CHRISTOPHER REBOLLAR-RAMIREZ

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Education

University of California San Diego — **La Jolla, California**
Bachelor of Science in Mathematics & Computer Science — *Expected Graduation, June 2025*
Bachelor of Science in Cognitive Science with a Specialization in Machine Learning and Neural Computation

Relevant Coursework

- Advanced Data Structures in C++
- Supervised Machine Learning Algorithms
- Practical Data Science with Python
- Algorithm Design & Analysis
- Software Engineering
- Machine learning in Practice using Python
- Discrete Structures
- Computer Organization in C/ARM
- Deep Learning

Experience

ACM Hack — **San Diego, California**
Full-Stack Team Lead — *Sept 2024 – Jan 2025*

- Developed Swipe Style, a Tinder-inspired web app for browsing fashion items, using **MERN Stack** and **TailwindCSS.**
- Implemented **10 API routes** for managing user interactions and integrating **Google OAuth** for secure authentication.
- Led a team of 5 members, organized weekly meetings, and delegated tasks to ensure efficient development.

Projects

Optimizing Fully Convolutional Networks for Semantic Segmentation | *Deep learning*

- Developed and optimized **CNN-based segmentation** models **(U-Net, FCN, DeepLab)** in **PyTorch** on PASCAL VOC-2012, improving **Mean IoU** from **0.0553 to 0.084** and **Pixel Accuracy** from **72.8% to 73.6%** using **class weighting** and **data augmentation**.
- Accelerated model training by **5x** with **GPU utilization**, optimized learning rate scheduling (**CosineAnnealingLR**), and **transfer learning** using a pre-trained **ResNet34 encoder**.
- Enhanced segmentation accuracy by **3.2%** through **Xavier weight initialization**, **batch normalization**, and **dropout**, reducing overfitting and improving generalization.

Shakespeare RNN | *Deep Learning, NLP*

- Achieved record-low test loss of **1.3237** by developing **LSTM** and **RNN models** with up to **512-character sequence handling**, optimized further with a **300-neuron dual-hidden-layer** configuration.
- Enhanced training convergence and text quality using **teacher forcing**, significantly improving model performance across various temperature settings. Balanced grammar and creativity in **text generation** to mimic Shakespeare at **medium temperatures**.

Fourier Number Embeddings for Arithmetic in GPT-2 | *Deep Learning, NLP*

- Engineered and fine-tuned **GPT-2** with **Fourier Number Embeddings (FoNE)**, achieving **99%+ accuracy** on addition and **15×** improvement on integer division over baseline.
- Conducted in-depth **Fourier space analysis of MLP** and **attention layers**, uncovering frequency-specific roles in arithmetic reasoning **(magnitude vs. modularity)**.
- Built **custom arithmetic datasets** (720k+ samples), optimized training with **cosine scheduling**, and added **WandB logging** and **inference profiling** tools.

Breast Cancer Prediction Using Perceptron and Logistic Regression | *Machine Learning*

- Achieved **98.25% training/testing accuracy** with a **custom Perceptron** model after 900 epochs on the **Breast Cancer Wisconsin dataset**. Compared **Perceptron** and **Logistic Regression** models, utilizing **NumPy** and **scikit-learn** for binary classification.
- Applied **data normalization** and **visualized performance** trends using **Matplotlib** for deeper model insights.

Technical Skills

Languages: C++, Python, Java, JavaScript, TypeScript, Swift, HTML/CSS
Frameworks & Tools: React.js, Next.js, Node.js, Express.js, Django, Flask, AWS, MongoDB, SQL, DynamoDB, TailwindCSS
Developer Tools: Git, Docker, GDB, JDB, Valgrind, GPROF
Certification: PC Core Hardware A+ Cert, PC Operating System A+ Cert
Professional Skills: Communication, Time Management, Teamwork, Critical Thinking

Leadership / Extracurricular

SkillsUSA Competitions — **Los Angeles, California**
Competitor/Mentor — *January 2019*

- Competed using C++, placing **3rd** among **20 participants** at the regional and state levels, demonstrating proficiency in program design and problem-solving.