Anil Kumar Vadathya   Jan, 2024

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Education

M.S. by research, Electrical Engineering   Aug 2018
Indian Institute of Technologies, Madras

B.Tech, Electronics & Communications Engineering   May 2015
Rajiv Gandhi University of Knowledge Technologies (RGUKT), Basar, India

Work Experience

Research Engineer   Nov 2018 - present
with Prof. Ashok Veeraraghavan
Rice Digital Health Initiative
Rice Computational Imaging Lab
Electrical and Computer Engineering Dept., Rice University

Visiting Research Engineer   Jan 2019 - present
with Dr. Teresia O'Connor
Child Nutrition Research Center (CNRC), Baylor College of Medicine

Professional Service

Reviewer (Journal)
IEEE TIP, IEEE TCI, IEEE TPAMI, Optics Express, IEEE Access, IJCV

Reviewer (Conferences)
ECCV 24, CVPR 24, WACV 24, CVMI 24, ICIP 24, FG 24, ICHI 24
ICHI 23, ICIP 23, ICIP 22, WACV 2022, FG 2021, ICVGIP 2018, SPCOM 2016

Scholastic Achievements

- M.S. thesis was awarded `Qualcomm Innovation Fellowship (India) 2016 & 2017`
- Received IEEE SPS Travel Grant award for ICIP 2017
- Granted MHRD, India scholarship for masters at IITM (Jul 2015 to Feb 2018)
- Selected for Summer Fellowship 2014 of Indian Academy of Sciences
- Awarded state govt.'s postmatric scholarship for undergrads at RGUKT, Basar

Research Interests

Computational Imaging, Computer Vision, Deep Learning and Image Generative Models, Medical Imaging Analysis, Healthcare applications

Journal Publications

Vadathya, Anil Kumar, Tom Baranowski, Teresia M. O'Connor, Alicia Beltran, Salma M. Musaad, Oriana Perez, Jason A. Mendoza, Sheryl O. Hughes, and Ashok Veeraraghavan. "FLASH-TV a machine learning pipeline to passively measure children's TV viewing: validation studies of the system." **Under review at Nature scientific reports**

Vadathya, Anil Kumar, Tom Baranowski, Teresia M. O'Connor, Alicia Beltran, Salma M. Musaad, Oriana Perez, Jason A. Mendoza, Sheryl O. Hughes, and Ashok Veeraragha-

van. "Development of family level assessment of screen use in the home for television (FLASH-TV)." Multimedia Tools and Applications (2024): 1-19.

Perez, Oriana, Tatyana Garza, Olivia Hindera, Alicia Beltran, Salma M. Musaad, Tracey Dibbs, Anu Singh et al. "Validated assessment tools for screen media use: A systematic review." Plos one 18, no. 4 (2023): e0283714.

Perez, Oriana, **Anil Kumar Vadathya**, Alicia Beltran, R. Matthew Barnett, Olivia Hindera, Tatyana Garza, Salma M. Musaad et al. "The Family Level Assessment of Screen Use–Mobile Approach: Development of an Approach to Measure Children's Mobile Device Use." JMIR Formative Research 6, no. 10 (2022): e40452.

Anil Kumar Vadathya, Salma Musaad, Alicia Beltran, Oriana Perez, Leo Meister, Tom Baranowski, Sheryl O. Hughes, Jason A. Mendoza, Ashutosh Sabharwal, Ashok Veeraraghavan, Teresia M. O'Connor, "An Objective System for Quantitative Assessment of Television Viewing Among Children (Family Level Assessment of Screen Use in the Home - Television): System Development Study," *JMIR Pediatrics and Parenting*, 2022.

Moukaddam, Nidal, Vishwanath Saragadam, Mahsan Abbasi, Matt Barnett, **Anil Kumar Vadathya**, Ashok Veeraraghavan, and Ashutosh Sabharwal. "Evolution of Mood Symptomatology Through the COVID-19 Pandemic: Findings From the CovidSense Longitudinal Study." Cureus 14, no. 10 (2022).

Pradyumna Chari, **Anil Kumar Vadathya**, Kaushik Mitra, "Optimal HDR and Depth from Dual Cameras," *Under review, 2020.*

Anil Kumar Vadathya, Sharath Girish, Kaushik Mitra, "A Unified Learning-Based Framework for Light Field Reconstruction From Coded Projections," *IEEE Transactions on Computational Imaging,* 2019.

Akshat Dave, **Anil Kumar Vadathya**, Ramana Subramanyam, Rahul Baburaj, Kaushik Mitra, "Solving Inverse Computational Imaging Problems using Deep Pixel-level Prior," *IEEE Transactions on Computational Imaging,* 2018.

