

QIFEI CUI

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Education

University of Pennsylvania

Master of Science in Engineering in Data Science

Jun 2026

Philadelphia, PA

GPA: 4.00/4.00

University of California - Santa Barbara

Bachelor of Science in Applied Mathematics and in Statistics & Data Science

Dec 2023

Santa Barbara, CA

GPA: 3.75/4.00

Skills

Programming Languages: Python (Proficient), C++ (Familiar), MATLAB, SQL, R, JavaScript

Machine Learning & Computer Vision: PyTorch, OpenCV, Scikit-learn, NumPy, Pandas

Deep Learning Applications: Image Segmentation, 3D Pose Estimation, Recommendation Systems, NLP

Robotics & Control: Kinematics, Pose Mapping, Real-time Control, SLAM, Path Planning

Mathematical Foundations: Convex Optimization, Linear Algebra, Topology, Probabilistic Methods (Gaussian Processes, Bayesian Inference), Kalman Filtering, Manifold Learning

Developer Tools & Platforms: Git/GitHub, Docker, VS Code, AWS (EC2 GPU instances), Anaconda

Specialized Skills: Uncertainty Quantification, Multi-modal Data Fusion, Adversarial Learning, Reinforce Learning

Research Experience

Real-Time Vision-to-Robot Motion Transfer via ESFP Pipeline

Jun 2025

First Author, Supervised by Professor Pratik Chaudhari — Paper: <https://arxiv.org/pdf/2506.21234>

Philadelphia, PA

- Developed ESFP, an end-to-end pipeline converting monocular RGB video to executable robot trajectories in real-time, integrating ROMP-based 3D pose estimation with a novel Transformer-based smoothing module (HPSTM) for 4-DoF robotic arm control.
- Designed HPSTM using encoder-decoder Transformers with multi-head self-attention and differentiable forward kinematics, achieving 28.69mm bone consistency (34% improvement over baselines) while maintaining sub-millimeter jerk (5×10^{-4}) for smooth robot control.
- Implemented probabilistic pose refinement with full 3×3 covariance matrix prediction per joint, trained via three-stage curriculum on AMASS dataset with synthetic noise augmentation, reducing MPJPE by 20.6% under complex noise conditions.
- Achieved 20Hz real-time performance for human-to-robot motion mapping, demonstrating successful deployment on uArm Swift Pro with coordinate transformation and dynamic workspace scaling. Demo provided in paper.

GANet-Seg: Adversarial Brain Tumor Segmentation with Limited Training Data Sep 2024 – Dec 2024

Supervised by Professor Pratik Chaudhari — Paper: arxiv.org/abs/2506.21245

Philadelphia, PA

- Developed GANet-Seg, a novel GAN-UNet hybrid framework that achieves 88.84% Dice coefficient for tumor core segmentation using only 300 training samples, demonstrating comparable performance to state-of-the-art models trained on 6x larger datasets.
- Engineered adversarial feedback mechanism with edge-guided loss and discriminator sensitivity analysis (98.11% detection rate), reducing HD95 error to 13.95mm—outperforming nnU-Net by 5.73mm on BraTS 2020 benchmark.
- Implemented efficient preprocessing pipeline with CDF-based enhancement and selective slice filtering, reducing training time by 40% while improving tumor boundary delineation across multi-modal MRI sequences.

Graph-Based Embedding Sequential Recommendation System

Aug 2023 – Jun 2024

Supervised by Professor Haowen

Remote

- Pioneered an approach to the cold start problem in sequential recommendation systems by incorporating 20-dimensional embedding for both users and items. Conducted experiments on selected testing sets from IMDB1M, focusing on the 30% of users with a watching history of less than 50 titles.
- Enhancing the base BERT4Rec model with dynamic graph layers to improve recommendation accuracy by 4.21% and adaptability in user-item interactions with an increase in Recall@10 of 5.38%.

Work Experience

Alphabet Inc.

Mar 2023 – June 2023

Intern Data Analyst

Hybrid, CA

- * Implemented efficient pipelines for preprocessing large datasets with 1m lines and ensured data integrity. Developed a double-tower recommendation model adapted from recent Recommendation System research papers with Recall@10 of 78.2%. Built real-world simulation with a node.js based App interface that generate movie suggestions with detailed information for registered user.
- * Engineered new embeddings by analyzing user-item interaction data based on statistical distributions. Applied different levels to varying lengths of watching history, resulting in a 2.3% increase in benchmark accuracy. Achieved an accuracy of 79.3% on Recall10, demonstrating effective learning and robust generalization.

Hobbies and Interest

Expertise Pastry Chief, Well-trained Cook, Amateur Frisbee Player, LGBT+ Community Volunteer