Sai Srivatsa Ravindranath

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EMPLOYMENT

- **Harvard University** — Cambridge, MA
  Fellow of Computer Science — *Oct. 2017 – Present*

- **Microsoft Research** — Bangalore, India
  Research Fellow — *Aug. 2016 – Aug. 2017*

EDUCATION

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

PUBLICATIONS

- *Learning Objective functions for Improved Image retrieval*
  Sai Srivatsa Ravindranath, Michael Gygli, Luc Van Gool
  MediaEval 2015 Workshops.

- *Salient Object Detection via Objectness Measure*
  Sai Srivatsa Ravindranath, R Venkatesh Babu
  IEEE International Conference on Image Processing (ICIP), 2015

  Under Submission
- *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

SKILLS

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

RESEARCH EXPERIENCE

- **Visual Computing Group** — Harvard University
  Advisor: Prof. Hanspeter Pfister — *Oct 2017 - Present*

  - **Deep Learning and Computer Vision for Connectomics:** We are working on a pipeline to create comprehensive neural wiring diagrams of the brain from electron microscopy images. I'm currently working on two problems:

    1. 3D-alignment and stitching of electron microscope scans.
    2. Detection and Segmentation of Synapses in 3D volumes.

- **Machine Learning and Optimization Group** — 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).
  - Implemented it on GPUs and achieved a 5x speedup over the existing C++ codebase. I also proposed changes that further improved the training time and accuracy.
  - Achieved results on par with existing methods like SLEEC and FastXML. On Related Search dataset, we performed 2.9% better than one-vs-all classifier and 6.5% better than FastreXML in terms of Precison@1
  - 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).

- **Computer Vision Lab** ETH Zurich
  Advisor: Prof. Luc Van Gool *Summer 2015*
    - **Learning Submodular Objectives for Improved Image Retrieval:** We formulated improving image retrieval as a subset selection problem.
    - We 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). Using a large-margin formulation, we learnt the weights for such a mixture.
    - We implemented lazy-greedy algorithm to select a nearly-optimal subset.
    - We showed that our approach achieves state-of-the-art results on MediaEval Diverse Images dataset. We also achieved 16% improvement (in terms of F1-measure) over Flickr results.
    - **Visual Interestingness of Images:** Analyzed how image content and emotions are linked to interest
    - Built a predictive model using deep convolutional neural networks, which predicts interest more accurately that the previous state-of-the-art.

- **Video Analytics Lab, IISc Bangalore** Indian Institute of Science, Bangalore
  Advisor: Prof. R Venkatesh Babu **Summer, 2014**
    - **Salient Object Detection via Objectness Measure:** We proposed a method to estimate the foreground regions in an image using objectness proposals.
    - We proposed and implemented a novel saliency measure which determines how tightly a pixel or a region is connected to the estimated foreground. We use this to refine our foreground estimate.
    - We integrated our approach with a saliency optimization framework to obtain smooth and accurate saliency maps.
    - We evaluated our approach on two benchmark datasets and obtained results that were better than the existing state of the art approaches.
    - We published our work at IEEE International Conference on Image Processing - 2015

- **Bachelors Thesis Project** Indian Institute of Technology, Kharagpur
  Advisor: Prof. Aurobinda Routray *Spring 2016*
    - **Alertness Prediction Using Mobile Devices:** We developed a prototype of a wearable system that detects the state of alertness of an individual using psychological and physiological features.
    - Involved with the design and implementation of several psycho-motor vigilance tasks on portable devices that test the visual and auditory response of individuals. We computed psychological features based on these responses.
    - Trained an SVM using these features to predict the state of alertness.
    - Our work was featured in major Indian press (Hindustan Times, Times of India). Our work is currently under review at IEEE Transactions on Mobile Computing.

Projects

- **Automated Essay Scoring:** We used a regression based approach for automatically scoring essays scoring using standard NLP techniques and vector-space models. We 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 the above 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.

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

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)