Saurabh Saini

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Research Interests

I am a PhD candidate at Center for Visual Information Technology, IIIT Hyderabad. My present interests and experiences are in the topics arising from the intersection of Computer Vision, Graphics and Machine Learning. My thesis research has been focused on *Inverse Rendering* involving problems like intrinsic image decomposition, inverse light transport and estimating scene shape, lighting and reflectance. Additionally, my other research collaboration projects are in 3D shape reconstruction, registration and tracking and domain adaptation. My current project is in analyzing 3D Deep Learning models using AutoML techniques.

Education

2013 - present — **Ph.D., Computer Science** — CGPA: 9.13/10
Center for Visual Information Technology, IIIT Hyderabad, India
Advisor: Prof. P. J. Narayanan (IIIT-Hyderabad)
Thesis: Topics, Methods and Applications of Inverse Rendering

2006 - 2010 — **B.E. (Hons.), Electrical and Electronics Engineering** — CGPA: 9.15/10
Birla Institute of Technology and Science (BITS), Pilani, India — (Distinction)

2004 - 2006 — **Centeral Board of Secondary Education** — 91.6%
BCM Arya Model Senior Secondary School, Ludhiana, India

Experience

Aug '13 - Present — **Research Assistant - Center for Visual Information Technology, IIIT Hyderabad**
Worked on remote/intra-lab collaborative projects, supervised undergraduate and dual degree students alongwith my own thesis and personal research interest topics.

July '18 - Oct '18 — **Computer Vision Research Consultant - Jotter.ai, Hyderabad**
Worked for a short time as a research consultant for a new startup working on AI assistive technologies for online retail and fashion markets.

Jan '15 - May '15 — **Teaching Assistant - Machine Learning, IIIT Hyderabad**
Conducting tutorials, grading, project assistance and evaluations for a class of approximately 100 undergradute and graduate students.

Aug '11 - July '12 — **Engineer - Qualcomm India Pvt. Ltd., Bangalore**
Assisted the newly established Corporate RnD India team by building assistive automation and annotation tools for their scene text recognition and translation project.

Aug '10 - July '12 — **Engineer - Qualcomm India Pvt. Ltd., Bangalore**
Worked as a Physical Design Engineer for the implementation of cellular SoC modems.

Jan '10- July '10 — **Interim Intern - Cisco India Pvt. Ltd., Bangalore**
Developed from scratch 'Network Implementation Plan Automation' internal web service.

May '09- July '09 **Research Intern - Central Scientific Instruments Organisation,**
Council of Scientific and Industrial Research, Chandigarh
Worked on development of medium voltage pulse generator for pulsed electric field applications.

May '08- July '08 **Undergraduate Intern - Indian Institute of Remote Sensing,**
Department of Space, Dehradun
Worked on content creation and deployment of the institute's Learning Management System.

Technical/Academic Skills

Programming Languages:	MATLAB, C++, JAVA, Python, Visual Basic
Libraries/API:	Qt, Open3D, OpenCV, TensorFlow, PyTorch, Caffe, GLPK, CVX
Core Courses:	Statistical methods in AI, Digital Image Processing, Machine Learning, Optimization, Computer Vision
Other Courses:	Databse Management Systems, Linear Algebra, Functional Analysis, Discrete Mathematics, Numerical Analysis, Communication Systems, Control Systems, Embedded Systems and Design, VLSI Designing, Introduction to MEMS

Publications

Under Review

Saurabh Saini and P. J. Narayanan, "*Semantic Hierarchical Priors for Intrinsic Image Decomposition*", Special Issue, International Journal of Computer Vision (IJCV), 2019.

Aakash KT, Parikshit Sakurikar, Saurabh Saini and P. J. Narayanan, "*A Flexible Neural Renderer for Material Visualization*", Arxiv, 2019.

Published

Saurabh Saini and P. J. Narayanan, "*Semantic Priors for Intrinsic Image Decomposition*", British Machine Vision Conference (BMVC), 2018. (*Oral, Best Industrial Paper, Honourable Mention*)

Gaurav Mishra, Saurabh Saini, Kiran Varanasi and P. J. Narayanan, "*Human Shape Capture and Tracking at Home*", IEEE Winter Conference on Applications in Computer Vision (WACV), 2018. (*spotlight)*

Saurabh Saini and P. J. Narayanan, "*Intrinsic Image Decomposition using Focal Stacks*", Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), 2016. (*Oral)*

Aditya Singh, Saurabh Saini, Rajvi Shah and P. J. Narayanan, "*Learning to Hash-Tag Videos with Tag2Vec*", Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), 2016. (*Oral)*

Aditya Singh, Saurabh Saini, Rajvi Shah and P. J. Narayanan, "*From Traditional to Modern : Domain Adaptation for Action Classification in Short Social Video Clips*", Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), 2016. (*Oral)*

C Ghanshyam, Saurabh Saini, Nilotpal, K Khanikar, Vijay Kumar Verma and Garima Bajwa, "*Design and Construction of Programmable Medium Voltage Pulse Generator for the Preservation of Liquid Semi-Liquid Food Items*", International Conference on Wireless Networks & Embedded Systems, 2009. (*Oral)*

Academic Projects

Ongoing

Inverse Light Transport (Thesis Project: CVIT, IIIT-H) - Studying feasibility of estimating bounces of light in a scene from a single image by inverting the light transport equation and possibility of extending the specularity removal methods towards this goal.

