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Manas Jyoti Buragohain

Education

University of Michigan — Ann Arbor, MI, USA
Master of Science, Robotics — Aug. 2019 - May 2021 (expected)
• GPA: 3.90/4.00

Delhi Technological University — Delhi, India
B. Tech., Electronics and Communications Engineering — Aug. 2013 - May 2017
• GPA: 75.13

Interests

Computer Vision, Deep Learning, Machine Learning, 3D Reconstruction

Publications

Fish species classification using graph embedding discriminant analysis
Manas Jyoti Buragohain*, Snigdhaa Hasija*, and S. Indu
In CMVIT, 2017.

Research Experience

Johnson AI Lab, University of Michigan — Ann Arbor, MI, USA
Graduate Research Assistant | Advisor: Justin Johnson — Jan 2020 - Present

3D Object Reconstruction
• Designed a grid based point cloud prediction network using ResNet-50 backbone.
• Developed a novel approach for point cloud refinement using local context and attention-based supervision through an augmented Transformer Architecture.
• Implemented differentiable Top-K selection through Reparameterizable Subset Sampling using CUDA Kernels.

Taubman College of Architecture, University of Michigan — Ann Arbor, MI, USA
Research/Teaching Assistant | Advisor: Matias del Campo — Aug 2020 - Dec 2020

• Worked with architecture graduate students (as part of ARCH660) to explore whether the current state of AI can have a novel sensibility of human creativity at large.
• Implemented various style transfer methods (GAN and VGG based) to empirically explore the hypotheses devised by the students.

Autonomous Underwater Vehicle - Delhi Technological University — Delhi, India
Team Lead & Head, Machine Vision — Aug 2014 - May 2017

Student Research team involved in exploring applications of marine robotics.
• Researched and fabricated an Autonomous Underwater Vehicle to capable of operating under varied environmental conditions.
• Overhauled the core control & navigational software stack for the AUV to coordinate inputs from various sensors - hull mounted cameras, hydrophone array, and AHRS.
• Deployed multiple computer vision based modules capable of performing real-time image processing applications.
• Participated in the Singapore Autonomous Underwater Vehicle Challenge 2017, representing India.

Technical Skills

• **Languages**: Python, C, C++, MATLAB, Javascript, HTML/CSS
• **Frameworks**: PyTorch, Pytorch3D, OpenCV, CUDA, NumPy, Matplotlib, Caffe
• **Tools**: Git, Slurm, Visual Studio, Eclipse, Jupyter

Professional Experience

Magic Leap. Inc. Sunnyvale, CA, USA
Software Engineer, Perception Aug 2021 - Present

- Implemented a python based 3D object rendering pipeline for generating synthetic data to lower reliance on gathering real world data by 25%.
- Designed real time object pose estimation pipeline using RGB and Depth data at 5 FPS with 95% accuracy.
- Conceptualized and deployed communication pipeline for sending sensor and mesh data between AR device and cloud server using Protocol Buffers from GRPC library.
- Optimized the pipeline's performance by decreasing the latency by 50% through custom data compression and elimination of unnecessary data copy operations freeing up 15% CPU capacity.
- Evaluated and rectified shift sensitivity of predictions from Hand Keypoint prediction network due to input jitter, reducing prediction error 30% to subpixel accuracy.

NXP Semiconductors NOIDA, India
ADAS Engineer, Functional Validation Aug. 2017 - Feb. 2019

- Coded C++ programs for Advanced Driver Assistance System (ADAS) system to perform Lane and Pedestrian Detection using SSD architecture optimized for embedded systems.
- Executed continuous testing and integration of Low Light Noise Reduction and Histogram of Gradients Generation modules for accelerating hardware computation on ADAS system.
- Formulated and streamlined C++ unit tests of FlexCAN and LINFlex protocol modules for intra vehicular communication.

Relevant Projects

Sparse Neural Generative Inference Based Pose Estimation
EECS 542: Advance Computer Vision Course Project | Instructor: David Fouhey
Attempted to build a particle filter based pose estimator where each particle learns latent embedding to infer pose, object likelihood, and re-sampling objective iteratively.

Single Image 3D Reconstruction based on Conditional Generative Adverserial Networks
EECS 504: Computer Vision Course Project | Instructor: Andrew Owens
A conditional GAN framework for generating 3D objects from single RGB image. We achieve improved qualitative 3D reconstructions compared to the Pixel2Mesh baseline.

Probabilistic Data Association for Semantic SLAM with Loop Closure Detection
EECS 568: Mobile Robotics Course Project | Instructor: Maani Ghaffari
Replicate and improve upon the work of Bowman et al with augmentations to object detection framework along with incorporation of loop closure for better offline map generation.

Robot Middle-ware Development
ROB 511: Robot Operating System| Instructor: Chad Jenkins
Developed a web-based dynamic simulator and set-point controller for mobile manipulators like Fetch, Baxter and Sawyer. Implemented motion planners like A*, Bi-directional RRT-connect and RRT* in the simulator for any obstacle environment.

6-DOF Serial Link Robotic Manipulator
ROB 550: Robotic Systems Laboratory Project
Produced a codebase in Python to drive serially connected motors autonomously, employing object detection using a kinect camera suite for pick-n-place operation.

SLAM and Path Planning implementation on MBot
ROB 550: Robotic Systems Laboratory Project

Explored and implemented various mapping, path planning and motion control algorithms on a simulation model for a differential drive robot.

Mobile Inverted Pendulum System
ROB 550: Robotic Systems Laboratory Project
Designed a cascaded control architecture to balance a two-wheeled robot and to autonomously drive in pre-defined trajectories.

Teaching

GSI, EECS 442: Computer Vision, University of Michigan — Winter 21
TA/RA, ARCH 660: Visionary Machines, University of Michigan — Fall 20

Salient Courses

University of Michigan: Deep Learning for Computer Vision, Foundations of Computer Vision, Ecological Approach to Perception, Advanced topics in Computer Vision, Applied GPU Programming, Machine Learning

Delhi Technological University: Digital Image Processing, Computer Vision, Pattern Recognition, Robotics & Object Tracking