SHREYAS SKANDAN SHIVAKUMAR

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Education

University of Pennsylvania, Philadelphia PA | GPA: 3.62 / 4.00
Master of Science in Engineering in Robotics **Spring 2017**
• Relevant Courses: Machine Learning, Machine Perception, Learning in Robotics, Computer Vision

BMS College of Engineering, Bangalore India | GPA: 9.19 / 10.0
Bachelor of Engineering in Computer Science **June 2014**
• Relevant Courses: Data Structures, Computer Vision, Artificial Intelligence, Algorithm Design and Analysis

Experience

Rehabilitation Robotics Lab, Perelman School of Medicine, University of Pennsylvania, Philadelphia PA
Smart Toy Gym Project – Research Assistant **(May 2016 – present)**
• Led the computer vision and machine learning efforts in the Smart Toy Gym project
• Designed a multiple-camera vision system using GoPro cameras in a stereoscopic setup a Kinect v1 range camera, and integrated the system into the Smart Toy Gym platform to record the interaction of infants with the platform
• Developed a stereo camera calibration and disparity generation library using Matlab and OpenCV to automate stereo 3D reconstruction
• Implemented detection and tracking algorithms to estimate infant limb pose and motion in 2D and 3D in order to evaluate the risk of cerebral palsy in infants under the age of 1 year using visual data

Kumar Lab, GRASP Laboratory, University of Pennsylvania, Philadelphia PA
Precision Agriculture Project – Research Assistant **(March 2016 – present)**
• Developed a generalized fruit counting pipeline based on Deep Learning to accurately detect and count fruits in different unstructured environments utilizing a custom crowd-sourcing platform for label gathering
• Implemented a pipeline comprising of two Convolutional Neural Networks using Python and Caffe for detection and counting
• Achieved a squared count error (l2) of 13.8 and 11.9 on our Orange and Apple dataset respectively (paper submitted to RAL, ICRA)
• Experimented with classifying fruit using hyperspectral sensor data to identify feasibility of hyperspectral imaging in fruit detection
• Achieved an overall accuracy of 81.2% across seven fruit classes using a Quadratic Support Vector Machine classifier
• Explored the feasibility of dense 3D reconstruction from 2D camera data for the 3D localization of fruit in unstructured environments

Projects

University of Pennsylvania, Philadelphia PA
Structure From Motion (SfM) **May 2016**
• Reconstructed a sparse 3D point cloud and identified individual camera pose from six images taken on a GoPro Hero 3 camera
• Achieved a proficient understanding of the SFM pipeline including two view reconstruction, triangulation, PnP and bundle adjustment

Convolutional Neural Networks for Image Classification **April 2016**
• Introduced myself to the fundamentals of Convolutional Neural Networks by attempting to recreate the AlexNet ImageNet classifier on a reduced three class dataset of Cats, Dogs and Humans using Caffe
• Achieved an error rate of 38.4% and understood the importance of longer training durations and the benefit of GPU computation

Learning in Robotics – Machine Learning algorithms to Mobile Robotics **March 2016**
• Implemented an Unscented Kalman Filter to estimate 3D orientation from IMU data and created a panorama image of the camera data
• Implemented 2D Simultaneous Localization and Mapping (SLAM) of an indoor environment using a particle filter on IMU and Lidar sensor data acquired from a THOR-OP humanoid robot

Machine Learning - Learning to Turn Fantasy Basketball Into Real Money **November 2015**
• Designed a machine learning model using Support Vector Regression and Random Forest Regression to predict individual NBA player's statistical performance in a game, achieving a player rank prediction of ~3.2 positions and game outcomes with 70% accuracy
• Developed the Rank Difference Error (R.D.E) metric to evaluate player performance

BMS College of Engineering, Bangalore India
Gesture Controlled Wireless Robotic Arm (nominated among top three projects of the Computer Science Department) **May 2014**
• Built a Web Application supported by the WebSocket JavaScript framework to transmit sensor data wirelessly to a 5-DOF Robotic Arm (controlled by an Arduino Yun) that was built using high torque servo motors and a laser cut plastic frame
• Led the development of the Robotic Arm and programming of the Arduino microcontroller

Skills

• Programming: Matlab, Python, C, C++, Java | Tools: OpenCV, Caffe, Scikit-learn, LaTeX | Operating Systems: Linux, Windows, OSX

Other

• **Independent Coursework -** Artificial Intelligence Planning, Machine Learning, Control of Mobile Robots, Image & Video Processing, Introduction to Programming with Matlab, Microeconomics Principles, Philosophy and the Sciences. Introduction to Computer Science and Programming with Python, Autonomous Navigation for Flying Robots.
• **Interests –** Transhumanism, Progressive Metal – guitarist/producer at Limit Zero, Philosophy and Cosmlogy