AutoML Assisted 3D CNN Analysis (Collaborative Project: CVIT, IIIT-H & Microsoft Research) - Analyzing different 3D deep learning models using AutoML techniques towards the goal of better understanding their strengths and weaknesses for various 3D problems.

Neural Rendering for Material Visualization (Student Guidance Project: CVIT, IIIT-H) - Real-time, raytraced and faithful representation of spatially varying and parametric BRDF models for material visualization and selection.

Previous Projects

Material Analysis and Label Propagation (Research Exploration: CVIT, IIIT-H): Various part estimation, material assignment and label propagation methods in large 3D shape datasets.

Image Decompositions and Manipulation Methods (Research Exploration: CVIT, IIIT-H): Various possible IID like layer separation methods for image Information disentanglement and their image editing applications.

Geometric Deep Learning (Research Exploration: CVIT, IIIT-H): Spectral, Graph and Charting based Non-Euclidean Convolutional Neural Networks and their applications.

3D Skeletonization and Image Symmetry Analysis (Research Exploration: CVIT, IIIT-H): Various symmetry based mesh skeleton estimation techniques for use in shape/image correspondence, retrieval and segmentation.

Geometric Domain Adaptation (Research Exploration: CVIT, IIIT-H): Use of geometry based domain adaptation methods for knowledge transfer.

Image Search Web Tool using Bag of Words Model (Course Project: Computer Vision, IIIT-H): Matlab backend and python frontend based web service for an image based search engine.

Diverse M-Best Solutions in Probabilistic Inferences (Course Project: Machine Learning, IIIT-H): Study of LP relaxation of MAP classification solutions for diverse retrieval.

Multiple Image Fusion for Image Enhancement (Course Project: Digital Image Processing, IIIT-H): Creating an all-in-focus image using Generalized Random Walker algorithm implementation in Matlab.

SVM Image Classification Full Implementation (Course Project: Statistical Methods for AI, IIIT-H): Complete SVM classifier training system using basic C++ Linear algebra libraries.

Studying SLAM algorithms (Independent Study Project: RRL, IIIT-H) - Studying the basics of various SLAM algorithms and trying out some incremental approaches on standard datasets.

Undergraduate Projects

Design and Simulation of MEMS logic gates (Independent Project: MEMS-Lab, CEERI-Pilani) - Understanding and simulating both partial and full fixed micro-cantilevers for developing micro-switches based logic circuits.

Analysis and Simulation of Performance Enhancing Techniques in a Wireless Network (Independent Project: Communications Lab, BITS-Pilani) Study of various wireless scheduling algorithms and software implementation (Matlab) of Wireless Fair Queuing algorithm in order to perform data traffic management.

Study, Simulation and VLSI Implementation of Encryption Algorithm (Independent Project: VLSI-Lab, BITS-Pilani) - Software (Matlab) and hardware (VLSI workflow) implementation of Advanced Encryption Standard.

VLSI Circuit Designing (Course Projects: VLSI-Lab, BITS-Pilani) - Designed and tested 8-bit serial to parallel converter and 10-bit digital to analog converter circuits using the VLSI design flow from scratch.

Game on Chip (TechFest Project: Quark, BITS-Goa) - System designing and coding of a small hand-held micro-controller based gaming device (first prize).

Tracking Bug (TechFest Project: Apogee, BITS-Pilani) - Development of transmitter-receiver modules and data reading software on a PC by parallel port interfacing (second prize).

Achievements

Best Paper Honorable Mention, BMVC	2018
TCS PhD Research Scholarship	2013 - 2017
QualStar - Team appreciation awards, Qualcomm - Bangalore	2010 - 2012
VP's Recommendation and PPO, Cisco - Bangalore	2010
Director's Certificate of Appreciation, IIRS - Dehradun	2007
MCN Scholarship, BITS - Pilani	2007 - 2010
Merit Scholarship (top 10), BITS - Pilani	2006
AIEEE AIR: 1456 State Rank: 38, BITSAT 399/450	2006
National Top 1% merit (AIR 17), National Standard Examination in Physics	2005 - 2006
Indian National Chemistry Olympiad, National Standard Examination in Chemistry	2005 - 2006
Regional Mathematics Olympiad, North India Zone	2005 - 2006
School Captain, BCM Ludhiana	2005 - 2006
Class Merit Holder (top 3)	2001 - 2006

References

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