Vikram Voleti

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RESEARCH INTERESTS

To work at the intersection of computer vision and machine learning towards artificial intelligence; to understand and apply learning techniques such as deep neural networks to vision-related research

EDUCATION

Indian Institute of Technology (IIT), Kharagpur, India *2009 - 2014*

Dual Degree (B.Tech. (H) + M.Tech.) in Electrical Engineering
with Master's specialization in Instrumentation and Signal Processing **CGPA:** 8.44 / 10

RESEARCH PAPERS

Journal:

[1] S. Jonna, S. Satapathy, V. S. Voleti, R. R. Sahay, "Unveiling the scene: A Multimodal Framework for Simultaneous Image Disocclusion and Depth Map Completion using Computational Cameras," *International Journal of Computer Vision*, 2017 (under review)

Conference:

[2] V. Voleti, "*Carry-Free Implementations of Arithmetic Operations in FPGA*" in *Proc. 24th National Conference on Communications*, 2018 (under review) [pdf]

[3] V. Voleti, P. Mohan, S. Gupta, J. Iqbal, "Simple Real-Time Pattern Recognition for Industrial Automation," in *Proc. International Conference on Industrial Design Engineering*, 2017 (under review) [pdf]

[4] S. Jonna, V. S. Voleti, R. R. Sahay, and M. S. Kankanhalli, "A Multimodal Approach for Image De-fencing and Depth Inpainting," in *Proc. Int. Conf. Advances in Pattern Recognition*, 2015, pp. 1—6 [pdf, IEEE]

CURRENT WORK

Research Intern — *Applied Research Lab* *May 2017 - present*
INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY (IIIT) - HYDERABAD, INDIA
Under Prof. C. V. Jawahar, Centre for Visual Information Technology, IIIT-Hyderabad

- Towards weakly supervised lipreading using deep neural networks
- Analyzing the effect of visual attributes such as head pose, facial landmarks on visual speech recognition datasets such as GRIDcorpus, Lipreading-in-the-wild (LRW)
- Experimenting with convolutional and recurrent neural networks for self-training on unlabelled data

WORK EXPERIENCE

Image Processing Engineer — *Embedded Systems Team* *February 2016 - May 2017*
GREYORANGE ROBOTICS, INDIA — *a multinational firm that designs, manufactures and deploys advanced robotics systems for automation at warehouses, distribution and fulfillment centres*

- Developed computer vision module to perform video processing in real time for warehouse automation
- Optimized and implemented vision and learning algorithms for faster pattern recognition
- Experimented with CNNs on GPU for classification of objects on warehouse conveyor belts
- Developed embedded vision modules in automated guided robots for warehouses
- Research paper [3] based on work is under review at ICIDE 2017, for publishment by ACM

Associate Engineer — *Avionics Software & Systems Testing Group* *July 2014 - February 2016*
AIRBUS, INDIA — *a commercial aircraft manufacturer, the largest aeronautics & space company in Europe*

- Involved in development and integration of avionics systems for the long-range aircrafts family
- Simulated signal-level modifications to the Flight Warning Computer, adopting standard avionics coding guidelines (DO-178B)

RESEARCH PROJECTS

"De-fencing of Images using RGB-D Data" — M.Tech. Thesis *2013 - 2014*
IIT KHARAGPUR — *Prof. Rajiv Sahay, Department of Electrical Engineering*

- Elimination of fence-like occlusions, inpainting of images using RGB-D data
- Nominated for Best M.Tech. Project Award among three departments (Electrical, Electronics, CS)
- Research paper [4] based on work is published in the proceedings of ICAPR 2015 in IEEE Xplore
- Co-authored journal paper [1] is under review at the International Journal of Computer Vision (IJCV)
- Links — GitHub repository containing thesis, presentation, codes, and related files

"Identification of Bilabial Consonants in Audio and Lip Closures in Video" — B.Tech. Thesis
IIT Kharagpur — *Prof. Rajiv Sahay, Department of Electrical Engineering* *2012 - 2013*

