Ambrish Rawat

Contact Information

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Research Interests

Statistical Machine Learning, Deep Learning
Applications of Machine Learning in Computer Vision, Speech and Language Technologies

Education

M. Phil. in Machine Learning, Speech and Language Technologies, *2015 - currently*
Department of Engineering, University of Cambridge, UK

Integrated M. Tech. Mathematics and Computing *2010 - 2015*
Indian Institute of Technology Delhi (IITD), New Delhi, India
Cumulative Performance Index (CPI) : **8.246** on a scale of 10 (top 10%)

Publications

- **A. Rawat**, P. K. Sahoo, N. Chatterjee, "Multi-document Text Summarization Using Random Indexing and Clustering", Information Processing & Management (2015), Elsevier (under review)
- J. Chrin, M. Aiba, **A. Rawat**, Z. Wang,"Accelerator Modelling and Message Logging with ZeroMQ", in Proc. 15th Int. Conf. on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'15), Melbourne, Australia, Oct. 2015, paper WEBO04.

Patent

"A Multi-Modal Infotainment Device for Interactive Braille Learning", India Patent Application number: 1729/DEL/2014 e-filed, Status: Uploaded by Patent Office; Patent Pending

Research Experience

Multi-Document Text Summarization using Random Indexing *Jan 2014 - July 2015*
Department of Mathematics, IIT Delhi *New Delhi, India*
Guide: Prof. Niladri Chatterjee, Department of Mathematics IIT Delhi

- Used Random Indexing to map documents to an approximately orthogonal high-dim. word space.
- Ranked and picked sentences from clustered semantic vectors to generate summaries.
- Evaluated ROUGE metric scores to compare with human-generated summaries of DUC corpus.
- Improvement scores of closest-to-centroid scheme with cosine similarity being reported to IPM.

Visual-SLAM on Android *Sep 2014- July 2015*
Department of Computer Science, IIT Delhi *New Delhi, India*

- Used Extended Kalman Filter to infer the joint posterior of device position and map-estimates.
- Used SIFT descriptors for real-time feature detection and tracking from every camera frame.
- Implemented and demonstrated an OpenCV based Android system for visual-SLAM.

Investigation of ZeroMQ for SwissFEL *May 2014 - July 2014*
Paul Scherrer Institut (Summer Internship) *Villigen, Switzerland*
Guide: Dr. Jan Chrin, Accelerator Controls Group, PSI Villigen

- Implemented a middleware using ZeroMQ for distributed control and data acquisition systems.
- Developed a language neutral & platform independent messaging framework using protocol buffers.
- Report on effectiveness of built beam-monitoring system published in proceedings of ICAELPCS'15.

Multi-modal device for Braille Tutoring *July 2013 - Jul 2015*
Assistive Technologies Lab, IIT Delhi *New Delhi, India*

- Designed, fabricated and assembled working prototypes of the proposed Raspberry Pi based device and its multiple peripherals which enable audio, video and tactile feedback.
- Design and developed an extensible software (multi-lingual support) with interactive games and tutorials which test and enhance the knowledge (of spelling, mathematics, etc.) of a user.
- Conceptualised and implemented the modes of independent and peer-to-peer learning.
- Analysed the results of focus group testing which serve as evidences of usefulness of the device.

Audio Playback With & Without-OpenMAX *May 2013 - July 2013*
Qualcomm (Summer Internship) *Hyderabad, India*

- Analyzed with-OMX & without-OMX frameworks for audio playback on Android platform.
- Investigated reasons for observed delta in application power waveforms; found its source in frequent memory-copy operations and excessive context switching of OMX threads.

Parallelizing Graph Primitives on GPGPUs *December 2011, June 2012 - July 2012*
Supercomputing Education & Research Centre, IISc *Bangalore, India*
Guide: Dr. R. Govindarajan, SERC, Indian Institute of Science Bangalore

- Implemented algorithms for Parallel & Segmented Scan graph primitives on GPUs using OpenCL.
- Analysed their performance throughput against CUDA implementations on NVIDIA GPUs.

Course Projects

TIMIT Phone Recognition *Oct 2015 - currently*
Department of Engineering, University of Cambridge *Cambridge, UK*

- Acoustic modelling using GMM-HMMs and DNN-HMMs for TIMIT corpus (using HTK toolkit)
- Examining configurations of front-end features, context dependent models and phone-level language

Large Vocabulary Speech Recognition *Oct 2015 - currently*
Department of Engineering, University of Cambridge *Cambridge, UK*

- Analysing language modelling, acoustic model speaker adaptation and system combination
- Build systems to examine approaches for a Broadcast News transcription task (using HTK toolkit)

Honors and Awards

- Participated in the prestigious, (2nd) Heidelberg Laureate Forum (HLF), Germany, 2014
- Awarded Scholarship for Professional Studies, Ministry of Human Resource & Development, 2014
- IIT Delhi Semester Merit Award; Semester I, 2010-2011
- Awarded CBSE Merit Scholarship for Professional Studies; All India Engineering Entrance Examination (AIEEE), 2010
- All India Rank 678 out of 450,000 student aspirants across India (top 0.15%) in IIT-JEE, 2010
- All India Topper, Science, X & Computer Science, XII; awarded Certificate of Merit, 2008 & 2010
- Qualified (top 1%) for the Indian National Physics Olympiad, 2010
- Kishore Vaigyanik Protsahan Yojna Scholar (KVPY); awarded after 2-stage selection process to students with aptitude for research by Dept. of Science & Technology, Govt. of India 2009
- 1 of 35 selected students, Indian National Junior Science Olympiad, 2008
- National Talent Search Examination (NTSE) Scholar; awarded by NCERT, Govt. of India, 2008
- Ranked 28th in Regional Mathematics Olympiad, NBHM, Dept. of Atomic Energy, 2008

Test Scores

- GRE – Verbal: 154/170, Quantitative: 168/170, Analytical Writing: 3.0/6.0
- TOEFL – Reading: 29/30, Listening: 30/30, Speaking: 24/30, Writing: 26/30, Total: 109/120

Teaching Experience

Teaching Assistant, Course: Real Analysis *July 2014- Dec 2014*
Tutored students of freshman batch the Mathematics course on Real Analysis. Duties included solving doubts, developing problem solving skills and grading examination papers.

Teaching Assistant, Course: Calculus Part 1 *Jan 2015- May 2015*
Tutoring students in the subject of first-year Calculus. Duties include solving doubts and helping students with the programming assignments

Mentor, Avanti Fellows *July 2013 - currently*
Avanti Fellows is an initiative to provide better educational opportunities to meritorious students from low-income backgrounds. Mentoring involves preparing for engineering competitive exams via one to one teaching sessions & home visits.

Other Interests

Astronomy: Amateur Astronomer; interested in planetary & deep-sky telescopic observations

- Ranked in top 1% in 2 Astronomy Olympiads (2008 & 2010)
- Designed all rounds of Inter-college Astro Quiz with 100+ participents, IIT Delhi, 2013

Moral Philosophy - Completed two HarvardX courses - 'Justice' (by Michael Sandel), 2013 & 'Introduction to Bioethics',2014 and one UTAustinX course - 'Ideas of 20th Century', 2013
MOOC - Completed multi-disciplinary courses varying from music, to education, to superheroes
Academic Officer, Fitzwilliam College, University of Cambridge - organising multi-disciplinary academic talks and events for graduate students
Hobbies - Bird watching and Photography: photographed 100+ bird species found in North India. Enthusiastic traveler and hiker; maintain a traveling blog to catalog my forays.