CONFERENCE
PUBLICATIONS

Teresia M. O'Connor, **Anil Kumar Vadathya**, Tatyana Garza, Uzair Alam, Alicia Beltran, Alex Ho, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Jennette P. Moreno, Tom Baranowski, Ashok Veeraraghavan, "FLASH-TV 3.0: Validation of FLASH-TV methods for estimating TV-viewing among children", *ISBNPA abstracts 2024.*

Teresia M. O'Connor, **Anil Kumar Vadathya**, Alicia Beltran, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Tom Baranowski, Ashok Veeraraghavan, "Development of an automated, objective assessment of children's mobile device use: FLASH-Mobile," *ISBNPA abstracts 2022.*

Teresia M. O'Connor, **Anil Kumar Vadathya**, Alicia Beltran, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Tom Baranowski, Ashok Veeraraghavan, "FLASH-TV 2.0: Refining and assessing the FLASH-TV methods for TV viewing estimation," *ISBNPA abstracts 2022.*

Anil Kumar Vadathya, Sai Kiran Cholleti, Gautham Ramajayam, Vijalakshmi K and Kaushik Mitra. "Learning Light Field Reconstruction from a Single Coded Image." *Asian Conference on Pattern Recognition, 2017.*

Akshat Dave, **Anil Kumar Vadathya**, and Kaushik Mitra. "Compressive Image Recovery Using Recurrent Generative Model." *IEEE International Conference on Image Processing, 2017.*

Sowmya Ch, Anjumara Shaik, Chakravarthi Jada, **Anil Kumar Vadathya**. "Butterfly Communication Strategies: A Prospect for Soft-Computing Techniques." *Proc. of IEEE International Joint Conference on Neural Networks (IJCNN)*, 2014.

Harish Y, Kranthi Kumar R, Irfan Feroz G MD, Chakravarthi Jada, **Anil Kumar Vadathya**, Mounika Mesa. "ROBOG: Robo-Guide with simple learning strategy." *Proc. of IEEE Student's Technology Symposium*, India, 2014.

Chakravarthi Jada, **Anil Kumar Vadathya**, Anjumara Shaik, Sowmya Charugundla, Parabhaker Reddy Ravula, and Kranthi Kumar Rachavarapu. "Butterfly Mating Optimization." *In Intelligent Systems Technologies and Applications*, Springer International Publishing, 2015.

Kranthi Kumar R, Irfan Feroz G MD, Chakravarthi Jada, Harish Y, **Anil Kumar Vadathya**. "ROBOG An Autonomously Navigating Outdoor Robo-Guide." In *Swarm, Evolutionary, and Memetic Computing*, Springer International Publishing, 2014.

PROJECTS

FLASH-TV: an objective system for measuring screen-time among children
with Dr. Ashok Veeraraghavan, Rice University and Dr. Teresia M. O'Connor, Baylor College of Medicine *(Nov 18 - present)*

- Built an integrated system using state-of-the-art computer vision methods - face detection, recognition, and gaze estimation to measure screen-time (TV, mobile, and tablets) among children.
- Extensive evaluation of the system through iterative alpha tests under challenging conditions. Performs with 85% accuracy, overcoming the recall errors associated with self-report.
- Built an easily portable embedded system that runs our deep learning-based algorithms in real-time. Runs on edge devices, deleting images after analysis, ensuring user privacy
- Led to an ongoing 5-year `NIH PO1 grant` (2022-2027) to study impact of screentime on children's health.

Bias-for-action: implicit neural networks for video modeling
with Dr. Guha Balakrishnan, Rice University and Dr. Vishwanath Saragadam, UC Riverside *(Nov 23 - Jan 24)*

- Bias variables in implicit representations tend to act similarly to motion fields. Controlling them enables video editing, compression capabilities.

Reconstructing CT Volume from a few Chest X-ray images
with Yiran Sun and Dr. Guha Balakrishnan, Rice University *(Oct 22 - Nov 22)*

- Extended PixelNeRF architecture to reconstruct 3D CT volume from a few X-ray projections.
- Application significantly reduces the time and cost-effectiveness for obtaining CT volume.

Perceptual loss functions for Medical Imaging restoration
with Dr. Guha Balakrishnan, Rice University *(Jul 22 - Oct 22)*

- Pretrained unsupervised CNN models for medical imaging restoration perceptual loss. Popular imagenet pretrained models are not perfect for medical imaging applications

Lightfield Reconstruction from Focus-Defocus Pairs using CNNs
with Dr. Kaushik Mitra, EE dept., IIT Madras   *(Oct 17 - Apr 18)*

- We learn to estimate disparity from focus-defocus pair via view-supervision using deep neural networks. The disparity map is used to synthesize light field.

Recurrent Generative Priors for Computational Photography
with Akshat Dave and Dr. Kaushik Mitra, EE dept., IIT Madras   *(Jun 16 - Jun 17)*

- Data driven priors for compressive imaging reconstruction, we achieved a 3 dB improvement on avg. over traditional methods like TVAL3 and D-AMP.

