Parikshit Vishwas Sakurikar

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Personal Information	Date of Birth: 17^{th} April 1989 Place of Birth: New Delhi, India Sex: Male Nationality: Indian	

Education

2012-Present, International Institute of Information Technology, Hyderabad, India
Pursuing: Ph.D. in Computer Science

2007-2011, International Institute of Information Technology, Hyderabad, India
B.Tech (Hons.) in Computer Science (CGPA: 9.18/10.00).

2005-2007, FIITJEE Junior College, Hyderabad, India
Class XII - 98%, Board of Intermediate Education, Andhra Pradesh

1995-2005, Siva Sivani Public School, Hyderabad, India
Class X - 92.5%, Indian Certificate of Secondary Education.

Research

I am a Ph.D. Candidate at the Center for Visual Information Technology, Kohli Center on Intelligent Systems, IIIT-Hyderabad, India. I am advised by Dr. P. J. Narayanan, Professor and Director, IIIT-Hyderabad. My primary research area is **Epsilon Focus Photography** which deals with post-capture control of focus and defocus in wide-aperture images. My broad research interests are **Computational Photography**, **Computational Displays**, **Machine Learning**, **Multi-camera Synchronization** and **High Performance Computing**.

Epsilon Focus Photography (2013-Present):
Focus and defocus blur are critical elements of aesthetic photography. The spread and the location of focus portray the emphasis on certain elements in the photograph, while the defocused regions bring out visual contrast. Focus and defocus are useful cues for understanding the three-dimensional structure of the scene with respect to the camera. We study different measures of focus and defocus and propose a composite measure which does well at estimating scene depth. We build a geometric refocusing framework which enables a user to freely refocus a scene after it has been captured. We build a compact representation for multi-focus images, so that they can be stored and processed efficiently. We study free-form refocusing from a single image using deep neural networks trained using an adversarial learning scheme. We show how depth-from-focus can be useful for vision and photography tasks such as intrinsic image decomposition, view interpolation, defocus magnification etc.

Other Research Work:

1.) Unsupervised Monocular Depth Estimation (2018): We present a structured training approach for unsupervised monocular depth estimation using large-scale stereo images. Our training framework produces disparate images in an incremental order ranging from easy to difficult. Structured training results in quantitative, qualitative and most importantly semantic improvement over other state-of-the-art methods in unsupervised monocular depth estimation.

2.) Synthetic Light-Field Tracing (2018): We build a physically accurate ray-tracing framework for tracing and storing the 4D light-field of a scene. Tracing a light-field enables post-render creation of novel wide-aperture images with significantly reduced computation. For efficient storage, we use a representation based on video-encoding that utilizes the redundancy in adjacent slices of the traced light-field.

3.) Multi-Camera Synchronization (2016-2017): Present day mobile-devices are equipped with high-performance camera units. The ability to use cameras from multiple devices together can enable novel media applications. We build a synchronization utility for multiple heterogeneous mobile cameras. The cameras are controlled by a server which executes capture requests with synchronized callbacks at sub-frame accuracy. We demonstrate applications such as HDR video, panoramic video, multi-flash photography, multi-view stereo etc.

4.) High Performance Comparison Sorting (2012-2014): Comparison based sorting approaches are relatively slower than standard radix/integer based sorting but are more general in nature. We build a hybrid solution to comparison sorting, where we use the split primitive and share the sorting workload between the GPU and all available CPU cores on a single machine.

5.) Computational HDR Display (2012): We use a low-complexity computational technique to gain intensity resolution on off-the-shelf displays. We sacrifice vertical refresh, spatial resolution or both in order to gain intensity resolution by mixing intensities and thereby increase the overall dynamic range of the display.

6.) Fast Graph-Cuts (2011-2012): The graph-cut operation is computationally expensive as it scales exponentially with the number of nodes in the graph. We improve the convergence time of graph cuts on grid graphs. Instead of processing a graph at the level of full detail, the graph-cut is first applied to a sub-sampled version of the original graph and the result is used to generate a quick but optimal solution at the full level of detail.

