

EDUCATION

- **Indian Institute of Technology** Kharagpur, India
B.Tech (Hons.) Major: EE, Minor: CS July. 2012 – Apr. 2016

EMPLOYMENT

- **Harvard University** Cambridge, MA
Fellow of Computer Science Oct. 2017 – Present
- **Microsoft Research** Bangalore, India
Research Fellow, Machine Learning and Optimization Group Aug. 2016 – Aug. 2017

MANUSCRIPTS

- *Optimal Auctions through Deep Learning*
P. Dutting, Z. Feng, H. Narasimhan, DC. Parkes, **SS. Ravindranath**.
*Ordered alphabetically
- *A Smart Wearable System for Classification of Alertness States*
P. Dash, A. Dasgupta, S. Chakroborty, **SS. Ravindranath**, A. Routray, D. Samanta.
IEEE Transactions on Mobile Computing

PUBLICATIONS

- *Learning Objective functions for Improved Image retrieval*
SS. Ravindranath, M. Gygli, LV. Gool
MediaEval Workshops, 2015.
- *Salient Object Detection via Objectness Measure*
SS. Ravindranath, RV. Babu
IEEE International Conference on Image Processing (ICIP), 2015

RESEARCH EXPERIENCE

- **Machine Learning for Auction Design** Harvard University
Advisor: Prof. David Parkes April 2018 - Present
 - We formulate incentive compatible auction design as a non-standard, constrained learning problem, and show how it can be solved using multi-layer neural networks.
 - We replaced sampling-based approach with a gradient-based approach to compute constraint violations more accurately.
 - We scaled our approach to larger settings with more agents and items where optimal auctions are unknown. We achieved results better than Myerson's item-wise auction
- **Deep Learning and Computer Vision for Connectomics** Harvard University
Advisor: Prof. Hanspeter Pfister Oct 2017 - April 2018
 - Worked on a improving alignment and stitching of electron microscopy images, a key step in the pipeline to create comprehensive neural wiring diagrams of the brain.
 - Extended Mask-RCNN to 3D setting to perform synapse segmentation and classification. Modified the segmentation head of the network to produce a regression map which can be used to determine the polarity of the synapse
 - Currently investigating a two-network model to improve guided proof-reading for image segmentation
- **Large-scale Multilabel Learning** Microsoft Research, India
Advisor: Dr. Prateek Jain Aug 2016 - Aug 2017
 - Investigated the use of ProtoNN (a KNN based algorithm) for extreme classification (multi-label learning with a large label set). Attained 5x speedup over the existing C++ codebase. Proposed changes that further improved the training time and accuracy. On related search dataset with dense features, we out-performed the one-vs-all classifier by 2.9% and FastXML by 6.5%.

- Explored extending the ProtoNN algorithm for efficient semi-supervised classification for multi-class and multi-label problems.
- Investigated the use of side-information such as label features to extend existing multi-label algorithms to inductive setting (where labels in the test set are not observed in training set).

• **Learning Submodular Objectives for Improved Image Retrieval**

ETH Zurich

Advisor: Prof. Luc Van Gool, Dr. Michael Gygli

Summer 2015

- Formulated improving image retrieval as a subset selection problem. Proposed an objective function which is a mixture of several monotone submodular functions that score different aspects of a potential set (such as interestingness, relevance and diversity). Learnt the weights for the mixture with a large-margin formulation
- Showed that our approach achieves state-of-the-art results on MediaEval Diverse Images dataset. Achieved 16% improvement (in terms of F1-measure) over Flickr results.

• **Visual Interestingness of Images**

ETH Zurich

Advisor: Prof. Luc Van Gool, Dr. Michael Gygli

Summer 2015

- Analyzed how image content and emotions are linked to interest. Built a predictive model using deep convolutional neural networks, which predicts interest more accurately than the previous state-of-the-art.

• **Salient Object Detection via Objectness Measure**

Indian Institute of Science, Bangalore

Advisor: Prof. R Venkatesh Babu

Summer, 2014

- Proposed a method to estimate the foreground regions in an image using objectness proposals. Implemented a novel saliency measure to refine our foreground estimate and integrated it with a saliency optimization framework to obtain smooth and accurate saliency maps.
- Obtained results that were better than the existing state of the art approaches on two benchmark datasets (MSRA and CSSD).

• **Alertness Prediction Using Mobile Devices**

Indian Institute of Technology, Kharagpur

Advisor: Prof. Aurobinda Routray

Spring 2016

- Developed a prototype of a wearable system that detects the state of alertness of an individual using psychological and physiological features.
- Designed and implemented several psycho-motor vigilance tasks on mobile devices that test the visual and auditory response of individuals. Used the responses as features to predict the state of alertness.

SELECTED PROJECTS

- **Automated Essay Scoring:** Used a regression based approach for automatically scoring essays scoring using standard NLP techniques and vector-space models. Obtained results that were comparable to the performance of professional human raters, while at a much faster rate.
- **Object Recognition:** Implemented Selective Search, a state-of-the-art object proposal algorithm in Python. Integrated it with Fast-RCNN model to perform Object Recognition.
- **Intelligent Game Agents:** Developed a Minimax search and alpha-beta pruning based intelligent agent for Warfare game (a 2-player board game) and designed the GUI using Qt.

AWARDS AND SCHOLARSHIPS

- **Inspire Fellowship for Higher Education** 2012
Program by Dept. of Science and Technology, Govt. of India
- **Kishore Vaigyanik Protsahan Yojna Fellowship (KVPY)** 2011
Awarded to top 250 students in India by Dept. of Science and Technology, Govt. of India
- **National Talent Search Scholarship (NTSE)** 2009
Awarded to top 1000 high school students in India by NCERT

SCHOLASTIC ACHIEVEMENTS

- **99 percentile** in IIT-JEE Amongst 0.5 million candidates
- **99.93 percentile** in AIEEE Amongst 1.1 million candidates
- **All India Rank 7** in National Cyber Olympiad
- **Certificate of Merit** in
 - Indian National Mathematics Olympiad (INMO) Top 75 (National)
 - National Standard Examinations in Chemistry (NSEC). Top 300 (National)
 - National Standard Examinations in Physics (NSEP). Top 1% (Regional)

PRESS COVERAGE

- IIT Kharagpur innovation to monitor fatigue level in pilots. Hindustan Times, 2016
- Stressed? Now, wear a pair of glasses and find out how much. Times of India, 2016

SKILLS

- **Programming Languages:** C, C++, MATLAB, Python
- **DL Libraries:** Tensorflow, Pytorch, Keras