KUSHAGRA MAHAJAN

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Education

Indraprastha Institute of Information Technology, Delhi CGPA: 8.76
B.Tech (CSE) (till 6th Semester)
2014 – Present

Delhi Public School Rohini, Delhi Percentage: 91.8
Central Board of Secondary Education
2012 – 2014

Delhi Public School Rohini, Delhi CGPA: 10
Central Board of Secondary Education
2000 – 2012

Skills

Expertise Area	Machine Learning, Computer Vision, Deep Learning, Automatic Speech Recognition
Programming Language	C, C++, Java, Python, MATLAB, Octave, Shell Scripting, SQL, HTML, CSS, Javascript
Tools and Technologies	Caffe, Keras, Tensorflow, OpenCV, Kaldi, NodeJS, MongoDB, MySql

Internships

Undergraduate Technical Intern – Intel Corporation (Aug'17 – Dec'17)
Guide: Tigi Thomas
Working on a Virtual Reality and Desktop module for gesture recognition. Main task is data analysis followed by building of machine learning and deep learning models for data modeling taking into consideration memory constraints and output latency. Device to be used for applications like Google Maps, Music System controls. Awarded best upcoming project for IoT Group in Intel India.

Research Intern – IIT Delhi (Dec'15 – July'16)
Worked in the systems and architecture research group at IIT Delhi. Details about the projects can be found in the major and minor projects sections.

Sewa Bharti – Community Work Internship (May'15 – July'15)
Guide: Mr. Prateek
Helped under-privileged and slum students gain valuable exposure to computer software and providing them vocational training in applications like Ms Excel and Ms Powerpoint; Received a certificate of appreciation for completing 100+ hours.

Major Projects

Pose - Aware Fine Grained Recognition (BTech Thesis) (Aug'16 - Sep'17)
Guide: Prof. Chetan Arora, IIIT Delhi Team Size – 3
In this work, pose specific Convolutional Neural Networks were trained for non-deformable pose aware dataset images and then merged. In addition, we have trained an additional meta-network to identify the pose of the supplied image. The ensemble achieved significantly better results than deeper networks. Our model outperforms that state of the art results on FGCV-Aircrafts dataset, Stanford Cars dataset and gives only slightly less than state-of-the-art for CUB-200-2011 dataset. Contributed additional pose aware footwear dataset. **Submitted to International Conference on Image Processing (ICIP 2018) (under review).** Link to the current version of the paper.

Exploiting Texture Cues in Clothing Parsing (July'17 - Present)
Guide: Prof. Chetan Arora, IIIT Delhi Team Size – 2
We propose a two-stream deep neural network architecture for fashion image parsing. While the first stream uses the regular fully convolutional network segmentation architecture to give accurate spatial segments, the second stream provides texture features based upon Gabor filters and helps in determining the clothing type resulting in improved recognition of the various segments. Our approach achieves state-of-the-art results on the standard benchmark datasets: Fashionista and CFPD. **Submitted to International Conference on Image Processing (ICIP 2018) (under review).** Link to the current version of the paper.

Dynamic Traffic Light System (Jan'17 – May'17)
Guide: Prof. Saket Anand, IIIT Delhi Team Size – 3
Comparison among the HOG based, Deformable Part Model and deep learning based Single Shot Detector for detecting car density on the roads through surveillance videos. Involved lane isolation and vehicle speed detection through metric rectification followed by KLT tracking to produce a deployable system. System to be deployed on Swarath (Mahindra's Spark Rise Driverless Car Challenge Vehicle at IIIT Delhi).

Speech Emotion Recognition and Generation (May'17 – Present)
Guide: Prof. Saket Anand, IIIT Delhi Team Size – 1
Worked on building a kaldi based toolkit that produces alignment files and word level segmentation for the input wave files according to the supplied model. Developed CNN-RNN architectures for emotion classification on the RECOLA dataset, achieving competitive performance to the state of the art. Currently working on generative models for speech to incorporate emotion aspects into the generated speech. The motivation is to disentangle different factors affecting the quality, emotion and naturalness of speech using adverserial learning.

