

Interests

Machine Learning, Deep Learning, Computer Vision

Research Experience

- **Real Time Object Detection in Mobile Devices** May 2017-July 2017
IBM India Research Laboratory, Bangalore
 - *Objective:* To detect and identify objects in real time on mobile devices such that the model is memory, space and power efficient, and adaptable on arbitrary environments with relatively less training data
 - Intelligently **prune** redundant parameters in a **deep network**, reducing model size while maintaining similar accuracy, bringing applications from high-end immobile servers to mobile devices/robotics
 - Trained and Pruned the model on COCO with over a million object instances with competitive accuracy
 - Contributed Workplace Dataset and a Visual-IOT system for instance level recognition in mobile devices
- **Person Re-Identification: Multi-Task Deep CNN with Triplet Loss** May 2016-July 2016
Supervisor: Prof. Vinay Namboodiri, IIT Kanpur [Code ✉](#)
 - *Objective:* To solve the problem of Person Re-Identification i.e. Identifying a person in a **Low-resolution** Dataset given a query image of that person from a Same or a Different Camera
 - *Method:* Multi-Task Deep Convolutional Neural Network with shared parameters in lower layers to Jointly Learn Attributes and Features for Pedestrian Images with Multi-Task Loss
 - Achieved Results comparable to state-of-the-art on Market-1501 with over 32000 images
- **Deep Hybrid Models for Semi-Supervised Learning** Sep 2017-Ongoing
Supervisor: Prof. Piyush Rai, IIT Kanpur
 - *Objective:* Training a Deep Network in a Semi-Supervised Framework with minimum labelled examples
 - *Model:* Combined strength of Discriminative-Generative Approaches in Multi-Task Setup with Feedback
 - Gaussian Mixture VAE for Generative branch and CNNs for Discriminative Branch with shared Encoder

Relevant Projects

- **Zero-Shot Image Tagging** [Report ✉](#) [Presentation ✉](#) [Code ✉](#)
Supervisor: Prof. Piyush Rai *Course Project : Machine Learning Techniques*
 - *Problem Statement:* Automatic **Annotation** of Images with Previously Unseen Tags
 - Proposed a Deep Network for **FastTag**, experimented with **Co-occurrence** based tag embedding, and suggested a **Kernelized** Ridge Regression based model to learn the Principal Direction for an Image
- **Training Sparse Neural Networks** Aug 2017-Ongoing
Supervisor: Prof. Purushottam Kar
 - *Problem Statement:* To train sparse one-hidden layer Neural Network and recover the sparsity structure
 - Implemented and Experimented with **Tensor Methods** for Weight Initialization in the Sparse Setting
- **Semantic Segmentation** [Survey-Report ✉](#) [Survey-Presentation ✉](#)
Supervisor: Prof. Gaurav Pandey
 - *Problem Statement:* To solve the problem of **Pixel-level** Semantic Segmentation for Images/Videos/3D
 - Conducted a **survey** and studied research papers covering all the major algorithms such as Conditional Random Fields, Fully Convolutional Networks, HyperColumns, Dilated Convolutions, Sensor Fusion
- **Texture Synthesis** [Code\(nps\) ✉](#) [Code\(quilting\) ✉](#)
Supervisor: Prof. Vinay Namboodiri *Course Project : Introduction to Computer Vision*
 - *Objective:* To synthesize large Texture image from small samples, capturing important Texture Properties
 - Studied and Implemented Research Papers: "Image Quilting for Texture Synthesis and Transfer" by Alexei A. Efros, William T. Freeman and "Texture Synthesis by Non-parametric Sampling" by Efros et.al

Other Selected Projects

- **Varun : Autonomous Underwater Vehicle** [Webpage](#) [Github](#)
Faculty Advisers : Prof. K.S. Venkatesh, Prof. Sachin Y. Shinde
 - Designed and implemented Object Detection Algorithms using OpenCV to detect various obstacles Underwater to help the vehicle maneuver autonomously around these obstacles
 - Developed the software architecture of the Vehicle using ROS(Robot Operating System)
- **ShareCab** [Code](#)
Supervisors: Prof. Satyadev Nandakumar, Prof. Piyush Karur *Course Project: Computing Laboratory II*
 - Developed Full Stack Ride-Sharing Web Application, based on Django, for Campus Community
 - Automated Search for Suitable Ride Matching based on Timings, Train/Flight Details, Destination
- **Software Testing Tool** [Code](#)
Supervisors : Prof. Amey Karkare, Prof. Subhjit Roy *May 2015- July 2015*
 - Developed a tool for Automatically Generating Test Cases for High MCDC coverage
 - Build the solution over open-source tools implemented in multiple languages like Ocaml,C and Python
- **NachOS: Operating Systems** [Code](#)
Supervisor: Prof. Mainak Chaudhury *Course Project: Operating Systems*
 - Implemented System Calls such as Fork, Exec, Sleep, Yield over the basic implementation of NachOS
 - Implemented Shared Memory Interface, Demand Paging and various Page Replacement Algorithms
- **Ada Compiler in Python** [Code](#)
Supervisor: Prof. Amey Karkare *Course Project: Compiler Design*
 - Implemented an end-to-end compiler from scratch for Ada95 in Python
 - Separate modules for parse trees, abstract syntax trees, intermediate code, and target code(x86)
- **Speech Recognition - Hidden Markov Models** [Report](#)
Supervisor: Prof. Rajat Mittal *Course Project: Discrete Mathematics*
 - Learned about the concepts related to Markov Chains and Hidden Markov Models
 - Automatic Speech Recognition using Hidden Markov Models considering the Markov assumption

Technical Skills

LANGUAGES	C/C++, Python , Matlab
LIBRARIES AND TOOLS	OpenCV, ROS, Caffe, Tensorflow, Keras, Theano, Django
OPERATING SYSTEMS	Linux(Ubuntu, CentOS), Windows , BSD(FreeBSD)

Academic Achievements

- Secured All India Rank 118 in JEE-2014 amongst 1,400,000 candidates (99.99 percentile)
- Kishore Vaigyanik Protsahan Yojana (KVPY) Scholar 2013-14 with an All India Rank 240
- Qualified for INOI-2012 conducted by IARCS (Indian Association for Research in Computing Science)
- Secured 2nd position in the National Student Competition of Save, organized by NIOT, India, 2016
- Awarded the IBM Blue Scholar Program Fellowship for the work done during Summer Internship

Course Mentor

- **Introduction to Machine Learning** [Course Webpage](#)
with Prof. Purushottam Kar *2017-18 Semester I*

Relevant Coursework

- Intro to Programming (A*)
- Discrete Mathematics
- Data Structures and Algorithms
- Computing Laboratory
- Probability and Statistics
- Intro to Computer Vision
- Intro to Machine Learning
- Operating Systems
- Analysis of Algorithms
- Compiler Design
- Topics in Computer Vision
- Multi Agent Systems
- Neurobiology
- Probabilistic Machine Learning
- Computer Networks

A* grade for exceptional performance