Levi Rankin

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EDUCATION

University of California, Santa Cruz   **Santa Cruz, CA**
B.S. Computer Science   *Sept 2021 – June 2025*

- Relevant course work: Deep Learning, Machine Learning, Software Engineering, Principles of Computer Systems Design, Data structures & algorithms

SKILLS

Programming Languages: Python, C++, SQL
Libraries: PyTorch, TensorFlow, Keras, OpenCV
Machine Learning: CNN, RNN, LSTM, ResNets, Vision Transformers
Research Interests: Autonomous Systems Development, Computer Vision, Sensor Fusion, Geospatial Analysis

PROFESSIONAL EXPERIENCE

Synthura   **Santa Cruz, CA**
Founder and Tech Lead   *Apr 2024 – Jun 2024*

- Led the Synthura project directing a team of 6 engineers in developing an advanced security system with integrated cutting-edge object detection models such as YOLOv10, achieving significant milestones in real-time analytics and operational efficiency.
- Spearheaded the development of dynamic tracking lists that continuously categorize all objects and highlight dangerous items in real-time, significantly boosting the system's analytical capabilities.
- Engineered a backend optimization that dramatically reduced camera response time by **99.8%**, lowering latency from approximately 10 seconds to 20 milliseconds, through the implementation of advanced buffering and multi-threading techniques.
- Implemented a flexible video processing architecture, enabling dynamic adjustment between GPU-accelerated (CUDA) and CPU-based processing. This key upgrade to GPU support dramatically reduced model inference time by **85.7%**, from 70 milliseconds to just 10 milliseconds, ensuring optimal performance across various hardware setups and significantly enhancing object detection and motion analysis efficiency in real-time security systems.
- Developed and fine-tuned a motion detection algorithm using background subtraction methods, significantly improving surveillance capabilities by enabling precise and real-time detection of movement within video feeds.
- Designed and implemented a robust, scalable backend using FastAPI and WebSocket technologies, ensuring the system could handle higher volumes of concurrent video streams with reliability and minimal latency.

Baskin Engineering at UCSC   **Santa Cruz, CA**
Undergraduate Researcher   *Jan 2024 – Present*

- Collaborated with a PhD fellow on a rip current detection project, focusing on the meticulous labeling of extensive datasets using AnyLabeling and creating bounding boxes to structure training data effectively.
- Engaged in comprehensive research on detection transformers, reviewing numerous academic papers to enhance understanding and application of cutting-edge detection technologies in rip current analysis.
- Developed specialized scripts for automated extraction of multiple frames per second from drone videos, generating multiple diverse training datasets of **500+** images from various perspectives to improve model accuracy.

PROJECTS

Autonomous Driving Steering Control

- Spearheaded a team of 5 engineers in developing a machine learning project that secured the highest grade and top peer recognition among 16 projects in a deep learning class. The project focused on predicting steering angles for autonomous vehicles in the CARLA simulation environment.
- Employed CNNs, ResNets, and Vision Transformers to analyze front-facing camera data, enabling autonomous vehicles to effectively navigate complex scenarios, execute precise turns, and maintain correct lane discipline.
- Conducted thorough testing on various model architectures, assessing key performance metrics such as vehicle lifespan, turns executed, inappropriate lane changes, and steering variance. These tests provided crucial insights into optimizing neural networks for real-time autonomous vehicle control in simulated urban environments.

Advanced Human Segmentation and Portrait Enhancement

- Engineered a U-Net-based neural network for human segmentation in images using 18 layers with increasing filters up to 512. Integrated advanced features like batch normalization and dropout. Trained the model on a dataset of 2000+ images using the Adam optimizer and binary crossentropy, achieving high precision in distinguishing human figures from complex backgrounds.
- Extended the model for selective background blurring in portraits, implementing Gaussian blur and mask inversion techniques for focused human subject enhancement.
- Deployed the model in a user-friendly web application using Gradio, allowing real-time, interactive portrait editing with professional grade image processing capabilities.

CERTIFICATES

- **DeepLearning.ai** *TensorFlow Developer Specialization*
- **DeepLearning.ai** *Deep Learning specialization*
- **DeepLearning.ai** *Machine Learning specialization*