Suriya Narayanan Lakshmanan

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EDUCATION

CMU, ROBOTICS INSTITUTE
MASTER'S IN COMPUTER VISION
Advised by Prof. Srinivasa Narasimhan
Dec 2018 | Pittsburgh, PA
Cum. GPA: 3.83/4.0

NIT, TIRUCHIRAPPALLI
BACHELOR OF TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING
May 2014 | Tiruchirappalli, India
Cum. GPA: 8.8 / 10.0

COURSEWORK

Intro to Machine Learning
Intro to Computer Vision
Math fundamentals for Robotics
Visual Learning and Recognition
Geometry based maths in Vision
Computational Photography

Algorithms and Data Structures
Operating Systems
Object Oriented Programming
Digital Signal Processing

SKILLS

PROGRAMMING
C • C++ • CUDA • Python • Matlab • OpenCL • LATEX

LIBRARIES
OpenCV • PyTorch (Python and C++) • ROS • PCL • Numpy • TensorFlow (Python and C++) • scikit-learn

OPERATING SYSTEMS
Linux • Windows • Android

OTHER SOFTWARE
Git • Microsoft Office • GIMP

EXPERIENCE

NVIDIA CORP. | SENIOR COMPUTER VISION ENGINEER
Oct 2022 - Present | Santa Clara, CA, USA
- Shipping multiple L3 autonomous vehicle software products running on NVIDIA hardware
- Productionized lidar code to run on vehicle on embedded NVIDIA hardware
- Adapted Lidar hazard detector to work with solid state lidars that improved detection range by 2x
- Accelerated camera object tracker by 2.5x, traffic sign detector by 2x using CUDA optimizations
- Implmented KPI WF to evaluate hazard detection with nightly dashboard
- Accelerated ground detection code 5x by porting the CPU code to CUDA
- Implemented key performance indicator workflow to evaluate obstacle detection
- Fine-tuned acceleration of several computer vision modules by 2x aggregate

NVIDIA CORP. | COMPUTER VISION ENGINEER
Feb 2022 - Sep 2022 | Bangalore, India

- Accelerated obstacle detection code by porting the CPU code to CUDA achieving 18x speedup

NVIDIA CORP. | COMPUTER VISION ENGINEER
Jan 2021 - Jan 2022 | Santa Clara, CA, USA

- Prototyped and designed obstacle detection algorithm for small obstacles
- Implemented the designed obstacle detection algorithm to run on CPU
- Designed porting the obstacle detection algorithm to Nvidia GPU using CUDA

CYNGN INC (SELF-DRIVING VEHICLE COMPANY) | PERCEPTION ENGINEER
Feb 2019 - Oct 2020 | Menlo Park, CA, USA

- Designed and implemented traffic light detection system from scratch consisting of components such as traffic light detection, traffic light recognition and tracking
- Built 2d object detection system using PyTorch with BIFPN, Swish activation and deployed using TorchScript
- Evaluation of lidar based SLAM algorithms for indoor applications
- Analyzed the depth error of stereo and came up with an optimal baseline width taking into account target working range, camera FOV and permissible blindspot
- Designed and implemented software based Lidar-Camera synchronization system that is capable of operating at 10Hz under certain configurations

SAMSUNG RESEARCH AMERICA | COMPUTER VISION RESEARCH INTERN
Think Tank Team
May 2018 - August 2018 | Mountain View, CA, USA

- Developed human pose datasets for proprietary imaging sensors using unsupervised domain adaptation
- Developed a deep learning based human pose estimation network that can predict human poses on frames obtained from the proprietary imaging sensor
- Deployed the above developed network by creating a C++ application using TensorFlow APIs for building and executing the deep learning graph

TEXAS INSTRUMENTS | SOFTWARE ENGINEER
July 2014 - June 2017 | Bangalore, India

- Improved accuracy of TI CNN model for driver drowsiness detection by **2x**
- Improved Adaboost classifier for object detection yielding **10%** more true detections. *[Efficient object detection and classification on low power embedded systems, ICCE 2017]*
- Developed a set of Image Processing modules. *[Understanding the Performance Benefit of Asynchronous Data Transfers, HiPC 2015]*
- Accelerated a set of OpenCV functions using OpenCL and DSP which was released as part of TI Vision SDK. *[Understanding the Performance Benefit of Asynchronous Data Transfers in OpenCL Programs Executing on Media Processors, HiPC 2015]*
- Accelerated OpenCV using OpenCL, boosting performance by **3x over ARM A15**
- Released the above accelerated functions as applications in TI Vision SDK

TEXAS INSTRUMENTS | COMPUTER VISION INTERN
May 2013 – July 2013 | Bangalore, India

- Improved an existing homography based Ground Plane Detection by **10%**. *[Ground plane detection, Patent 2017]. [Improved ground plane detection in real time systems using homography, ICCE 2014]*

ACADEMIC PROJECTS

UNSUPERVISED SEGMENTATION DATA GENERATION
October 2018 - December 2018 | CMU, Pittsburgh
Interpolated semantic segmentation labels to frames in between key frames in NYU depth dataset v2 videos using dense depth as supervision for intermediate frames improving mIoU by 2% over FCN baseline finetuned on NYU v2 dataset

RGB SUPER SLOMO USING HIGH FPS DYNAMIC VISION SENSOR
October 2018 - December 2018 | CMU, Pittsburgh
Developed a deep learning network to produce high frame rate RGB video from a low frame rate RGB video using optical flow derived from high frame rate dynamic vision sensor video as supervision and achieving comparable performance as that of using high FPS RGB video supervision

SMART RECONSTRUCTION
January 2018 - May 2018 | ILIM Lab, CMU, Pittsburgh
Reconstructed traffic from a single stationary camera using keypoint detetion and ground plane assumption (similar to the work done by Beyond Pixels paper), tracking and geometric constraints while stabilizing the camera

WEAKLY SUPERVISED OBJECT DETECTION
March 2018 - March 2018 | CMU, Pittsburgh
Implemented weakly supervised object detection algorithm: WSDDN as part of course project in TensorFlow

SCENE CLASSIFICATION
September 2017 | CMU, Pittsburgh
Implemented scene classification using Spatial Pyramid Matching from scratch as part of course project in Matlab

DIGITAL ART USING SFM
October 2017 - November 2017 | CMU, Pittsburgh
Developed an application to create portrait effect from single camera using SFM and 3D segmentation as part of course project using OpenCV C++

INTELLIGENT INPAINTING
October 2017 - November 2017 | CMU, Pittsburgh
Developed an application that removes a person from an image from a single click using pedestrian detection, semantic segmentation and exemplar inpainting in C++

PUBLICATIONS

- Improved ground plane detection in real-time using homography, ICCE
link to the paper
- Understanding performance benefit of asynchronous data transfers in OpenCL programs executing on media processors, HiPC
link to the paper