Publications

"Defocus Magnification using Conditional Adversarial Networks", Parikshit Sakurikar, Ishit Mehta & P.J. Narayanan. *IEEE Winter Conference on Applications of Computer Vision (WACV) 2019*, Hawaii, USA.

"SLFT: A Physically Accurate Framework for Tracing Synthetic Light Fields", Udyan Khurana, Parikshit Sakurikar & P.J. Narayanan. *Indian Conference on Vision, Graphics and Image Processing (ICVGIP) 2018*, Hyderabad, India.

"RefocusGAN: Scene Refocusing using a Single Image", Parikshit Sakurikar, Ishit Mehta, Vineeth N. Balasubramanian & P.J. Narayanan. *European Conference on Computer Vision (ECCV) 2018*, Munich, Germany.

"Structured Adversarial Training for Unsupervised Monocular Depth Estimation", Ishit Mehta, Parikshit Sakurikar & P.J. Narayanan. *International Conference on 3D Vision (3DV) 2018*, Verona, Italy.

"Composite Focus Measure for High Quality Depth Maps", Parikshit Sakurikar & P.J. Narayanan. *IEEE International Conference on Computer Vision (ICCV) 2017*, Venice, Italy.

"Focal Stack Representation and Focus Manipulation", Parikshit Sakurikar & P.J. Narayanan. *Asian Conference on Pattern Recognition (ACPR) 2017*, Nanjing, China.

"Beyond OCRs for Document Blur Estimation", Pranjal Rai, Sajal Maheshwari, Ishit Mehta, Parikshit Sakurikar & Vineet Gandhi. *IAPR International Conference on Document Analysis and Recognition (ICDAR) 2017*, Kyoto, Japan.

"SynCam: Capturing sub-frame synchronous media using smartphones", Ishit Mehta, Parikshit Sakurikar, Rajvi Shah & P.J. Narayanan. *IEEE International Conference on Multimedia and Expo (ICME) 2017*, Hong Kong.

"Intrinsic Image Decomposition using Focal Stacks", Saurabh Saini, Parikshit Sakurikar & P.J. Narayanan. *Indian Conference on Vision, Graphics and Image Processing (ICVGIP) 2016*, Guwahati, Assam, India.

"Dense View Interpolation on Mobile Devices using Focal Stacks", Parikshit Sakurikar & P.J. Narayanan. *CVPR International Workshop on Mobile Vision (IWMV) 2014*, Columbus, Ohio, USA.

"Comparison Sorting on Hybrid Multicore Architectures for Fixed and Variable Length Keys", Dip Sankar Banerjee, Parikshit Sakurikar & Kishore Kothapalli. *International Journal of High Performance Computing Applications (IJHPCA) 2014*.

"Fast, Scalable Parallel Comparison Sort on Hybrid Multicore Architectures", Dip Sankar Banerjee, Parikshit Sakurikar and Kishore Kothapalli, *Third International Workshop on Accelerators and Hybrid Exascale Systems (AsHES) 2013*, Boston, Massachusetts, USA.

"Increasing Intensity Resolution on a Single Display using Spatio-Temporal Mixing", Pawan Harish, Parikshit Sakurikar & P.J. Narayanan. *Indian Conference on Vision, Graphics and Image Processing (ICVGIP) 2012*, Mumbai, Maharashtra, India.

"Spatio-temporal Mixing to Increase Intensity Resolution on a Single Display", Pawan Harish, Parikshit Sakurikar & P. J. Narayanan. Poster at *CVPR Workshop on Computational Cameras and Displays (CCD) 2012*, Providence, Rhode Island, USA.

"Fast Graph Cuts using Shrink-Expand Reparameterization", Parikshit Sakurikar and P. J. Narayanan, *IEEE Winter Conference on Applications of Computer Vision (WACV) 2012*, Breckenridge, Colorado, USA.

Review Work Served as a Reviewer for IEEE CVPR, ACM ICVGIP, ACCV, IEEE Access.

Work Experience January 2019-Present,
Co-Instructor for Computer Graphics CSE251, Spring 2019, IIIT-Hyderabad, India.

June 2010 - Present,
Part-time teacher at Nirmala High School, Khairatabad, Hyderabad, India.
Course Title: Foundations of Science and Mathematics. Weekly classes for high school students in the age group of 13-15.

