

# Sai Srivatsa Ravindranath

*Fellow of CS, Harvard University*

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| CONTACT INFORMATION | Harvard University<br>MD 233, Oxford Street, Cambridge, MA  | <a href="http://saisrivatsa.com/saisr@g.harvard.edu">http://saisrivatsa.com/saisr@g.harvard.edu</a>   |
| EMPLOYMENT          | <b>Harvard University</b><br><i>Fellow of Computer Science</i><br><b>Microsoft Research, India</b><br><i>Research Fellow</i>  | (Oct 2017 - )<br>Advisor: Prof. David Parkes<br>(Aug 2016 - Aug 2017)<br>Advisor: Dr. Prateek Jain  |
| EDUCATION           | <b>Indian Institute of Technology, Kharagpur</b><br>B. Tech with Honors in Electrical Engineering<br>Minor in Computer Science  | (July 2012 - April 2016)  |
| PUBLICATIONS        | <b>Optimal Auctions through Deep Learning*</b><br>P. Dutting, Z. Feng, H. Narasimhan, DC. Parkes, <u>SS. Ravindranath</u> .<br>Thirty-Sixth International Conference on Machine Learning (ICML 2019)<br>*Authors ordered alphabetically, Accepted as <b>Long Oral</b><br>ArXiv Version: <a href="https://arxiv.org/pdf/1706.03459.pdf">https://arxiv.org/pdf/1706.03459.pdf</a><br><b>Learning Objective functions for Improved Image retrieval</b><br><u>SS. Ravindranath</u> , M. Gygli, LV. Gool<br>MediaEval Workshops, 2015.<br><b>Salient Object Detection via Objectness Measure</b><br><u>SS. Ravindranath</u> , RV. Babu<br>Twenty-Second International Conference on Image Processing (ICIP 2015)<br>ArXiv Version: <a href="https://arxiv.org/pdf/1506.07363.pdf">https://arxiv.org/pdf/1506.07363.pdf</a> |   |
| RESEARCH EXPERIENCE | <b>Machine Learning for Mechanism Design</b><br>Advisor: Prof. David Parkes   | Harvard University<br>April 2018 - <ul style="list-style-type: none"><li>◦ We formulated incentive compatible auction design as a non-standard, constrained learning problem, and showed 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.</li><li>◦ 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 and other well known baselines. We published our work at ICML - 2019.</li><li>◦ We're currently exploring the use of our framework to obtain new economic insights, validate conjectures and reveal gaps in our current understanding of auctions.</li></ul> |
|                     | <b>Deep Learning and Computer Vision for Connectomics</b><br>Advisor: Prof. Hanspeter Pfister   | Harvard University<br>Oct 2017 - April 2018 <ul style="list-style-type: none"><li>◦ 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.</li><li>◦ 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.</li><li>◦ Investigated a two-network model to improve guided proof-reading for image segmentation.</li></ul>  |
|                     | <b>Large-Scale Multilabel Learning</b><br>Advisor: Dr. Prateek Jain   | Microsoft Research, India<br>Aug 2016 - Aug 2017 <ul style="list-style-type: none"><li>◦ 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%.</li><li>◦ Explored extending the ProtoNN algorithm for efficient semi-supervised classification for multi-class and multi-label problems.</li></ul>  |

- Investigated the use of side-information such as label features to extend existing multi-label algorithms to an 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 relevance and diversity). Learnt the weights for the mixture with a large-margin formulation.
- 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. We used this interestingness predictor to further improve our image retrieval results.
- 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.

### **Salient Object Detection via Objectness Measure**

Indian Institute of Science, Bangalore

Advisor: Prof. 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).
- We published our work at IEEE International Conference on Image Processing (ICIP), 2015.

### **Bachelors Thesis Project**

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 these responses as features to predict the state of alertness.
- Our work was featured in major Indian press (Hindustan Times, Times of India).

### **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

### **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

### **ACHIEVEMENTS**

**99 percentile** in IIT-JEE

Amongst 0.5 million candidates

**99.93 percentile** in AIEEE

Amongst 1.1 million candidates

#### **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)

**All India Rank 7** in National Cyber Olympiad