Vasu Sharma

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EDUCATION

SCHOOL OF COMPUTER SCIENCE, CARNEGIE MELLON UNIVERSITY

Masters in Language Technologies
4.17/4.33 (Dept. Rank: 1)

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR

B.Tech. in Computer Science and Engineering
Cum. GPA: 9.9/10.0

ST. COLUMBA'S SCHOOL

AISSCE (Class XII, CBSE)
Percentage: 97%

ST. COLUMBA'S SCHOOL

AISSCE (Class X, CBSE)
GPA: 9.4/10.0

AREAS OF INTEREST

Deep Learning
Computer Vision
Natural Language Processing
Speech and Music Processing
Machine Learning Algorithm design

RELEVANT COURSEWORK

Deep Reinforcement Learning (Ongoing)
Neural Networks for NLP (Ongoing)
Deep Learning (A+)
Advanced Machine Learning (A+)
Recent Advances in Computer Vision (A)
Natural Language Processing (A)
Visual Recognition (A)
Machine Learning Techniques (A)
Human Centered Computing (A*)
Human Cognitive Processes (A*)
Advanced Algorithms (A)
Data Structures and Algorithms (A)
Digital Signal Processing (A)
Probability and Statistics (A*)
Linear Algebra (A*)
Digital Image Processing (Coursera)
Data Science Specialization(Coursera)

WORK EXPERIENCE

RESEARCH ASSISTANT

Articulab, Carnegie Mellon University
Justine Cassell | Aug 2017 - present| Pittsburgh, USA

- I am working on the **Socially Aware Robotic Assistant** project at the ArticuLab, which focus on building a socially aware robotics assistant. My primary focus is on trying to combine the user's visual, vocal and verbal cues to better gauge the 'rapport' between the user and the conversational agent and using it to enable the agent to become socially more aware to the user's emotional needs.
- I am also working on the natural language response generation conditioned on the social and task intent to achieve task completion and social rapport building in conversations with the voice agent

INTERNSHIPS

UNIVERSITY OF TORONTO

Summer Intern, Machine Learning Team
Raquel Urtasun, Sanja Fidler | May 2016 – Jul 2016 | Toronto, Canada

- **"FlowSeg: A Deep Learning based approach for simultaneous semantic segmentation and flow estimation from videos"**
- The project focused on building Deep Convolutional Neural Network architectures to study the problem of Instance and Semantic segmentation of videos. We experiment with fairly advanced and novel Deep CNN architectures to jointly estimate semantic segmentation and flow from videos. The approach shows promising results on various datasets.

ABZOOBA INC.

Technical Consultant
Labhesh Patel | Aug 2016 – Jul 2017 | California, USA (working remotely)

- Worked on building **"A Smart E-commerce Virtual Assistant"** . Implemented features like cloth parsing from images, similar image retrieval from a huge fashion catalogue and a state of the art Deep Recommender system.
- Implemented a **Multi Turn Conversational Voice Agent** to facilitate user interaction. Involved the use of Memory Networks and a soft attention mechanism over previous queries and responses to figure out the best response to a given user query.
- Also worked on **"Query based document retrieval"** by learning rich semantic document embeddings using a deep LSTM pipeline and using these to find the match the queries to relevant documents
- **"Abstractive summarization using Attention based encoder-decoder networks"** : Worked on building a deep residual LSTM pipeline which used temporal attention over both encoder and decoder networks to generate an abstractive summary of documents.

CARNEGIE MELLON UNIVERSITY

Summer Intern, School of Computer Science
Bhiksha Raj, Rita Singh| May 2014 – Jul 2014 | Pittsburgh, USA

- **"Deep Recurrent Gated Neural Networks for Dynamic Audio Denoising"**
- The project focused on construction of a Deep Recurrent neural network to achieve signal reconstruction by denoising noise corrupted signals by dynamic spectral subtraction.
- Techniques used: Recurrent and Time Delay Neural Networks, Spectral Subtraction, Multi Layer Perceptrons and other Deep Learning techniques

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (EPFL)

Summer Intern, Machine Learning and Optimization Lab
Martin Jaggi | May 2017 – Jul 2017| Lausanne, Switzerland

- "Learning semantic sentence embeddings using Hierarchical Convolutional Neural Networks
- In this project I worked on creating Deep Hierarchical Convolutional Neural Networks to learn unsupervised semantic textual embeddings. The representations learnt capture both local and global textual information and hence perform competitively against major state of the art approaches on both supervised tasks like sentiment analysis and unsupervised ones like similarity matching.

