Aasheesh Singh

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EDUCATION

DELHI TECHNOLOGICAL UNIVERSITY

B.Tech Electronics and Communications
Pre-final year
Adviser:Dr S.Indu,Head:ECE Deptt.
Aggregate:73.5% (Upto 4th Semester)
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

TensorFlow • 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 Signal Processing
Computer Architecture
Probability and Stochastic Process
Advanced Mathematics(1 and 2)
Programming fundamentals
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 solving trajectory planning and navigation problems through Hierarchical and Inverse Reinforcement learning.
- I am looking forward for an opportunity to work on Universal Function Approximators introduced here that would allow learning to be transferred to an agent with different goal set.

Deep learning

- Semantic Segmentation of scenes and Visual question answering systems

EXPERIENCE

IIIT-HYDERABAD | Robotics Research Center

Dec 2016-Present
Guide: Dr. K.Madhava Krishna

- Working 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.
- **Results**:SVM with RBF kernel:77 steps to breakage, Q learning based RL agent with handcrafted reward function(95% exploitation):112 steps to breakage. IRL agent with optimized reward function(95% exploitation):174 steps before SLAM failure.
- IRL agent is trained using expert feature expectations generated from RL agent and hence performing better than a handcrafted reward function agent.
- Submitting Publication for IROS'17.

IIT MADRAS, CHENNAI | RISE Lab, Research Intern

June-July 2016 | Chennai,India
Guide: Dr.Balaraman Ravindran,CSE Department

- Studied Hierarchical Reinforcement learning methods such as Options and MAXQ value function decomposition and solved the famous Taxi-domain world example discussed in (Dietterich,2000).
- In original literature a deterministic MDP is used but in robotic state space the problem is of solving a Partially observable MDP. Implemented it on a small gridworld in ROS.
- Brief Technical Report:arXiv:1701.04350 [cs.RO]

AUTONOMOUS UNDERWATER VEHICLE |Undergraduate Researcher

Sept 2015-Nov 2016| Vision and Control Department

- Worked on building Robust buoy detection and path following algorithm that could work in low visibility conditions.
- Image enhancement in underwater conditions and PID control loop to remain aligned with path.
- 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

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 2016-Present
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.
- Capable of autonomous navigation doing RGB-D SLAM using Kinect sensor.Main features include Speech recognition for product enquiry from inventory and Google's FaceNet Face recognition model.
- Working on using Semantic segmentation and information extraction from visual data to hold intelligent conversations. Extracted labels would also be used for semantic mapping for SLAM engine to form dense reconstructions.
- Using NYUv2 depth dataset for training and Google Speech API for recognition.

FISH SPECIES CLASSIFICATION | Research Assistant
Nov 2016-Present
Guide: Dr. S.Indu

- Working 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 deep architecture with special layers for texture based classification and improved pre-processing stage.

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 research fellowship by **Indian Academy of Sciences**,Bengaluru with stipend for working at **IIT Madras** over summer 2016.
- 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.