ABHINAV NARAYAN HARISH

EDUCATION

Indian Institute of Technology(IIT), Gandhinagar *July'16 - August'20*
BTech in Electrical Engineering (Minor in Computer Science & Engineering)
GPA: **9.41/10** - Institute Silver Medal

PUBLICATIONS

Double JPEG Compression Detection for Distinguishable Blocks in Images Compressed with Same Quantization Matrix : *Abhinav Narayan Harish, *V.Verma and Nitin Khanna
International Workshop on Machine Learning for Signal Processing, 2020 [pdf]

Neural Networks based Block-Level Detection of Same Quality Factor Double JPEG Compression : *AU.Deshpande, *Abhinav Narayan Harish, *S.Singh, V.Verma and Nitin Khanna:
International Conference on Signal Processing and Integrated Networks, 2020 [pdf]

Note : *denotes equal contribution

EXPERIENCE

IIT Gandhinagar, India *July'20 - present*
Research fellow at Computer Vision Lab
Advisor: Professor Shanmuganathan Raman

IIIT Hyderabad, India *May-July'19*
Research Intern at Center of Visual Information & Technology
Advisor: Professor Avinash Sharma

IIT Gandhinagar, India *May-July'18*
Intel Cup - Emdedded System Design Contest @ SJTU[1]
Advisor: Professor Joycee Mekie

IIT Gandhinagar, India *May-June'17*
Center of Creative Learning
Advisor: Professor Manish Jain

ACADEMIC ACHIEVEMENTS

- *Best poster award* (out of $\approx$ 75 posters) at SRIP-2017[2], IIT Gandhinagar poster presentation
- *Sabarmati Bridge Fellowship* for the year 2020-21 to pursue independent research at IIT Gandhinagar
- *Institute Silver Medal* by the department for second highest CPI in graduating batch
- *Dean's list* for academic excellence during Semester I - VI at IIT Gandhinagar
- Secured A^+(11/10) grade in Machine Learning for outstanding performance in a class of $\approx$ 80 students
- Selected for Youth Scientist Encouragement Scheme ($KVPY$[3]) supported by the Government of India to promote scientific talent (ranked 420^{th} out of 20,000 applicants)
- Ranked 1^{st}(among $\approx$ 40 teams) in the *Inter School Mathematics Quiz*(conducted by Mathematics teachers of Rotary Club, Pune) in 2011 & 2013

[1]Shanghai Jiao Tong University
[2]Summer Research Internship Programme
[3]Kishore Vaigyanik Protsahan Yojana

PROJECTS

Part Assembly *August'20 - present*

Professor Shanmuganathan Raman

This project is focused on predicting alignments of the components of an object to make a complete structure. Formulated this problem for two parts using multi-stage supervision to sequentially improve predictions along with a global shape critic to monitor the quality of assembly. Currently working on extending this framework to multiple object parts.

Human Mesh Interpolation *August'20 - present*

Professor Shanmuganathan Raman

Interpolation and extrapolation between human meshes in distinct poses, in the absence of point to point correspondence. Formulated a graph neural network approach for correspondence estimation and shape regression. Currently, generalizing this framework to deal with different graph structures.

Human Monocular Depth Estimation *May'19 - July'19*

Professor Avinash Sharma

Studied the problem of human depth estimation for the application of 3-D reconstruction. Experimented with U-Net architectures using segmentation supervision which improved reduced the pixel wise L1 loss by about $\times$ 5 times.

Functional Maps for finding Image correspondences *January - April'19*

Professor Shanmuganathan Raman

Gained an understanding of sparse representations of 3-D shape correspondences using **Functional Maps**[4] between manifolds for segmentation transfer. Utilized this framework to tackle the problem of 2-D correspondence between stereo images.

Multi-Scale Fusion for Image Forgery Localization *October - November'19*

Digital Image Processing with Professor Nitin Khanna

Detected double compression tampering with multiple sizes of sliding windows, using **Mode Based First Digit Features.**[5] Implemented fusion of tampering maps detected at multiple-scales using the **Bottom-Up** & **Top-Down**[6] approach.

Image Inpainting using Contextual Attention *January - April'19*

Machine Learning with Professor Nipun Batra

We aimed to fill in the pixels of missing regions in an image to appear most aesthetically appealing. A **contextual attention model**[7] was used along with the generative network to create local and global awareness. We conducted ablation studies by understanding the effect of the dilated convolution layers on understanding global scene context.

Intelligent Rescue Operations Bot *May'18 - July'18*

Professor Joycee Mekie

Developed an Intelligent Rescue Operations Bot remotely operated bot that provides aid to rescuers during rescue operations. Dehazing was used to obtain a clear input stream, Indoor Localization and Motion Magnification to localize and identify rescuable victims. The solution was developed using Python(OpenCV) on the Intel UP2 development board.

TECHNICAL SKILLS

Programming	MATLAB, Python, C
Libraries	Pytorch, Tensorflow, Scikit-Learn, OpenCV
Tools	Simulink, LaTeX

[4]Ovsjanikov, Maks, et al. "Functional maps: a flexible representation of maps between shapes."
[5]Bin.Li.et.al "Detecting doubly compressed JPEG images by using mode based first digit features."
[6]Korus, Paweł, and Jiwu Huang. "Multi-scale fusion for improved localization of malicious tampering in digital images."
[7]Yu, Jiahui, et al. "Generative image inpainting with contextual attention."

POSITION OF RESPONSIBILITY

Teaching Assistant for Machine Learning *January - April'20*

Teaching Assistant for Machine Learning Course under Professor Nipun Batra, IIT-Gandhinagar. Prepared lecture slides, mentored a student team on the project of gesture based text recognition and conducted help-sessions for programming assignments.

Teaching Assistant for Design Workshop *January' - February'18*

Teaching assistant for a design workshop attended by students from *The New School*, New York. Supported the design team in obtaining valuable feedback for developing their product.

Secretary of the Cinematheque Club *July'17 - May'18*

Responsible for the weekly screening and discussion on films. Consolidated a team to developed new processes, like movie of the week, to improve the film watching experience.

EXTRACURRICULAR

- Member of *Chetana* initiative by Nyasa at IIT Gandhinagar for education for under privileged.
- Sponsorship team member at IIT Gandhinagar's cultural festival, *Blitchron* in my freshman year.
- Conclave team member at IIT Gandhinagar's technical summit, *Amalthea* in my freshman year.
- My hobbies include playing football and chess.