Akshay Sharma

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Education

Carnegie Mellon University *Pittsburgh, PA*

Master of Science in Mechanical Engineering (Specialization: Machine Learning) (**GPA:** 3.94/4.0) *Aug'18 - May'20*

- **Courses:** Deep RL and Control | Convex Optimization | Computer Vision | Deep Learning for Engineers | AI and ML for Engineers | Statistical Techniques for Robotics | Engineering Optimization

Indian Institute of Technology Kanpur *Kanpur, India*

Bachelor of Technology in Mechanical Engineering (**GPA:** 8.6/10.0) *Jul'14 - May'18*

- **Courses:** Intro to Natural Language Processing | DS and Algorithms | Introduction to Robotics | Robot Motion Planning

Projects

Visual Dialog based search and rescue agents trained using RL *Dr. Katia Sycara | CMU | Ongoing*

- Working on a simulated agent capable of exploring a disaster hit environment while having a dialog with a guiding human
- Currently working on the neural network architecture of the vision to dialog, and vision to mapping module, syntheic data generation, and integrating these module with a central simulator

Analysis and Comparison of generative models for Optical Flow estimation *Dr. Amir Farimani | CMU | 2020*

- Designed architectures for **GAN** and **VAE** based optical flow estimators with an **image pair conditioned generator**
- Compiled a comparative study of the above methods with the commonly used auto-encoder based optical flow estimators

Query network based limited guidance for RL agents *Dr. Katia Sycara | CMU | 2019-20*

- Designed a neural network based observer policy capable of identifying states for which an RL agent is confused and facilitate efficient communication with an expert
- Resulting network cuts down on episode lengths and improves episode return while minimizing expert queries

Unsupervised Optical Flow Estimation with temporal smoothing *Dr. Amir Farimani | CMU | 2018*

- Designed an unsupervised version of the Flownet-C architecture for optical flow estimation
- Formulated a **temporal smoothing loss** term which penalizes large changes in consecutive optical flow maps
- Generated temporally smoother optical flow maps producing more temporally consistent warped images

High-Frequency information prediction based Video Super Resolution *Dr. Anurag Mittal | IIT Madras | 2018*

- Designed a novel **2-phase progressive-retrogressive** training, and a **dual motion warping** frame alignment techniques
- Designed a neural network for explicit **refinement and fusion of high-frequency details** of super resolved videos
- The system produced more visually appealing results than most SOTA methods with no noticeable temporal artifacts

Visual Question Answering *Dr. Harish Karnick | IIT Kanpur | 2018*

- Designed an open-ended visual Q/A system capable of differentiating question types and choosing the correct answer
- The system used a **LSTM network** on top of the GloVe embeddings for question words, and **VGG16** features for images

Vision based Active Target Tracking *Dr. Mangal Kothari | IIT Kanpur | 2018*

- Improved upon an existing Siamese neural network based object tracker by designing a **LSTM based memory network**
- This auxiliary system learnt a motion model of the tracked objects and improved tracking accuracy in cases of occulsion

Controllable Tennis Ball Launching Machine *Dr. Mohit Law | IIT Kanpur | 2017-18*

- Designed and manufactured an economical and efficient tennis ball launching machine completely from scratch
- Designed a control system which allowed variable yaw and pitch, along with both backspin and topspin

Publications

Retrogressive Training towards High-Frequency Prediction for Video Super-Resolution

Vikram Singh, Akshay Sharma, Sudharshann D., Dr.Anurag Mittal

- Winter Conference on Applications of Computer Vision (WACV) 2020. [Paper]

Technical Skills

- **Programming Languages:** Python, C, C++ | **Utilities:** PyTorch, Keras, TensorFlow, Matlab | **OS:** GNU/Linux, Windows

Extracurricular Activities

- **Student Guide at Counselling Service, IIT Kanpur** for the year 2015-16. Mentored 9 freshmen in their first year at college.
- Organized a 4 day long orientation program for freshmen students as part of the Counselling Service at IIT Kanpur