

MANOJ ALWANI

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EDUCATION

Stony Brook University, New York. 3.67/4.0 (2014 - 2015)
M.S. in Computer Science (**Thesis:** Fused Convolutional Neural Network Accelerator)

The LNM Institute of Information Technology, Jaipur, INDIA 8.06/10 (2007- 2011)
Bachelor of Technology, Communication and Computer Engineering

Indian Institute of Technology Delhi, INDIA 8.18/10 (Aug - Dec, 10)
Semester Exchange

PROFESSIONAL EXPERIENCE

Element Inc | Research Engineer Feb, 2016 - Current
Working on deep learning solutions for Biometric applications under guidance of **Yan Le Cunn**.

Element Inc | Research Intern May, 2015 – Aug, 2015
Project: Implemented faster CNN's /RNN's for Biometric applications using Lua, Torch and ported on mobiles.

Computer Architecture Lab | Stony Brook University | Research Assistant Aug, 2014 – Dec, 2015
Project: GPU/FPGA Accelerators for Deep Learning, Computer Vision and Big data.

Advance System Technology | STMicroelectronics, INDIA | Senior System Software Engineer June, 2011 – July, 2014
Projects: Human Machine Interaction (HMI), Intelligent Systems and parallel computing.

Google | Summer Intern | Google Summer of Code (GSOC) Apr – Aug, 2011
Project: WSI with DICOM [\[Project Link\]](#) [\[code\]](#)

COMPUTER SKILLS

Programming: C/C++, Python, **Torch, Lua**, Matlab, Assembly (8051), R, Java, C#.

OpenSource: **OpenCL**, OpenGL, CUDA, OpenVX, GDCM, Hadoop, Map Reduce, **OpenCV**, OpenJPEG, JM(**HEVC**), HM(**H.264**).

PROJECTS

Deep Learning (C++, Python, Caffe, Matlab, OpenCV, Big Data, R) Fall 2014 | Stony Brook University
Architecture

- **Accelerators for deep learning, computer vision and big data**
 - Worked on NSF funded project on accelerator's for deep learning and computer vision. Implemented a method to fuse different layers of Convolutional Neural Networks (CNN) and got 2x speedup in executing them. To see the efficiency in real world scenario we implemented our method on VGG (23 layers deep) network and ported it on FPGA which beats current Microsoft and UCLA's benchmark results.
 - Identified bottleneck layers in Neural Network (NN) Architectures and redesigned them for heterogeneous systems.
- **Natural Language Processing Architectures**
 - Implementing a neural network architecture which can be trained according to dependency of words in the sentences. This can learn better linguistic knowledge as compared to Recurrent NN (RNN) , CNN and RNTN architecture.

Applications

- **Brain Tumor Classification:** Implemented deep CNN architecture in caffe framework for 6 different types of brain tumor detection and got accuracy of 77 which is 5 percent higher than traditional CNN network.
- **Transfer learning:** Used brain tumor learned network for breast cancer classification. We got accuracy of around 65 percent in this case where newly learned new network can reach up to 72 percent.
- **Facial beauty prediction:** Predicted Facial beauty using CNN in caffe framework and got accuracy of 80%.
- **Deep Learning for NLP**
 - **Word vector prediction:** predicted word vectors for medical vocabulary using three layer fully connected network and got accuracy of around 97 percent.
 - **Relation extraction in medical sentences:** Implemented recursive (RNN) and plain neural network to identify effect of drug over disease in medical sentences. Used multinomial logistic regression for identify multiple sentiments.
- **Networks:** **Recurrent** Neural Network (NN), Recursive NN, **Convolutional** NN, **Reinforcement** leaning based networks.

Computer Vision (OpenCV, CUDA, Arm neon Intrinsics, GPU, OpenGL) Aug, 2013 – July, 2013 | STMicroelectronics

- **Finger Tracking:** Implemented Finger tracking with single camera using visual models and particle filtering. It was also optimized for arm and GPU using CUDA. We got accuracy of around 80% with 30 fps. The results were presented at Consumer Electronics Show (CES) – 2014.

