Kuldeep Purohit

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Education

INDIAN INSTITUTE OF TECHNOLOGY MADRAS
PhD+MS
Image Processing and Computer Vision Lab
May 2020 | India

INDIAN INSTITUTE OF TECHNOLOGY MANDI
B.Tech | Department of Electrical Engineering
2013 | India

Skills

LIBRARIES
PyTorch • Tensorflow • Keras
Familiar:
Torch • MatConvNet • OpenCV • AIMET • SNPE

PROGRAMMING
Python • MATLAB • LaTeX
Familiar:
C/C++ • Lua • SQL

Service

JOURNAL REVIEWER
IEEE Transactions on PAMI
IEEE Transactions on Image Processing
IEEE Transactions on Multimedia
IJCV (Springer)
Neurocomputing (Elsevier)
IEEE Transactions on CSVT
Computers and Graphics Journal
J. Optical Society of America-A
Optics Express
Applied Optics

CONFERENCE REVIEWER
AAAI
CVPR
WACV
NeurIPS (Sub-reviewer)
ICVGIP
ICAPR

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

Teaching Assistant

Deep Learning for Imaging
Image Signal Processing
Introduction to Electrical Engineering

Experience

GOOGLE, MOUNTAIN VIEW, USA | AI/ML Research Engineer, Geo
December 2022 – Present
- Developing end-to-end AI pipeline for in-vehicle AI perception capability: Data labeling, ingestion, anonymization, modeling, training, quantization, deployment.

PHIAR, CALIFORNIA, USA | AI Research Scientist
October 2021 – December 2022
- Worked with AI team for research and development of Computer Vision models powering an Augmented Reality based Autonomous Navigation System.

MICHIGAN STATE UNIVERSITY, USA | Postdoctoral Research
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
- 13 Primary authored and 15 co-authored publications in venues such as CVPR, ICCV, ECCV, AAAI, and premier Journals. Finalist in several CV challenges.

KLA-TENCOR | Research Intern
Dec 2016 - May 2017 | Chennai, India
- Developed models for 3D surface reconstruction from scanning electron microscope (SEM) images and enhancement for fault detection in semiconductors.

CENTER FOR AI 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** AIM
2019	Winner	Image Colorization Challenge, **CVPR** NTIRE
2019	Finalist	Several Image Restoration **Challenges** in CVPR, ICCV and ECCV
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	Travel grant	From IIT Madras to participate in ICIP, USA and ICCV, Korea
2016	Top 0.3%	(National) Graduate Aptitude Test in Engineering (**GATE**)
2012	Scholarship	Awarded annually to **meritorious** under-graduates by IIT Mandi.
2010	Scholarship	Offered by Indian **Government** under Central Sector Scheme.
2009	Top 1%	(National) IIT- Joint Entrance Examination (**IIT-JEE**)

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

Additional Projects

Autonomous Bot

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

- Designed a fully autonomous ground vehicle as part of Computer Vision Team (Abhiyaan), IIT Madras
- Designed and implemented Computer Vision algorithms 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.

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

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

- "Spatially-Attentive Patch-Hierarchical Network with Adaptive Sampling for Motion Deblurring", under review at IEEE Transactions on Pattern Analysis and Machine Intelligence (**T-PAMI**).

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 Demoireing: 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.