- Measurement of synchronization between audio and video using bilabial cues in both modes
  - Trained a Gaussian Mixture Model (GMM) in MATLAB with MFCCs extracted from audio
  - Devised a C++ program to identify lip closures in video using OpenCV modules
- Links — GitHub repository containing thesis, presentation, codes, and related files

Research Internships

"Implementation of Carry-Free Arithmetic Operations in FPGA" *Summer 2013*
KU Leuven, Belgium — *Prof. Ingrid Verbauwhede, Computer Security & Industrial Applications*

- Designed and implemented addition, subtraction, multiplication using Carry-Free Logic
- Developed, tested and verified the modules in Verilog, and simulated circuits in Xilinx
- Single-author research paper [2] is under review at the 24th Indian National Conference on Communications (NCC) 2018, for publishment in IEEE Xplore
- Links — GitHub repository containing report, presentation, and related files

"Fingertip Gesture Recognizer using HMMs" *Summer 2012*
IIT Kharagpur, India — *Prof. Aurobinda Routray, Department of Electrical Engineering*

- Implemented Hidden Markov Models (HMMs) in MATLAB, verified with standard implementations
- Created a program that recognizes shapes drawn by fingertip using HMM
- Links — GitHub repository containing report, presentation, and related files

"Measurement of Intra-die Power Variation in Sub-nm FPGA's" *Summer 2011*
Imperial College, London — *Prof. Peter Cheung, Head, Electrical and Electronics Engineering*

- Measured the relative power consumption among the LookUp Tables (LUTs) of an FPGA
- Designed and implemented an automated workflow for signal processing, and visualization of results
- Links — GitHub repository containing presentation, and related files

Technical Skills

Languages : C, C++, HTML/CSS, Javascript, Python, MATLAB, Shell, Verilog
Operating Systems: OS X, Unix/Linux, Windows
Libraries: CUDA, IDS (cameras), Keras, LaTeX, OpenCV, PyTorch, Tensorflow

Scholastic Achievements

- Attended summer schools on Computer Vision and Machine Learning at IIIT-Hyderabad in 2017
  - Stood 3rd in Computer Vision Summer School out of 120+ participants, rewarded full fee waiver
  - Stood 4th in Machine Learning Summer School out of 120+ participants, rewarded full fee waiver
- Talk: "Mathematics of back-propagation in multi-layer perceptrons" [link]
  - Lecture given at GreyOrange Robotics, India, and at IIIT-Hyderabad
- Completed *additional* courses in Computer Science & Engineering at IIT Kharagpur
  - Algorithms-I, Artificial Intelligence, Computational Number Theory
- Achieved highest grade in Digital Voice & Picture Communication, Programming & Data Structures, Real Time Signal Processing lab., Digital Electronic Circuits, Control & Electronic System Design, Power Systems lab., Total Quality Management, Transform Calculus, Game Theory & Applications
- Participated in Amazon Data Science competition in MVSP 2012, Kaggle competitions, Coursera courses on machine learning, computer vision, neural networks, natural language processing
- Qualified JEE 2009 by IIT at 99.7 percentile, with All India Rank of 1330 (out of 384,977)

Relevant Courses

Computer Science & Engineering: Algorithms-I, Artificial Intelligence, Computational Number Theory, Computer Architecture & Operating Systems

Computer Vision and Multimedia: Digital Image Processing & Applications, Digital Voice & Picture Communication, Vision & Visualization

Signal Processing, Embedded Systems: Analog Communication, Analog Signal Processing, Data Communication Networks, Digital Electronic Circuits, Digital Signal Processing, Programmable & Embedded Systems, Real Time Signal Processing, Signals & Networks, Statistical Signal Processing

Mathematics & OR: Probability & Stochastic Processes, Transform Calculus, Game Theory & Applications, Total Quality Management

Online

Website: voletiv.github.io *GitHub:* github.com/voletiv *LinkedIn*: Vikram Voleti