

GARRICK BRAZIL

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Education

Michigan State University - East Lansing, MI

- PhD Computer Science, Fall 2016 – Present, Adviser: Dr. Xiaoming Liu
- Research interest in machine learning, computer vision, object recognition (2D/3D), semantic segmentation, scene forecasting, binary and quantized neural networks.

Kettering University - Flint, MI

- Bachelors of Science in Computer Science, 2015, 3.85/4.0 GPA
- Dual concentrations in Data Security, Computer Graphics

Employment

Deepcam LLC (*Lansing, Michigan from May 2018 – August 2018*)

- AI Research Associate: R&D for efficient object detection involving binary/quantized neural networks. Implemented pedestrian detection system to run on very low-end embedded hardware.

Pixo Group (*Southfield, Michigan from October 2015 – April 2016*)

- Software Engineer: development for interactive digital applications in the realms of mobile, web apps, animation, and virtual reality using HTML5, Javascript, CSS3, and Unity.

Bosch Car Multimedia (*Novi, Michigan from April 2013 – June 2015*)

- System Test: performed formal testing, diagnostics, and bug patching on embedded infotainment systems.
- Software Engineer: developed internal automation applications, a speech driven mobile application using Nuance speech system, route calculation analysis, and an OpenCV multi-camera system.

Skills

- Python, MATLAB, C++, PyTorch, Caffe, OpenCV, Java, Javascript, HTML5, CSS3, Android, Cordova, OpenGL, Unity, C#, jQuery Mobile, Foundation, Bootstrap, Sass, GSAP, LabVIEW

Awards

- Michigan State University - University Enrichment Fellowship, 2016
- MITRE Cyber Challenge Team Leader - 4th Place (of 96 teams), 2015
- Kettering University - Upsilon Pi Epsilon, 2014
- Kettering University - Kettering "Impact" Contest Winner, 2014

Services

- Web chair: WACV18, WACV19
- Connected and Autonomous Networked Vehicles for Active Safety (CANVAS)

Publications

[Pedestrian Detection with Autoregressive Network Phases](#)

[arXiv 1812.00440](#)

arXiv preprint, arXiv:1812.00440, Dec. 2018

Authors: Garrick Brazil, Xiaoming Liu

[Recurrent Flow-Guided Semantic Forecasting](#)

[arXiv 1809.08318](#)

In Proc. of Winter Conference on Application of Computer Vision (WACV 2019), Waikoloa, Hawaii, Jan. 2019

Authors: Adam M. Terwilliger, Garrick Brazil, Xiaoming Liu

[Illuminating Pedestrians via Simultaneous Detection & Segmentation](#)

[arXiv 1706.08564](#)

In Proc. of International Conference on Computer Vision (ICCV 2017), Venice, Italy, Oct. 2017

Authors: Garrick Brazil, Xi Yin, Xiaoming Liu

Course Projects

Below are selected projects from various coursework at Michigan State University as part of the CSE doctoral program.

Fooling Pedestrian Detection CNNs

(Computer and Network Security – 2018)

We implemented a GAN loss to generate residual images to augment urban driving scenes with 2 primary goals: photo realism and maximum confusion/anarchy for the pedestrian detector. In essence, we aim to fool and attack a state-of-the-art detector. We further investigate the effects of using the synthetic data for alternate training and thus putting the GAN network against a detector. We find that state-of-the-art systems are not naturally robust to such attacks in that the miss-rate error will quadruple (4x) unless the network is trained directly on the real and synthetic image data.



Natural Language Person Retrieval in Traffic Surveillance

(Language and Interaction – 2018)



Q: Man wearing a red shirt holding a backpack.

We build a convolutional word embedding network using a series of fully-connected layers followed by two LSTMs and utilize attribute labeling as an auxiliary task, resulting in a natural language person retrieval system functional on in-the-wild traffic surveillance data (manually collected at MSU). The system works as a proof-of-concept and, in our experience, performs only modestly due to apparent poor generalization between training and test data domains. We merge the CUHK person description dataset with the PETA pedestrian attribute dataset for training the respective loss functions.

Generating Semi-Synthetic Pedestrian Data

(Advanced Computer Graphics – 2017)



Synthetically placed pedestrians using the cut-and-paste method on road ground plane.

We build a proof-of-concept project for generating synthetic pedestrian data. We use the MakeHuman tool to generate synthetic 3D pedestrian models with highly variable pose, shape, race, hair, clothing, etc. In addition to synthetic, we further use a simple cut-and-paste method based on pixel-level segmentation masks to generate real people. Finally, we place synthetic or real pedestrians onto arbitrary background images. We learn depth cues to logically place pedestrians at proper scales on the sidewalk or road regions only. In reflection, this method, while a useful proof-of-concept, could be drastically improved using a GAN to enforce realistic shadows, color consistencies, and borders.

For Fun

More details on the below projects can be found in the side-projects webpage (<https://garrickbrazil.com/side-projects>)

Multipi - 2015

A Unity game written in C#, based on an imaginary operation called multipication. The objective is to throw pies at other pies, so that when they collide they multiply. Score is kept in terms of Pi and Pie.

KetteringJS - 2015

Javascript API framework created to abstract useful data extraction from Kettering University, including information for news, events, student services, and much more. Combination of restful calls, web scraping, and authentication.

Oakland Scheduler - 2013

Scheduling tool written (unofficially) to help students analyze optimal schedules across millions of permutations.

Lightsaber Simulator - 2013

Simulates and projects 3D lightsabers from a webcam feed in real-time using OpenCV and OpenGL.

Refer to garrickbrazil.com for sample code and further details.