KULDEEP SHARMA

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Education:

Indian Institute of Technology Delhi **Hauz Khas, New Delhi (2013-17)**
Bachelor of Technology
Major Focus: *Machine Learning, Deep Learning, Computer Vision, Object Recognition & Detection, Attention Mechanism, Linear Algebra, Automobiles, Robotics, Data Structure & Algorithms, Probability & Statistics*

Academic Achievements:

- Designed a *convertible laptop platform;* shortlisted for ***Gandhian Young Technological Innovation Awards***
- Secured an **All India Rank *1438*** out of **1.3 million candidates** in *Joint Entrance Examination, 2013*

Technical Skills:

Langauges and Tools: **C++**, **Python**(***TensorFlow***, ***PyTorch***, ***OpenCV***), Docker, JIRA, **GitHub, iOS**

Experiences:

Pactera APAC **December 2020 - Currently**
(*AI Consultant*) *Minato City, Tokyo*

- Leading the team to build a word/spell correction NLP model for documents in Japanese language
- Working on probabilistic approach to solve word correction problem and used **MeCab** as tockenizer
- Successfully developed a fully working Face Recognition system for the internal usage of the company

AWL Inc. **January 2020 - December2020**
(*Core AI Researcher*) *Chiyoda City, Tokyo*

- Developed & presented AI solution in 3 months, potentially brought **100s millions JPY** worth business
- Designed and developed the *entire AI system* solution for a very famous food restaurant chain in Japan
- Worked on **Semi-Supervised Learning, Contrastive Learning** for **Domain Adaptation** to generate more information from less label data, it helped us solving the issue of data scarcity for some scenarios
- Worked with **GANs** for visual data balance and to generate new data points for better **CNN's** training
- Implemented the whole AI solution on an **embedded device** to achieve *low cost & real time* product
- Implemented and modified *state-of-the-art* research papers that include latest ***Attention Mechanism, Graph CNNs, Multi-label Classification & Domain Adaptation*** technologies from the **CVPR-2019**
- Managed & worked with a research group in India and designed a self-supervised training system which will lead to the ***mass deployment*** of the *edge product* for the restaurant chain all over the ***Japan***

Vision & Machine Learning Group (HESL) **November 2017 - November 2019**
(*Research Assistant*) *Nanyang Technological University, Singapore*

- Published and worked on a novel approach for designing **energy & resources efficient** deep neural network by utilising their ***plastic behaviour*** and showed their ease of deployment on ***embedded devices***
- Successfully developed ***cost-efficient, robust & real-time vision based sensors*** to ***detect, track &***

classify vehicles for *intelligent traffic management and law enforcement* in **Singapore**

- Presented our working prototypes of sensors to members of ***Ministry of Transport Singapore & Land Transport Authority Singapore,*** motivated us for the field trial of our products inside **NTU** Campus
- Implemented a ***network pruning technique*** developed by **NVIDIA** in ***PyTorch***, used it to **compress & accelerate *SqueezeNet***, successfully deployed this pruned ***SqueezeNet*** on an ***embedded device*** achieved ***7x size reduction*** and ***10x speed up*** on a single ***A15 core*** without losing any performance
- Researched various techniques for creating *efficient deep neural networks* such as ***Quantisation, Low-Rank Representation, Network Pruning***, added different perspective to solve this problem

Vision & Graphics Lab **May 2016 - May 2017**
(Prof. Subhashis Banerjee & Prof. Sudipto Mukherjee) *Indian Institute of Technology Delhi, India*

- Worked on ***Object Detection, Scene Recognition & Image Classification*** to develop smart sensors for ***Transportation Research & Injury Prevention Program*** to reduce poor health effect of road transport
- Developed program for ***Pedestrian Detection*** using ***VGG-16 & ResNet*** coupled with ***Faster-RCNN***, used the ***Caffe's*** **python wrapper** for implementing and training the deep networks
- Fine-tuned **deep neural networks such as *VGG-16, ResNet & AlexNet*** to fit our applications and implemented ***Kanade-Lucas-Tomasi & Kalman Filter*** to **track pedestrian** for more robustness
- Developed program for **camera calibration** and **6D Pose Estimation** of real objects from **2D & 3D images,** used **Aruco Markers, OpenCV** & **solvePnP** to extract the translational & rotational vectors

Impact Simulation Lab **May 2015 - December 2015**
(Prof. Anoop Chawla) *Indian Institute of Technology Delhi, India*

- Worked as a member of research team of IIT Delhi to *generate* ***3D Meshes using Delaunay Triangulation*** for a mechanical simulation software ***PIPER***, funded by ***European Union Research Organisation***
- Developed a **C++ program for mesh generation** of solid objects given their nodal points in 3D space
- Implemented & compared two different papers: ***Shelling Algorithm*** and ***Divide & Conquer Algorithm***

Publication:

Evaluating the Merits of Rankings in Structured Network Pruning
(ICDCS EAI 2020, Singapore)

- Showed how controlled removal of random filters from networks can get optimal compressed CNNs
- Proposed a simple GFLOPs friendly pruning techniques for accelerating CNNs for embedded devices

Course Projects:

Computer Vision **July 2016 - November 2016**
(Prof. Subhashis Banerjee) *Indian Institute of Technology Delhi, India*

- Implemented a **higher order clustering** using a method called ***sparse grassmann clustering***, used it to cluster data points in **higher-dimensions** & for ***segmentation task*** on **3D images** (Microsoft Kinect)
- Used ***Scale-Invariant Feature Transform(SIFT)*** to extract key-features from images, implemented a **Vocabulary-Tree** on Indian cityscapes and used it for ***image retrieval task***
- Implemented ***Baker & Matthew's*** paper on ***Lucas-Kanade*** algorithm, used for ***image stabilisation task***

Machine Learning **January 2016 - May 2016**
(Prof. Sumeet Agarwal) *Indian Institute of Technology Delhi, India*

- Implemented a **deep neural network from scratch** in ***Caffe***, trained it on the standard **MNIST** dataset and achieved an accuracy of **99.843** % on the ***Kaggle's Digit Recognition*** **competition**
- Implemented a **neural network in python from ground up**, experimented with different hyper-parameters such as *number of layers*, *activation function* to study their impact on final performance
- Developed a ***Naive Bayes*** **program** and used it for the ***Language Classification task*** for **4 languages**
- Designed & performed experiments to understand both ***supervised learning*** & ***unsupervised learning***, compared their performances using **K-means**(*unsupervised*) & **SVM**(*supervised*) on **MNIST**
- Implemented **GMM from scratch** in **MATLAB**, compared results with **standard K-means** & **GMM**

Activities and Leadership:

- Led the hostel team to the 3rd position of the inter-hostel hockey tournament IIT Delhi 2104-15
- Participated in several sports events for hostel and won runner-up trophy in General Championship'15
- Enjoy exploring cultures & travelling, running, watching and playing sports & e-sport(DoTA)