- **Augmented Reality (AR):** Developed a method for inspecting virtual objects using fingers. The object is rendered on the finger and zooming /rotation are supported using fingers gestures.
- **Smart Camera:** Implemented Combined Scheme of object Recognition, compression and privacy Protection. Implemented this scheme with **H.264** and **HEVC** video coding standard. The results were published at:
 “A Method For Fast Rough Mode Decision In **HEVC**”, **DCC-2013. (IEEE) (Logistic Regression based Approach)**

Parallel Computing (Parallel Architectures, CUDA, OpenCL, OpenVX, PCL, GPU) Aug, 2012 – July, 2014 | STMicroelectronics

- **Face Detection:** Implemented face detection using OpenVX (future embedded systems library) and OpenCL on ST’s single threaded architecture. Presented at Consumer Electronics Show (CES), Las Vegas, 2013.
- **Point Cloud Library:** Implemented octree building and search using OpenCL got 3x speed up.
- **Deep Learning:** Implemented various learning networks of NLP and CV using CUDA and OpenCL.

SBUnix, Preemptive Operating System (C, JOS) Fall 2014 | Stony Brook University

- **Project: Cure Cancer or something** (C, File System)
 Implemented inline data de-duplication method to store genome sequences efficiently. Used content aware chunking to break genome data into different chunks and stored information in SHA1-hash for fast searching and storing.
- **OS Coursework:** Developed a preemptive operating for intel x86_64 architecture on JOS kernel. Implemented features like memory management, multiprogramming, fork and File system.

Artificial Intelligence (C++, OpenCV, python) STM | Spring 2015 | SBU

- **Particle Filtering:** Implemented particle filtering based methods for object tracking and data compression.
- **Games:** Peg Solitaire, PacMan (Adversial, A*), N Queen, Sudoku, Reinforcement learning.

Natural Language Processing

- **Interactive Search Engine** (Python, Java) Spring 2015 | SBU
 Building an 'interactive search engine' for consumer devices like mobile, tablet which applies Natural Language Processing and multimedia analysis to process queries and return most relevant search results in interactive form (like tags, Videos).
- **Deep learning for NLP** (C++, Python, Java) Spring 2015 | SBU
 Using Deep learning in semantic word models and word vectors prediction which can be used for text understanding, entity extraction, classification and applying data summarization. Got accuracy of around 78 percent when used these trained vectors for sentiment analysis in medical sentences.

Robotics and Circuit Design

- **Brain Machine Interaction:** Done experimentation on controlling objects based on different cognitive states of minds using single probe EEG based brain computer interface.
- **Wild Life Tracking:** Developed a prototype for Wildlife Tracking. We used FAT based approach to store all the records and used this data to predict animal health and environment conditions. (**Best Project Operating System Course**)
- **Others:** Robotic Arm, Heart beat detector, Transistor and Mosfet Curve Tracers, Unidirectional Text communication system.

PUBLICATIONS [\[Link\]](#)

- M.Alwani, M.Ferdman and P.Milder, “**Fused Layer CNN accelerator**”, Micro 49, 2016(**IEEE/ACM**)
- M.Alwani, S Johar and SP Singh, “**Transform domain based image/video privacy protection**”, LASCAS, 2014, Chile. (**IEEE**)
- S.Johar and M.Alwani, “**Method For Fast Bits Estimation In Rate Distortion For Intra Coding Units In HEVC**”, CCNC, 2013.
- M.Alwani and M. Mathur, “**Restricted Affine Motion Compensation in Video Coding Using Particle Filtering**”, ICVGIP, 2010.

COURSES

Algorithms, Operating System, Machine Learning, Computer Vision, NLP, Artificial Intelligence and Deep Learning.