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", Natural Language Engineering (submitted; 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

Adversarial Examples & Bayesian Convolutional Neural Networks *Mar 2016 - currently*
M. Phil. Thesis, University of Cambridge   *Cambridge, UK*
Supervisor: Prof. Zoubin Ghahramani, University of Cambridge
- Investigating adversarial examples for models trained for image-classification.
- Analysing robustness of Bayesian CNN (Dropout approximation) against the adversarial examples.

Large Vocabulary Continuous Speech Recognition in HTK   *Oct 2015 - April 2016*
Department of Engineering, University of Cambridge   *Cambridge, UK*
- Analysed context dependency and parameter sharing in HMM-GMM based acoustic models.
- Explored speaker adaptation, acoustic & language model rescoring in lattice-based ASR systems.
- Built a sequence-alignment based system for combining hypotheses from lattices and Confusion Networks Combination (CNC) for improving the word-error-rate of pre-trained ASR systems.

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

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*
Supervisor: Dr. Jan Chrin, Accelerator Controls Group, PSI Villigen
- Implemented a middleware using ZeroMQ for distributed control and data acquisition systems.
- Developed a platform independent messaging framework using Google 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.
- 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.

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*
Supervisor: 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   **Investigation of Speech-based systems** *Oct 2015 - April 2016*
Department of Engineering, University of Cambridge *Cambridge, UK*
- Analysed the effect of global variance in trajectory generation for Mel-cepstral features.
- Implemented word-score combination, score normalisation & system-combination in a KWS system
- Explored the dynamics of policy optimisation in a probabilistic dialogue manager.

Machine Learning Practicals *Oct 2015 - April 2016*
Department of Engineering, University of Cambridge *Cambridge, UK*
- Implemented approximate inference in Gaussian Processes; variational free energy based methods.
- Implemented and explored Policy & Value iteration, Q-Learning and SARSA on toy data sets.
- Ranked 1st, 2nd & 5th in Kaggle competitions on Density Modelling, Classification & Regression.

HONOURS 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
- 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

TEACHING EXPERIENCE
Teaching Assistant, Perception-Guided Technology Design *Jan 2015- May 2015*
Tutored students in an introductory course on HCI and cognitive psychology.
Teaching Assistant, Calculus Part 1 *Jan 2015- May 2015 & Jul 2015- Nov 2015*
Duties include solving doubts and helping students with the assignments
Mentor, Avanti Fellows *July 2013 - July 2015*
Avanti Fellows is an initiative to provide better educational opportunities to meritorious students from low-income backgrounds. Mentoring involves one to one teaching sessions & home visits.

OTHER INTERESTS
Academic Officer, Fitzwilliam College, University of Cambridge - organising multi-disciplinary academic talks and events for graduate students
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+ participants, IIT Delhi, 2013

Bird watching and Photography: photographed 100+ bird species found in North India.
90percenthumour: a blog to catalog forays in travel, literature, popular science etc.