Aasheesh Singh

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EDUCATION

DELHI TECHNOLOGICAL UNIVERSITY
B.Tech Electronics and Communications
Final year
Adviser:Dr S.Indu,Head:ECE Deptt.
Aggregate:74.78%, First Class

VIJAYA SENIOR SECONDARY SCHOOL
CBSE Class XII, 95.6%
Rank:First,Best Student Award 2014
CBSE Class X, CGPA:10/10

SKILLS

FRAMEWORKS
PyTorch • ROS • OpenCV • Caffe
PCL • CUDA • Matlab
Languages
Python • C++ • LaTeX • HTML
CSS• Assembly
Version Control
Git • Mercurial

LINKS

Github:// **ashdtu**
LinkedIn:// **Aasheesh Singh**
Website:// **ash**

COURSEWORK

ACADEMIC
Digital Image Processing
Computer Architecture
Probability and Stochastic Process
Computer Vision
Digital Signal Processing
Programming fundamentals
Advanced Mathematics(1 and 2)
Control Systems

MOOC
Machine learning by Andrew Ng
CS231N,Stanford CNN for Visual Recognition
David Silver's RL course
Data Structures,IIT Delhi
Linear Algebra MIT OCW
NPTEL,India Reinforcement learning by Dr B. Ravindran

RESEARCH INTERESTS

Reinforcement learning
- Primarily interested in applications of Reinforcement learning to Dialogue systems and HCI models. Further interested in evaluation of Covariance based exploration strategies.
- Looking forward for an opportunity to work on Universal Function Approximators introduced <u>here</u> that would allow learning to be transferred to an agent with different goal set.

Deep learning
- Semantic Segmentation of Scenes,Generative models for speech & Visual question answering systems.

EXPERIENCE

AALTO UNIVERSITY,FINLAND | Probabilistic Machine Learning Group
Jun'17- Aug '17 | Guide: Prof. Samuel Kaski, Dr. Ulpu Remes
- Developed a Gaussian Process based cognitive model that mimics how users interact with UI menus in terms of visual search.
- Extending the previous work <u>Chen et.al</u> , a PO-MDP model was built to capture continuous state space with belief distribution.
- Evaluated Covariance based exploration policies and No-Regret(UCB) for action selection in the menu search task.
- Using Approximate Bayesian Computation the model parameters are inferred corresponding to observed user behavior(eye-tracking).[Paper in Progress]

IIIT-HYDERABAD | Robotics Research Center
Dec'16 - Jan' 16 | Guide: Dr. K.Madhava Krishna
- Worked on generating safe navigation Trajectories for a Monocular ORB-SLAM system for a Max margin planning inspired Inverse Reinforcement learning agent.
- Our agent executes backup actions generated from IRL framework to prevent Monocular SLAM failure at critical and low feature density positions in the map.
- <u>Results Summary</u>

IIT MADRAS | RISE Lab, Research Intern
June-July 2016 | Guide: Dr.Balaraman Ravindran,CS
- Studied Hierarchical Reinforcement learning methods such as Options and MAXQ value function decomposition and implemented the famous Taxi-domain world example discussed in (Dietterich,2000) in a C++ library ROS.
- Brief Technical Report:<u>arXiv:1701.04350 [cs.RO]</u>

AUTONOMOUS UNDERWATER VEHICLE |Undergraduate Researcher
Sept 2015-Nov 2016| Vision and Control Department
- Worked on building Robust underwater algorithms for buoy detection and path following that could work in low visibility conditions.
- Designed entire Power distribution board of the AUV that could handle large currents upto 12A efficiently.

EXTRA CURRICULAR

- Student Member of **IEEE-DTU**.
- Presented a 4 session ROS Tutorial for a Special Interest Group.
- Participated in an amphibian robot competition at TechFest IIT Bombay.
- Member Debating and Movie discussion club.

REFERENCES

Prof. Samuel Kaski
Academy Professor
Department of Computer Science
Aalto University,Finland
Website E-mail

Dr K.Madhava Krishna
Center Head
Associate Professor
Robotics Research Center
IIIT-Hyderabad, India
Website E-mail

Dr B. Ravindran
Associate Professor
Department of Computer Science
Indian Institute of Technology(IIT-M)
Chennai,India
Website E-mail

Dr S.Indu
Head of ECE Department
Associate Professor
Delhi Technological University
Website E-mail

PROJECTS

SERO ROBOT | Minor Project
Sept'16 - Feb'17
Guide: Dr S.Indu

- Selected for Texas Instrument Innovation Challenge 2017, SERO is a robot intended for use in Retail(Warehouses and Super-markets)and office space scenarios as a robotic assistant.
- Fine tuned the VGG-Net deep CNN architecture using Transfer learning for indoor scenes segmentation into different classes [NYUv2 RGB-D dataset]. Trained the whole Caffe model on AWS EC2 GPU instances.
- Implemented a RGB-D SLAM system which uses Kinect camera for effective navigation in indoor spaces on ROS.

FISH SPECIES CLASSIFICATION | Research Assistant
Nov 2016-Jan'16
Guide: Dr. S.Indu

- Worked on a Fish species classification project in underwater video sponsored by Department of Science & Technology,India.
- With SVM & Softmax classifier an accuracy of about 82.27% and 87.41% respectively was obtained with a dataset of about 4000 images.
- Working on a fast deep architecture for classification and de-noising in raw videos.

FPGA BASED OBJECT RECOGNITION | Spring 2016
Guide: Dr S.Indu

- SURF descriptor was used for object recognition in still images in cluttered environments taking advantage of pipeline architecture of FPGA. Implemented using OpenCV library.
- Although these methods(SIFT like) have been fairly invariant to translation, scale and orientation but still far way from human level accuracy(94%). CNN based object classification studied.

KALMAN FILTER BASED OBJECT TRACKING | Fall 2015
Guide: Dr S.Indu

- Kalman filter was used for tracking of a ball while it passes through regions of occlusion by forming the perceptual and motion model of the ball. MATLAB used for development.

AWARDS AND ACCOMPLISHMENTS

- Awarded with **ASCI Fellowship** by Aalto University, Finland. Amongst 15 students worldwide to be awarded with a completely funded internship at Aalto University,Helsinki.
- Awarded with a Research fellowship **twice** in consecutive years 2016,17 by **Indian Academy of Sciences**,Bengaluru. Worked at **IIT Madras** in summer 2016 using this fellowship.
- Awarded with **KVPY fellowship 2013** by **Department of Science & Technology,India** for displaying research potential by obtaining an All India Rank 543 among 0.15 million candidates.
- Awarded with Certificate of Excellence for being **Top 0.1% in Chemistry** in India in Class XII examination by Education Minister,India.
- Secured **All India Rank-2309** among 1.5 million candidates in IIT-JEE Mains examination 2014.
- Headed Debating and Quiz club in High School and won over 6 district level competitions.