Kushagra **Mahajan**

COMPUTER SCIENCE ENGINEER · MACHINE LEARNING EXPERT

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"Do what you love. Love what you do."

Sum**mary**

I am a final year undergraduate student pursuing Bachelor of Technology in Computer Science at Indraprastha Institute of Information Technology, Delhi (IIIT Delhi). My research interests are in Machine Learning, Deep Learning, Computer Vision, and Speech Analysis. Interested in exploring the complex interplay between facial expression and speech through disentanglement of speech content and style and relating speech style to expression and content to movement of the mouth.

Edu**cation**

Indraprastha Institute of Information Technology, Delhi (IIIT Delhi)   *New Delhi, India*

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING   *Aug. 2014 - Exp.Dec. 2018*

- CGPA :8.76 (till semester 6)

Delhi Public School Rohini   *New Delhi, India*

HIGH SCHOOL   *Apr. 2012 - Exp. Mar. 2014*

- Percentage: 91.8%

Delhi Public School Rohini   *New Delhi, India*

JUNIOR SCHOOL   *Apr. 2000 - Exp. Mar. 2012*

- CGPA: 10

Wor**k Experience**

Intel Corporation   *Bangalore, India*

UNDERGRADUATE TECHNICAL INTERN   *Aug. 2017 - Dec. 2017*

- 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.

Indian Institute of Technology, Delhi (IIT Delhi)   *New Delhi, India*

RESEARCH INTERN, DEPARTMENT OF COMPUTER SCIENCE   *Dec. 2015 - Jul. 2016*

- Worked on a cycle accurate model of DRAM memory controller mentioned in detail in the projects section.
- Worked on the EmuARM Emulator for compiling, running and debugging assembly programs with both ARM and THUMB architectures. Details are mentioned in the projects section.

Sewa Bharti   *New Delhi, India*

TEACHING FELLOW   *May. 2015 - Jul. 2015*

- 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.

Res**earch**

Pose - Aware Fine Grained Recognition using Pose Experts (BTech Thesis) [paper]

PROF. CHETAN ARORA, IIIT DELHI   *Aug. 2016 - Sep. 2017*

- 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.
- Accepted in IEEE International Conference on Image Processing (ICIP 2018).

Exploiting Texture Cues for Clothing Parsing in Fashion Images [paper]

PROF. CHETAN ARORA, IIIT DELHI   *July. 2017 - Feb. 2018*

- We propose a two-stream deep neural network architecture for fashion image parsing. The first stream uses the regular fully convolutional network segmentation architecture to give accurate spatial segments, while the second stream provides texture information based on Gabor and LBP features.
- Our approach achieves state-of-the-art results on the standard benchmark datasets: Fashionista and CFPD.
- Accepted in IEEE International Conference on Image Processing (ICIP 2018).

Disentangling Factors of Variation in Speech

PROF. SAKET ANAND, IIIT DELHI   *May. 2017 - Present*

- 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 Factorized Hierarchical VAEs for disentangling gender and accent information from speech.

Academic Projects

Dynamic Traffic Light System [code] [report]

PROF. SAKET ANAND, IIIT DELHI   *Jan. 2017 - May. 2017*

- 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).

Stock Price Prediction and Analysis [code] [report]

PROF. SAKET ANAND, IIIT DELHI   *Sep. 2016 - Oct. 2016*

- 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 [report]

PROF. AV SUBRAMANYAM, IIIT DELHI   *Sep. 2016 - Dec. 2016*

- 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. We used DWT filter to analyze the limitations of our model with regards to the relative sizes of the images and objects of interest.

DRAM Simulator for CPU Simulator Tejas [site]

PROF. SMRUTI SARANGI, IIT DELHI   *May. 2016 - Jul. 2016*

- 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.

How I Met My TA?

PROF. PUSHPENDRA SINGH, IIIT DELHI   *Sep. 2016 - Dec. 2016*

- 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 [code] [manual] [software]

PROF. SMRUTI SARANGI, IIT DELHI   *Nov. 2015 - Jan. 2016*

- 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

PROF. PUSHPENDRA SINGH, IIIT DELHI   *Oct. 2015 - Nov. 2015*

- 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.

Honors & Awards

2017	**Dean's award winner**, for excellent academic performance during the year 2016-17	*IIIT Delhi*
2014	**School Gold Medalist and Principal's Cash Award winner**, for being a scholar for 7 consecutive years	*High School*
2012	**Obtained Scholar blazer and scholar tie**, for outstanding academic performances	*Junior School*
2014	**Awarded proficiencies**, for highest aggregate and for various subjects in different standards. Received proficiency in Computer Science in class 12.	*High School*

Positions of Responsibility

2016	**Student Volunteer**, at Open House sessions conducted for the incoming batches to solve queries and guide them through the transition.	*IIIT Delhi*
2015-16	**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.	*IIIT Delhi*
2016-18	**Volunteer**, at Vivekananda Kendra, New Delhi. Part of organizing various events like The Universal Brotherhood Day, 2016.	*Vivekananda Kendra, New Delhi*

Interests & 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.

- Love exploring finance and economics in my spare time with the objective of being able to sell my products better.