ACM Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), December 2016.
- "Splicing Localization in Motion Blurred 3D Scenes," In IEEE International Conference on Image Processing (ICIP), September 2016.

UNDER REVIEW

- "Aperture-Hierarchical Attentive Reconstruction Network for Light-Field Spatial and Angular Super-resolution", under review at IEEE Transactions on Computational Imaging (TCI).

CO-AUTHORED WORKSHOP PROCEEDINGS

NTIRE 2020 Challenge on Image and Video Deblurring (CVPR)
AIM 2019 Challenge on Real-world Super-resolution: Methods and Results (ICCV)
AIM 2019 Challenge on Image Demoiréing: Methods and Results (ICCV)
AIM 2019 Challenge on Bokeh Effect Synthesis: Methods and Results (ICCV)
NTIRE 2019 Challenge on Image Colorization: Report (CVPR)
NTIRE 2019 Challenge on Video Super-Resolution: Methods and Results (CVPR)
NTIRE 2019 Challenge on Video Deblurring: Methods and Results (CVPR)
NTIRE 2019 Image Dehazing Challenge Report (CVPR)
AIM 2020: Scene relighting and illumination estimation challenge (ECCV)
AIM 2020 challenge on image extreme inpainting (ECCV) (ECCV)
AIM 2020 challenge on efficient super-resolution: Methods and results (ECCV)
AIM 2020 challenge on rendering realistic bokeh (ECCV)

Extra-curricular

PG Coordinator | Training and Placement Cell | (2014 – 2015) | IIT MADRAS

- Facilitated the placements process and various professional training events.
- Explored industrial opportunities for post-graduate students and invited them.

Senior Member | Robotics Section | (2010 – 2011) | IIT MANDI, India

Hosted competitions and organized a hands-on workshop with Robotech Labs.