

**Kuldeep S. Kulkarni**  
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## Summary

Have proposed deep learning based, fast, data-driven solutions to inverse problems like compressive image and light-field reconstruction. Have worked on action detection in videos using bi-directional LSTMs. Have worked on a wide range of computer vision problems including weakly supervised problems like joint localization of multiple concepts like action, object and person.

## Skills

Python, C, OpenCV, MATLAB, Caffe

## Education

- **PhD candidate** in Electrical Engineering with Arts, Media and Engg. (AME) concentration (Fall 2012 -)  
Arizona State University, Tempe
- **Master of Science** in Electrical Engineering with Signal Processing and Communication as specialization (Fall 2010 - Summer 2012)  
Arizona State University, Tempe  
Thesis: Feature Extraction from compressive cameras with application to activity recognition
- **Bachelor of Technology** in Electrical and Electronics Engg. (2005-2009)  
National Institute of Technology Karnataka, Surathkal, India.

## Publications and Patents

- P0: Suhas Lohit, **Kuldeep Kulkarni**, Ronan Kerviche, Pavan Turaga, Amit Ashok, ‘Convolutional Neural Networks for Non-iterative Reconstruction of Compressively Sensed Images’, under review at **IEEE Transactions on Pattern Analysis and Machine Intelligence, 2017**<sup>1</sup>.
- P1: Mayank Gupta\*, Arjun Jauhari\*, **Kuldeep Kulkarni**, Suren Jayasuriya, Alyosha Molnar, Pavan Turaga, ‘Compressive Light Field Reconstruction using Deep Learning’, under review at **CVPR 2017 workshop**
- P2: Sohil Shah, **Kuldeep Kulkarni**, Arijit Biswas, Ankit Gandhi, Om Deshmukh, Larry Davis, ‘Weakly Supervised Learning of Heterogeneous Concepts in Videos’, **European Conference on Computer Vision (ECCV) 2016**.
- P3: **Kuldeep Kulkarni**, Suhas Lohit, Pavan Turaga, Ronan Kerviche, Amit Ashok, ‘ReconNet: Non-Iterative Reconstruction of Images from Compressively Sensed Measurements’, **IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2016**.
- P4: **Kuldeep Kulkarni**, Pavan Turaga, ‘Reconstruction-Free Action Inference from compressive imagers’, **IEEE Transactions on Pattern Analysis and Machine Intelligence, 2016**.
- P5: **Kuldeep Kulkarni**, Pavan Turaga, ‘Fast integral image estimation at 1% measurement rate’, under revisions at **IEEE Transactions on Pattern Analysis and Machine Intelligence**.
- P6: Suhas Lohit, **Kuldeep Kulkarni**, Pavan Turaga, Jian Wang, Aswin Sankaranarayanan ‘Reconstruction-free Inference on Compressive Measurements’, at the **4th IEEE Workshop on Computational Cameras and Displays (CCD)**, in conjunction with IEEE CVPR, 2015. (**Best Paper Award**)
- P7: Suhas Lohit, **Kuldeep Kulkarni**, Pavan Turaga, ‘Direct Inference on Compressive Measurements using Convolutional Neural Networks’, **International Conference on Image Processing, 2016**

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<sup>1</sup>CVPR and ECCV are highly selective computer vision conferences with acceptance rates of around 25%, similar to top journals like TPAMI, which has a impact factor of 5.781.

- P8: **Kuldeep Kulkarni**, Pavan Turaga, 'Recurrence Textures for Activity Recognition from compressive cameras', **International Conference on Image Processing**, 2012.
- P9: Ankit Gandhi, Arijit Biswas, Om Deshmukh, Sohil Shah, **Kuldeep Kulkarni**, Method and System for Multimedia Processing to Identify Concepts in Multimedia, patent application submitted to USPTO.

