Chaitanya Ahuja

CONTACT INFORMATION

Doctoral Candidate,
Language Technologies Institute, SCS
Carnegie Mellon University

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EDUCATION

Carnegie Mellon University **2015-Present**
Ph.D. in **Language Technologies**
Advisor: Prof. Louis-Philippe Morency
Research Interests: Multimodal Machine Learning and Conversational Systems, Natural Language Processing

- *Cumulative Performance Index* (CPI) - **3.63/4**

Indian Institute of Technology, Kanpur **2011-15**
B.Tech in **Electrical Engineering**
Minor in **Artificial Intelligence** (Computer Science and Engineering)

- *Cumulative Performance Index* (CPI) - **9.5/10**

PUBLICATIONS

- **Chaitanya Ahuja**, Louis-Philippe Morency, *Lattice Recurrent Unit* arxiv pre-print (coming soon)
- **Chaitanya Ahuja**, Karan Nathwani, and Rajesh M. Hegde, *A Complex Matrix factorization approach to joint modeling of magnitude and phase for source separation* - arXiv preprint - **[arXiv]** **[GitHub]**
- **Chaitanya Ahuja**, and Rajesh M. Hegde, *Fast modelling of Pinna Spectral Notches from HRTFs using Linear Prediction Residual Cepstrum*, Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), IEEE, Florence, Italy, 2014 - **[Paper]** **[Poster]**
- Ankit Sohani, **Chaitanya Ahuja**, and Rajesh M. Hegde, *Extraction of Pinna Spectral Notches in the Median Plane of a Virtual Spherical Microphone Array*, 4th Joint Workshop on Hands-free Speech Communication and Microphone Arrays (HSCMA 2014) Nancy, France - **[Paper]** **[Poster]**

SCHOLASTIC ACHIEVEMENTS

- Awarded **Summer Undergraduate Research Grant for Excellence** (SURGE) 2013, granted by *Dean, Resource Planning and Generation, IIT Kanpur*
- Judged as one of the top 7 projects (out of 70) **in SURGE 2013**
- Received **Academic Excellence Award** for distinctive performance in terms 2011-12, 2012-13.
- Secured **All India Rank 231 - Top 0.05%** (amongst 4,75,000 students) in IIT-JEE 2011.
- Secured **All India Rank 124 - Top 0.05%** (amongst 10,00,000 students) in AIEEE 2011.

INTERNSHIPS

- **Cornell University**
  Prediction of Adjectives for given Nouns using Probability distribution of adjective-noun pairs and adjective-adjective similarity. **[Report]**
  Mentor : Dr. Tsuhan Chen (Summer 2014)
  - Designed a system to **predict adjectives** for a given noun based on an existing set of tags, which increased the vocabulary of the tags while maintaining the sanctity of the noun-adjective pair.
  - Incorporated a Sentence Corpus (British-National-Corpus) to improve the compatibility of adjective with respect to nouns based on a probability measure.
  - Designed a storage system to **remove redundant data** from the sentence corpus which increased accuracy as compared to the baseline.

- **SURGE at Indian Institute of Technology, Kanpur**
  On-Line modeling of the Pinna for Computation of HRTFs in Rendering 3D Audio
  Mentor- Prof. Rajesh Hegde, IIT Kanpur (Summer 2013)
  - Preliminary **testing of spatial audio** to recognize issues that needed improvement.
  - Understanding the structure of the ear and working towards mimicking its functioning through digital filters
  - Relating the **anthropometry of the ear to HRTFs** in general and developing methods to verify contours generated by spectral notches (significant feature in HRTFs).
  - Currently working on application of closely-packed-multi-array systems in spatial audio analysis.
  - Involved in setting up of a **Spatial-Audio Lab**, which is crucial for finding newer methods of HRTF

Research Experience

- **Final Year Thesis - Visual Summarization of Foreground Object Motion using Boundary Initialization of Object Tracking [Report]**
  Mentors : Dr. Vinay P. Namboodiri and Dr. K.S. Venkatesh (Aug 2014/15)
  - Proposed an online system based on Kernel-based tracking for automated live synthesis of video synopsis of surveillance videos.
  - Initialization of foreground objects based on locally varying blob-detection algorithm.
  - Clustering tracks based on time and space to prevent occlusion in the summary.
  - Video Summary was synthesized by placing objects, equally spaced in time, on the background.
- **Final Year Thesis - Source Separation using a Complex Matrix Factorization approach for Joint Modeling of Magnitude and Phase [arxiv]**
  Mentor- Prof. Rajesh Hegde, IIT Kanpur (August 2014/15)
  - Proposed a new algorithm to jointly model magnitude and phase while matrix factorization
  - Reduced the Complex Matrix Factorization (CMF) problem to a simple Non-Negative Matrix Factorization (NMF) problem by simple transformations
  - Order of computation of the proposed CMF remains the same as that of standard NMF
  - Algorithm's effectiveness was confirmed by comparison against state of the art separation methods.
  - Accurate phase reconstruction resolves unwanted artifacts in the reconstructed speech signal, which has been aptly done so in this work

Teaching Experience

- **Teaching Assistant** for the course Advanced Multimodal Machine Learning at CMU (Spring 2017).
- **Academic Mentor** (2012/14) Provided academic assistance, along with taking extra-lectures for students struggling with academics.
- **Student guide** for the incoming freshman batch of 2012 at IIT Kanpur, mentoring 6 students through their freshman year.