2017 - Present,
Project lead on Industry-Academia collaboration projects between IIIT-Hyderabad and Qualcomm and IIIT-Hyderabad and Honeywell.

January - May 2013,
Teaching Assistant for the Computer Vision Course at IIIT-Hyderabad.

May 2014,
Teacher at Student Technology Education Programme (STEP) at IIIT-Hyderabad for middle-school and high-school students.

2010 - Present,
Teaching Assistant for induction of undergraduate students to the Center for Visual Information Technology at IIIT-Hyderabad.

Online Work Experience

November 2018 - Present,
Computer Vision expert consultant for Golden Set Analytics, San Diego, CA, USA (via Upwork).

February - April 2012,
Computer Vision expert consultant for Fuiszmedia, Los Angeles, CA, USA (via oDesk).

April - September 2016,
Google Summer of Code (GSoC) 2016 Project for Liquid Galaxy (partnered project).

Web Development

September 2011 - Present,
Web Design Engineer, Hoozinc, Hyderabad, India. https://hoozinc.com

September 2017 - Present,
Web Design Engineer, Hoozinc Graffiti, Hyderabad, India. https://graffitibyhoozinc.com

Application Development

October 2017
cFM Depth-From-Focus, High-quality depth maps using iOS devices.

February 2014
Touch Focus, A post-capture refocus application for Android devices.

Advanced Academic Course Work

Machine Learning, Computer Graphics, Digital Image Processing, Artificial Intelligence, Pattern Recognition, Computer Vision, Database Management Systems, Data Warehousing and Data Mining, Artificial Neural Networks, Multicore Architectures, Topics in Parallel Processing, Cognitive Science and Neuroscience.

Other Software Projects

1) Depth-of-Field calculator for arbitrary camera configurations.
2) Decaf Compiler.

3) Custom UNIX shell implementation.
4) 2-D and 3-D games in OpenGL and a custom IGL graphics library.
5) Shot Segmentation and Video Synopsis tool.
6) Research Paper Archive for intranet users within IIIT-Hyderabad.

Technical Skills

1) **Programming**: C/C++ (moderate), python (moderate)
2) **Deep Learning**: PyTorch (moderate), Tensorflow (basic)
3) **Parallel Computing**: CUDA (moderate), OpenCL (basic), OpenMP(moderate)
4) **Graphics**: OpenGL (basic), OpenSceneGraph (basic)
5) **IDE**: Eclipse (basic)
6) **Operating Systems**: Linux (moderate), Mac OS X (basic), Windows (basic)
7) **Mobile Operating Systems**: Android (moderate), iOS (basic),
8) **Web Design**: html, php, css (moderate), javascript (moderate)
9) **Others**: Latex (moderate), Gimp (moderate), Matlab (advanced).

Achievements

- **TCS Research Fellowship** for pursuing Ph.D. in Computer Science.

- Kohli Center on Intelligent Systems (KCIS) Travel Grant for travel to ECCV 2018.

- Microsoft Research India Travel Grant for travel to ICCV 2017 and WACV 2012.

- ACM IARCS India Travel Grant for travel to ICCV 2017.

- Featured in the **Dean's Merit List** for academic excellence in 6 out of 8 semesters at the undergraduate level at IIIT-Hyderabad.

- Secured All India Ranks of **2443 and 5557** among five hundred thousand candidates at the All India Engineering Entrance Examination (AIEEE) 2007 and the Indian Institute of Technology - Joint Entrance Examination (IIT-JEE) 2007 respectively.

- Served as the Head-boy of Siva Sivani Public School in the year 2004-2005.
Highest Score in Siva Sivani Public School for the ICSE 2005 Board Examinations.

- Participated and won the **Best Speaker Award** at the Regional Round Debate organized by the Rajiv Gandhi Foundation in collaboration with the United Nations Development Programme (UNDP), in September 2004 at Hyderabad, India.

- Participated in the National Round Debate organized by the Rajiv Gandhi Foundation in collaboration with the United Nations Development Programme (UNDP), in October 2004 at New Delhi, India.