XEROX RESEARCH LABS, EUROPE

Research Intern, Computer Vision Team
Diane Larlus, Albert Gordo | Sep 2015 – Dec 2015 | Grenoble, France

- Worked on "Large Scale Image Recognition using Deep Convolutional Neural Nets"
- The projects primarily focused on constructing Deep Learning frameworks for Image Recognition. Worked on designing some novel Deep Learning frameworks for the image recognition task on the ImageNet dataset. Also made extensive use of GPUs and the popular Caffe library for training Deep Convolutional Neural Nets.

XEROX RESEARCH LABS, INDIA

Research Intern, Speech Processing Team
Vivek Tyagi | May 2015 – Sep 2015 | Bangalore, India

- Worked on 3 projects during this internship: "Application of Deep Learning for Automatic Speech Recognition", "A comprehensive analysis of Activation Functions in Deep Nets" and "A new hashing technique to enhance Deep Net performance " . Also got the **Best Project award** for the same.

PUBLICATIONS

- "Segmentation Guided Attention Networks for Visual Question Answering"
  Vasu Sharma , Ankita Bishnu, Labhesh Patel
  Published at Annual Meeting of the Association for Computational Linguistics(ACL), Vancouver, Canada, 2017
- "Automatic tagging and retrieval of E-Commerce products based on visual Features"
  Vasu Sharma , Harish Karnick
  Published at NAACL, Association for Computational Linguistics(ACL) conference, San Diego, 2016
- "A Deep Neural Network Based Approach For Vocal Extraction From Songs"
  Vasu Sharma (single authorship)
  Published at IEEE's International Conference on Signal and Image Processing Applications 2015
- "AutoTag : Automatic Image Annotation and Content Based Image Retrieval"
  Vasu Sharma , Harish Karnick
  Submitted to Computer Vision for Pattern Recognition, Hawaii (CVPR 2017)
- "Automatic Video Surveillance: Entity Detection and Recognition"
  Vasu Sharma (single authorship)
  Submitted to Computer Vision for Pattern Recognition, Hawaii (CVPR 2017)
- "Analyzing Newspaper Crime Reports For Identification Of Safe Transit Paths"
  Vasu Sharma , Rajat Kulshreshtha, Puneet Singh, Nishant Agrawal, Akshay Kumar
  Published at NAACL, Association for Computational Linguistics(ACL) conference, Colorado, 2015
- "Image Summarization using Topic Modelling"
  Vasu Sharma , Nishant Agrawal, Puneet Singh, Rajat Kulshreshtha, Akshay Kumar
  Published at IEEE's International Conference on Signal and Image Processing Applications 2015
- "A Deep Autoencoder Decoder pipeline for audio based music database search and retrieval"
  Vasu Sharma (single authorship)
  Submitted to Neural Information Processing Systems, Montreal(NIPS 2015)
- "Automatic Sign Language Recognition Systems based on Deep Neural Nets"
  Vasu Sharma (single authorship)
  Accepted at IEEE's Multimedia and Signal Processing, 2015.

OTHER PROJECTS

- "Dynamic Co-Attention Networks for Open Domain Question Answering"
  Course Project: Deep Learning (Prof.Bhiksha Raj)(Ongoing)
  Working on implementing a 2 stage pipeline which involves building a Deep Dynamic Co-attention network to simultaneously compute attention over the question and knowledgebase and estimate the most likely span in a large knowledge base which is likely to contain the answer. A bi-directional GRU adversarial generator network then uses this predicted span to generate free form natural language responses to the asked questions. We are working with the popular Squad and MS Marco datasets.

- "Automatic Tagging of Images and Content Based Image Retrieval"
  (Undergraduate Thesis with Prof. Harish Karnick)
  Designed a novel pipeline which combined a Deep ConvNet with Extreme Learning approaches for tagging of images and an LSTM for captioning them. Our model was able to handle potentially unbounded tag set and we also built a highly accurate Content Based Image retrieval system on top of it.

- "Segmentation Guided Attention Networks for Visual Question Answering"
  Course Project: Visual Recognition (Prof. Vinay Namboodiri)
  This project involved enhancing the attention maps generated by the CNN for the task of visual question answering by using pixel level dense segmentation maps. The segmentation maps gave the network pixel level grounding enhancing them and giving an improved performance on the Visual7W dataset.

- "Real Time Video Surveillance using Deep Convolutional Neural Networks"
  Course Project: Machine Learning Techniques (Prof. Harish Karnick)
  Built a real time surveillance system which included object and entity detection and localisation along with face recognition and abnormal action detection. In this project we extended the Faster RCNN model and added time recurrent connections to model context across the video frames. The Face recognition and and abnormal action detection networks were integrated into this Recurrent Faster RCNN model using a novel combination layer and the whole network was trained in a joint end to end manner.

