

Max Ruby

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EXPERIENCE

Omnisight Inc., Charleston, South Carolina (Remote)

Lead Vision Algorithm Scientist

May 2023 - Current

- Trained Neural Networks for vehicle detection, achieving mAPs over 0.86 on 8 classes using a YOLOv11.
- Improved detector mAP by 21% by preprocessing data by removing image artifacts and incorrect labels.
- Designed a image stitching program based on OpenCV, achieving a 553% success rate improvement over OpenCV's default.
- Developed multimodal fusion algorithms for radar and camera-based detection in collaboration with a radar specialist.
- Created synthetic segmentation data for vehicle and axle detection with a YOLOv11 and SAM.
- Wrote a parking lot detection program, with an accuracy over 95% on highly compressed images.
- Managed and onboarded Image Annotation Specialists.

Sabbatical, Rochester, New York

Independent Researcher

August 2022 - April 2023

- Designed tools for detection of AI-generated artwork based on traditional Image Science methods.
- Built a Flask App for image forensics, called Ruby's Image Forensics Toolkit (RIFT).

L3Harris Technologies Inc., Rochester, New York

Senior Associate, Image Science Engineering

May 2020 - July 2022

- Trained, optimized, and containerized binary classifiers, including a ResNet and a VGG, with AUROCs exceeding 0.99.
- Presented and documented recent findings on Adversarial Attacks on Neural Networks.
- Implemented and tested Multimodal Neural Networks based on recent research using a combination of Image Processing and Natural Language Processing techniques.
- Generated a dataset of synthetic images using Blender, then trained multiclass classifiers on that dataset.
- Developed and trained a novel CNN architecture for heat-map based vehicle tracking.

Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee

ASTRO Participant at Oak Ridge National Laboratory

June 2019 - August 2019

- Authored and published a paper on the Mertens-Unrolled Network (MU-Net), a novel CNN/GAN written in Python with Keras and Tensorflow.
- Integrated the MU-Net into an imaging pipeline for face recognition, increasing the AUROC by 8.9% over Mertens HDR.
- Improved Image Processing algorithms in an HDR fusion imaging pipeline, including fine registration.
- Collaborated with a diverse team to set up imaging systems, using Git for version control.

EDUCATION

Master of Science, Mathematics (GPA: 3.51)
Purdue University, West Lafayette, IN.

Bachelor of Science, Mathematics, *Departmental Honors Award in Mathematics, Summa Cum Laude* (GPA: 3.92)
Oklahoma State University, Stillwater, OK.

TECHNICAL SKILLS

Languages: Python, C, C#, C++.

AI frameworks: Keras, Tensorflow, PyTorch.

Other Tools and Packages: Numpy, OpenCV, Matplotlib, CUDA, Docker, Pandas, Flask.

Operating Systems: Linux, Windows.

Areas of Research: Machine Learning, GANs, CNNs, Applied Mathematics, Computer Vision, Image Forensics.

PUBLICATIONS

Max Ruby et. al., "The Mertens Unrolled Network (MU-Net): A High Dynamic Range Fusion Neural Network for Through the Windshield Driver Recognition," *SPIE Autonomous Systems: Sensors, Processing and Security for Vehicles & Infrastructure*, 2020.

D. Hye Ye, G. T. Buzzard, M. Ruby, C. A. Bouman, "Deep Back Projection for Sparse-View CT Reconstruction," *GlobalSIP*, 2018.