### Work Experience

- **Research Intern** at Mitsubishi Electric Research Labs (MERL), Cambridge, MA (May-Sep 2016). Action detection in videos using bi-directional LSTMs. This work has submitted to ICCV 2017. Host: Mike Jones
- **Research Intern** at Xerox Research Centre India, Bengaluru, India (May-Aug 2015). Worked on joint spatio-temporal localization of multiple concepts like  $(\{\text{object}, \text{action}\}, \{\text{subject}, \text{action}\})$  in weakly-labeled youtube videos, leading to a paper at ECCV 2016 (P1).
- **Graduate Research Assistant**: Dept. of Electrical Engg. and Dept. of Arts, Media and Engg., Arizona State University, (Sept 2011- present)
- **Research Intern** at Bausch & Lomb, Rochester, NY (May-Aug 2013). Applied image processing techniques for segmentation of OCT images of contact lens.
- **Project Assistant**: Dept. of Instrumentation Engg and Applied Physics, Indian Institute of Science, (July 2009- March 2010)
- **Graduate Teaching Assistant**: for EEE 120 - Simulation Lab for Digital Design Fundamentals for 7 semesters since Fall 2013, and for EEE598 - Computer Vision in Spring 2016.
- **Summer Intern**: Dept. of Electrical Engg., Indian Institute of Science, (May 2008-June 2008). Applied shape-context feature descriptor for online hand-writing recognition of two South-Indian languages, Kannada and Tamil.

### Talks and poster presentations (excluding conferences)

- 01/2017 - Computer Vision at Low Measurement Rates at CMU, Pittsburgh, PA.
- 09/2016 - Action Detection from videos using bi-directional LSTMs at MERL, Cambridge, MA.
- 05/2016 - Compressive Computer Vision at IIIT Hyderabad, India.
- 04/2016 - Held a Deep Learning Workshop (with Suren Jayasuriya) at Penn State University, State College, PA.
- 03/2016 - Computer Vision from compressive cameras, PhD Comprehensive Exam, Arizona State University, Tempe, AZ.
- 07/2015 - Weakly supervised learning for joint person and action localization, XRCI, Bangalore, India.
- 03/2013 - Action recognition from compressive cameras, SenSiP seminar series, Arizona State University, Tempe, AZ.

### Mentoring Experience

I have mentored two masters students, Suhas Lohit and Mayank Gupta, for their thesis.

- Suhas's thesis work was presented and awarded the '**Best Paper Award**' at **4th IEEE Workshop on Computational Cameras and Displays (CCD)**, in conjunction with CVPR 2015.
- Mayank's thesis work on compressive light-field reconstruction using deep learning is under submission at CVPR 2017 workshop.

## Other Projects during PhD

- **What makes Federer so elegant ?:** This project aimed to quantify the aesthetics of the play of a sportsman (the poise, the economy of their movement, the smoothness or the lack of it of the flow of their movement) in terms of what we called ‘watchability’ of the play. Given, a video clip (like youtube video) of a player playing a shot like cover drive in cricket, or forehand in tennis, we built a system which determined the ‘watchability’ scores of the different movements, the player makes while playing that particular shot. The movements can be stance, back-lift, and follow-through.
- **How do I dance ?:** We built a real-time visualization feedback system for dancers using Kinect data of joint coordinates, as part of the ‘Digital-Culture Showcase’ organized every semester in AME department, ASU. The joint data collected from Kinect was used to determine in real time which of the 20 joints were being engaged the most, and which of them were being dormant at any given point in time. For each individual joint, a visualization based on the self-similarity matrix evolving in real-time, depicting the dynamics of the joint’s movements, was shown to the dancers. The visualizations were aimed at helping dancers fine-tune their dance steps and movements in real-time.

## Academic Honours

- Secured a All-India position in top 5 percentile in IIT-JEE(Indian Institute of Technology-Joint Entrance Examination) Screening Examination attended by 1,71,118 candidates.
- Secured a All-India position in top 1.5 percentile in AIEEE (All India Engineering Entrance Exam) 2005 attended by 4,36,048 candidates.

## Service

- Reviewer for CVPR 2015, WACV 2015, WACV 2016, Pattern Recognition journal
- Volunteer for ICIP 2016

## References

Available upon request.