- " Visual Storytelling"
  Course Project: Recent Advances in Computer Vision (Prof. Gaurav Sharma)
  This task entails producing story like descriptions for a sequence of images. I experimented with a unique GRU based decoder which looks at all the encoder states simultaneously which allows the model to peek into relevant parts of the encoder states using a soft attention mechanism. I also use a bidirectional encoder and also implemented my own custom version of the beam search algorithm in a more parrallelized fashion rather than the traditionally used sequential version.

- "An Automatic Review generator and Restaurant Recommender System"
  Course Project: Natural Language Processing (Prof. Harish Karnick)
  We build a state of the art recommender system along with an automatic review summarization system to provide user with quick reviews and suggestions. We also implement a sentiment analysis system using Paragraph vectors to represent text documents and predict ratings from user reviews. This was trained jointly with a recurrent network based review generator network which enhanced the accuracy of both the networks.

- "3Dify: Automatically convert 2D images and videos to 3D using Deep Neural Networks"
  Course Project: Topics in Internet Technologies (Prof. TV Prabhakar)
  Created a Deep Convolutional Network based pipeline to automatically learn 3D anaglyph maps from 2D images. Unlike other models this is trained directly on 3D images and learns the depth maps as implicit representations rather than learning them explicitly. We also created a web app around it.

- "DocGen: A novel Document Embedding technique"
  (Supervised by Prof. Harish Karnick)
  This project involves working towards designing a Document Embedding technique which is inspired by Generative Adversarial Networks. I trained a generator and discriminator network simultaneously in an adversarial manner. Once trained this network can be used to produce the document embedding vectors which are the latent activation values of the code layer in the network when the document in passed through it.

- "Artify: A Deep Neural Network based Image styling app"
  Course Project: Software Engineering (Prof. TV Prabhakar)
  Created an stylistic image editor Android app which implemented the Perceptual Style transfer method using Deep Convolutional Neural Networks to fuse artistic styles into a given image. Followed proper software architecture and design practices and implemented a variety of tactics to enhance quality attributes of the system.

SCHOLASTIC ACHIEVEMENTS

- Selected as Teaching Assistant for CS785A: Multiagent Systems under Prof. Harish Karnick
- Selected for S.N. Bose Scholars program, Google Mountain View Internship program and Qualcomm San Diego Internship program
- **Scholarships Awarded** : World Quantitative and Science Scholarship from Worldquant, JN Tata Endowment Fund Scholarship, KC Mahindra Trust Scholarship, National Talent Search Exam (NTSE), Junior Science Talent Search Exam (JSTSE), Kishore Vaigyanik Protsahan Yojana (KVPY), Aditya Birla Scholarship, NSTSE, IITK Sports Scholarship, NCC Scholarship
- **Olympiads Cleared** : International Informatics Olympiad (Silver Medal), National Cyber Olympiad (Silver Merit), National Science and Maths Olympiads, National Standard Exam in Physics and Chemistry
- Selected for Deep Learning Summer School 2016, Montreal among hundreds of graduate and undergraduate students worldwide.
- Gave an invited talk on 'A Deep Autoencoder based approach for Music Retrieval' at Sound and Music Technology Group at National University of Singapore.
- Among the 20 students selected from South East Asian region to attend Advances in Computer Science Technology Workshop at National University of Singapore.
- IIT JEE rank: 165, AIEEE Rank : 93
- Academic Mentor of Fundamentals of Programming course. Personally mentored 10 students and ensured that they passed the course with flying colours.

EXTRA - CURRICULAR ACHIEVEMENTS

- Awarded the **Outstanding Freshman of the Year** and **Best Incoming Sportsperson** by Student's Gymkhana, IIT Kanpur
- Inter IIT '15 Water Polo Champions and '16 Runners Up
- Delhi State Swimming Championship - Won 1 Silver and 2 Bronze Medals
- 2nd Position in Delhi State Chess Championship
- Won a 1 Gold, 1 Silver and 3 Bronze medals in Water Polo and Aquatics at Inter IIT Meets
- National Cadet Corps(NCC)
    1. Received the 'A' Certificate on clearing the 'A' Certificate Examination
    2. Highest Rank of Sergeant awarded
- Positions of Responsibility: Secretary: Programming Club IIT Kanpur, Student Guide: Counseling Service IIT Kanpur, Academic Mentor: Counseling Service IIT Kanpur, Executive: Alumni Contact Program, Member : Editorial Board