Compressive Lightfield Recovery using Deep Neural Nets   *(Feb 17 - Jul 17)*
with Sai Kiran and Dr. Kaushik Mitra, EE dept., IIT Madras

- CNNs are used to tackle the spatio-angular resolution trade-off in Lightfield imaging.

Learning Depth from Defocus (DfD) using View Supervision
with Sarath Girish and Dr. Kaushik Mitra, EE dept., IIT Madras   *(Jan 18 - Mar 18)*

- We exploit learning based techniques for DfD using light fields

Denoising High Density Expressions in Mouse Brain Imaging
with Mayug, Dr. Kaushik Mitra at IITM and Kannan UV, Pavel Osten at CSHL, NY (Dec 17 - Mar 18)

- We leverage deep neural networks for noise removal in mouse brain images to improve registration accuracy.

Adaptive Mixture of Conditional GSMs for Image Denoising
with Sarath and Dr. Kaushik Mitra, EE dept., IIT Madras   *(Jan 17 - May 17)*

- Conditional mixture model is adapted based on noisy image observation to improve denoising. Conditional modeling removes patch limitation with normal GMMs.

Compressive Lightfield Recovery using Convolutional Sparse Coding (CSC)
with Susmitha and Dr. Kaushik Mitra, EE dept., IIT Madras   *(Jan 17 - May 17)*

- CSC, a convolutional extension of dictionary learning is adopted for compressive light field recovery

Face Quality Assessment for Face Recognition in The Surveillance Scenario
Intern with Dr. Sumohana, Dept. of EE, IIT Hyderabad   *(Jun 14 - Jul 14)*

- Here we used Gaussian Binary Restricted Boltzmann Machine (RBM) for modeling the distribution of facial features. We then used this model to perceptually assess the face image for face recognition i.e whether a face is recognizable in the given image.

Butterfly Communication strategies: *(Jan 14 - Mar 15)*
A prospect for Multimodal Optimization
with Sowmya, Anjum and Chakravarthi Jada, ECE dept., RGUKT Basar

- In this work, we have developed a multi-modal optimization algorithm inspired from the communication strategies deployed by butterflies. We evaluated it on benchmark functions along with practical applications like unsupervised clustering of satellite images.

Robo*G*: Robo *G*uide based on simple learning strategy *(Aug 13 - Feb 14)*
with Kranthi, Irfan, Harish and Chakravarthi Jada, ECE dept., RGUKT Basar

- We developed a guiding robot for our university(RGUKT). We formulated the navigation as a regression problem and solved it with neural networks.

TALKS & POSTERS

- Poster on "A Deep Learning Framework for Light Field Reconstruction from Minimal Measurements" at ICCP 2018, CMU, Pittsburgh.
- Talk on "Compressive Lightfield Reconstruction using Deep Neural Nets", at Qualcomm Banglore, May 2017.
- Poster on "Compressive Image Recovery using Recurrent Generative Model" at ICCP 2017, Stanford.
- Poster on "Learning Light Field Reconstruction from a Single Coded Image" at ACPR 2017, Nanjing, China.
- Talk on "Single Pixel Camera(SPC) Reconstruction using Recurrent Generative Model", at Qualcomm Banglore, Feb 2016.
- Presented "Deep Generative Networks For Image Processing", at workshop by Interdisciplinary Lab on Data Sciences (ILDS), IIT Madras, 2016.

WORKSHOPS & SUMMER SHCOOLS

- Attended summer school on "Deep Learning for Computer Vision", summer school at IIIT Hyderabad, June 2016.
- Attending Summer School on "Computer Vision: Recent Advances in Computer Vision", IIIT Hyderabad, July 2017.

TEACHING EXPERIENCE

- Teaching assistance for Deep Learning for Image Processing (Fall 2017)
- Teaching assistance for Machine Learning for Computer Vision (Spring 2017)
  Setting up programming assignments and term papers
- Teaching assistance for Computational Photography (Fall 2017)
  Setting up and evaluation of course projects; Setting up term papers
- Teaching assistance for Machine Learning for Computer Vision (Spring 2016)
  Setting up programming assignments and term papers

SKILLS

Programming Languages	: Python, C, C++, BASH, Scikit-learn, Matplotlib, Numpy
Packages	: TensorFlow, PyTorch, Caffe, MXNet, MATLAB, OpenCV
Applications	: LaTeX, MS Office
Operating Systems	: Linux, Windows

References

Dr. Ashok Veeraraghavan
Professor
Dept. of Electrical and Computer Engineering
Rice University
computationalimaging.rice.edu

Dr. Guha Balakrishnan
Assistant Professor
Dept. of Electrical and Computer Engine
Rice University
guhabalakrishnan.com

Dr. Teresia O'Connor
Professor, CNRC Associate Director for Human Sciences
Pediatrics Nutrition; and Academic General Pediatrics
Baylor College of Medicine
Teresia O'Connor Lab