

ARKA SADHU

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University of Southern California, Los Angeles, CA, 90089

EDUCATION

PhD Computer Science University of Southern California, Los Angeles, CA, USA 2018-2023
Bachelor of Electrical Engineering Indian Institute of Technology Bombay, India 2014-2018
• **Honors in Electrical and Minor in Computer Science** • **Major GPA: 9.44/10**

INTERNSHIP

Research Intern, Wadhvani Institute of AI, Prof. Subhasis Chaudhuri (May'18 - Aug'18)

Automatic grading of TSM Images

- Achieved state of the art performance on automatic grading of ZN Stained Tuberculosis Sputum Microscopy test. Analyzed different methods from patch-based classification to end-to-end neural segmentation. Proposed three network architectures for mobile computations with upto 94% F1-score. The best performing model gave a relative counting error of less than 5%.
- Preparing to submit to ISBI 2019 and NIPS Workshop.

Research Intern, University of Southern California, Prof. Ram Nevatia (May'17 - July'17)

Media Forensics via Image Matching [[Report](#)] [[Code](#)]

- A spoofed image contains a scene image and a donor image. Aimed at recovering the scene image belonging to a set of world images.
- Used feature extraction methods and clustering algorithms to identify the similar base images. Achieved around 85% accuracy on nimble dataset 2017 (publicly available) for baseline matching.

Research Intern, Aalto University, Prof. Juho Kannala (May'16-July'16)

Robust Loop Closures [[Report](#)]

- Model 3D indoor environments using point cloud data from Google Tango.
- Enforced loop closures using a new cost function to automatically refine and improve the geometry estimations.
- Analyzed the role of switch variables to understand the contributions of different parts of the loss functions.

PROJECT

Advance Machine Learning Project, IITB, Prof. Sunita Sarawagi (Mar'18-May'18)

Inference Networks for Structured Prediction Energy Networks [[Report](#)] [[Code](#)]

- A tensorflow implementation to perform multi-label classification experiments from the paper Learning Approximate Inference Networks for Structured Prediction.
- Performed analysis on the knowledge base FIGMENT dataset.
- Further extended the paper to include WGAN like training and showed that the latter gave much more stable training curves.

Undergraduate Thesis, IITB, Prof. Subhasis Chaudhuri (Sep'17-Apr'18)

Graph Convolution Networks for ECG analysis [[Code](#)]

- Proposed new networks for analysis of ECG signals considering them as graph signals. Used Graph Convolutional Networks in conjunction with normal convolutional networks and achieved 96% accuracy and 94% f1 points on classification of myocardial infarction as well as classification of generalized anterior myocardial infarction.
- Preparing for submission to ICASSP 2019.

Automatic Speech Recognition Project, IITB, Prof. Preethi Jyothi (Aug'17-Nov'17)

Voice Conversion using GANs [[Report](#)] [[Code](#)]

- Participated in the Voice Conversion Challenge 2018 in both parallel and non-parallel corpus track. Showed superior performance of voice synthesis using GANs and sentence embeddings of transcriptions and achieved mean opinion score of 3.8 which was a significant improvement over a simple Variational AutoEncoder.

Learning Agents Project, IITB, Prof. Shivaram Kalyanakrishnan (Aug'17-Nov'17)

Learning to Run: NIPS Challenge 2017 [[Report](#)] [[Code](#)]

- Explored standard algorithms from Deep Deterministic Policy Gradient to Proximal Policy Optimizations on the open simulator challenge to provide correct activation functions for the muscles of the skeleton allowing it to run. Our best model achieved score of 32 points. Also proposed a solution using reward shaping and made ablation studies on the effect of parameter noise and layer normalization at train time.

Machine Learning, IITB, Prof. Ganesh Ramakrishnan (Aug'17-Nov'17)

Neural Networks with Memory [[Code](#)]

- Designed an OpenAI gym maze environment where the agent needs to collect a key and then open a door (a toy version of Montezuma's Revenge) with varying maze sizes. Experimentally verified that only deep networks with explicit memory (Memory Q-Network and Recurrent Memory Q-Network) are able to learn the optimal policy for a 7x7 grid.

Advanced Image Processing, IITB, Prof. Ajit Rajwade (Mar'17-Apr'17)

Image Noise Modeling via Skellam Distribution [[Report](#)] [[Code](#)]

- Modeled the noise characteristics of a DSLR-camera via difference based imaging of a colored chart. Used the model to perform background subtraction and edge detection and verified its usability in the wild.

Digital Image Processing, IITB, Prof. Ajit Rajwade (Oct'16-Nov'16)

Document Scanner via Image Stitching [[Report](#)] [[Code](#)]

- Stitched images of overlapping parts of a large document to produce a high resolution picture. Implemented Homography Transformation, Multi-View Blending and Bundle Adjustment from scratch in python.

Technical Project, IITB (May'15-Jul'15)

Virtual Reality Controller and Headset [[Code](#)] [[Video](#)]

- Designed a low cost (~ \$20) headwear and controller for virtual reality applications. Demoed it on the popular game of Counter-Strike. This won the Best Idea Project 2016 in the Technical and Research Exposition 2015, IIT Bombay.

SKILLS

- **Programming Languages:** Proficient in: C++, Python, Matlab, Bash, Embedded-C, Assembly
- **Deep Learning Frameworks:** Pytorch, Tensorflow, Caffe.
- **Computer Vision Frameworks:** OpenCV, Scikit-Image, Scikit-Learn
- **Web Dev:** Javascript, Django, Laravel, Bootstrap

ACADEMIC AND TECHNICAL ACHIEVEMENTS

- Placed 3rd at the IFood Challenge which was a part of the FGVC5 (Fifth Workshop on Fine Grained Visual Categorization) as a part of CVPR 2018. [[Code](#)]
- Awarded Annenberg Graduate Fellowship at University of Southern California, 2018.
- Awarded Viterbi-India Scholarship to pursue research at Viterbi School of Engineering (summer'17)
- Awarded Aalto Research Assistant fellowship to pursue research at Aalto University (summer'16)
- Secured All India Rank 134 in JEE Advance 2014 among 1.5 lakh selected candidates.
- Received the Best Idea Award for our project on Virtual Reality at the Tech and RnD Expo 2015.