DRAM Simulator for CPU Simulator Tejas (May'16 – Jul'16)
Guide: Prof. Smruti Sarangi, IIT Delhi Team Size – 2
A cycle accurate model of DRAM memory controller; it is an accurate and publicly available DDR2/3 memory system model which can be used in both full system and trace based simulations. Computationally efficient due to the novel semi event-driven model. Tested extensively by varying number of rows, channels, row buffer management policies and found to give great results on memory intensive benchmarks like mcf, zeusmp, gcc etc. not only in terms of accurate IPC figures but also for design space exploration.

Minor Projects

Stock Price Prediction and Analysis (Sep'16 – Oct'16)
Guide: Prof. Saket Anand, IIIT Delhi Team Size – 2
Picked three stocks from the National Stock Exchange from three different sectors: HDFC, Cipla, TCS and study their trends and interdependence with the NIFTY index. Some of the features used for analysis: Momentum over past 10 days, moving averages, NIFTY index, 10-day volatility, average price change with varying windows, turnover etc. Techniques used were SVR, Lasso, Ridge Regression, Linear Regression with varying kernels.

Marine Objects Detection and Segmentation (Sept'16 – Dec'16)
Guide: Prof. AV Subramaniam, IIIT Delhi Team Size – 2
AlexNet pretrained on ImageNet was used for detection of marine objects like ships, liners, boats. We made use of Segnet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation. The problem poses difficulty in tracking these marine objects due to the motion blur of the camera in recording these videos.

How I Met My TA? (Sep'16 – Dec'16)
Guide: Prof. Pushpendra Singh, IIIT Delhi Team Size - 3
Built an Android application through which students could post queries to the TAs of their courses, set up a meeting time integrated with Google Calender, chat, broadcast queries. TAs could respond individually or make an announcement and the instructor received statistics to monitor the efficiency of the TAs.

EmuARM Emulator (Nov'15 - Jan'16)
Guide: Prof. Smruti Sarangi, IIT Delhi Team Size - 1
An Emulator for compiling, running and debugging assembly programs with both ARM and THUMB architectures; key features include breakpoints, memory and jump mappings, step into and step over functionality, and GUI and command line compile and run options. The emulator is currently deployed in the Computer Architecture Course at IIT Delhi.

Building GNU/Linux shell using C (Oct'15 – Nov'15)
Guide: Prof. Pushpendra Singh, IIIT Delhi Team Size - 1
The shell was designed to perform all the shell operations including pipelining, redirecting input/output. System commands like top, kill, cp along with other popular linux commands were also compatible.

Positions of Responsibility

- Student Volunteer at Open House sessions conducted for the incoming batches to solve queries and guide them through the transition. (Jun'16 – Jul'16)
- Core Member of the publicity team and conducted the events Prosort, BrainFuzz and Darwin Games at Esya'15 and Esya'16, the annual technical fest of IIIT Delhi. (Jul'15 – Aug'15)
- Volunteer at Vivekananda Kendra, New Delhi. Part of organizing various events like The Universal Brotherhood Day, 2016. (Jan'16 – Present)

Awards and Achievements

- Dean's award winner for excellent academic performance during the year 2016-17
- School Gold Medalist and Principal's Cash Award winner for being a scholar for 7 consecutive years
- Obtained Scholar blazer and scholar tie for outstanding academic performances
- Awarded proficiencies for highest aggregate and for various subjects in different standards. Received proficiency in Computer Science in class 12

Interests and Hobbies

- Experienced Keyboard Player and Guitarist; Member of the Music Club. Cleared Grade 4 in Electronic Keyboard Practical and Grade 3 in Music Theory from Trinity College London.
- Cricket and Table Tennis Enthusiast

Declaration: The above information is correct to the best of my knowledge.
Kushagra Mahajan
Date: February 10, 2018