Sai Srivatsa Ravindranath

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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**.
  *Authors ordered alphabetically
  Under Submission at IEEE International Conference on Machine Learning (ICML), 2019
  ArXiv version: https://arxiv.org/pdf/1706.03459.pdf

- *A Smart Wearable System for Classification of Alertness States*
  P. Dash, A. Dasgupta, S. Chakroborty, **SS. Ravindranath**, A. Routray, D. Samanta.
  Under Submission at IEEE Transactions on Mobile Computing (Under submission)

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
  ArXiv version: https://arxiv.org/pdf/1506.07363.pdf

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 Myersons item-wise auction.

- **Deep Learning and Computer Vision for Connectomics** — Harvard University
  Advisor: Prof. Hanspeter Pfister — *Oct 2017 - April 2018*
  - Worked on improving the 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.

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