Justin Cui

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Work Experience

SWE/SDE/MLE/MLops Intern, Modiface – Toronto, CA — May 2024 - Present

- Engineered a robust data processing pipeline to augment a synthetic 3D-face dataset (25M images) using **stable diffusion** with **Python** and Shell scripting, achieving a **17% improvement** in facepoints prediction accuracy.
- Developed a seamless model conversion tool to translate in-house computer vision models from **PyTorch** to **TensorFlow**, ensuring consistent cross-platform integration, reducing latency by over 10%.
- Optimized inference performance of generative AI models (including **GANs** and **diffusion**-based models) by integrating OpenVINO, reducing latency by **over 40%** and enhancing scalability.
- Developed a **Python**-based **fine-tuning** pipeline integrating existing training conversation pairs and formatting scripts to enhance beuaty chatbot by replacing the in-context learning approach
- Architected end-to-end **fine-tuning** pipeline for **conversational AI** systems, replacing in-context learning with supervised fine-tuning on 5k+ curated dialogue pairs
- Finetuned **Stable Diffusion LoRA** models to improve task-specific GenAI performance, improving accuracy by 40%.

SWE/SDE/MLE/Applied ML/ML Research intern, Data-Driven Decision Making Lab (UofT) – Toronto, CA — April 2023 - September 2023

- Designed and implemented a **RAG**-based chatbot system leveraging **LLM APIs** for dynamic natural language interactions and personalized responses.
- Architected the application using **object-oriented design patterns**, creating a modular system with 10+ interchangeable components for different NLP workflows.
- Developed core infrastructure in **Python** with 5+ API integrations, implementing rate limiting and caching mechanisms to handle 500+ RPM.
- Built a custom data pipeline using **FAISS vector database** to process and embed 1M+ product entries for **real-time retrieval**.
- Conducted comprehensive system testing including unit tests (95% coverage) and integration tests with simulated synthetic users using **LLMs**.
- Authored detailed documentation including API specs, deployment guides, and maintenance procedures.

Software Engineer Intern, Voith Hydro – Montreal, CA — May 2022 - September 2022

- Engineered a SharePoint infrastructure solution to centralize engineering resources, deployed to 200+ users across the engineering department
- Automated material specification analysis by creating **Python** scripts (**Pandas/NumPy**) to process CSV datasets, generating standardized reports that reduced manual review time.
- Conducted user research interviews with 15+ engineers to optimize UI/UX flow, resulting in 95% adoption rate within first deployment month

Publications

- **Retrieval-Augmented Conversational Recommendation with Prompt-Based Semi-Structured Natural Language State Tracking**
  First-author, *ACM SIGIR*, 2024.
- **Elaborative Subtopic Query Reformulation for Query-Driven Recommendation**
  Co-author, *ACM SIGIR*, 2025 (under review).

Projects

- **Subjective Summarization with PCA + LLM**: Developed a novel approach to summarize opinion-based datasets using **LDA + LLMs** to identify key topics and opposing viewpoints. Produced structured summaries that capture stance distributions and core arguments while maintaining interpretability.
- **LLM Powered Resume Modifier for Job Descriptions**: Engineered a multi-agent system using Google's Gemini AI to tailor LaTeX resumes. The system parses resumes, condenses job descriptions, and employs relevance scoring and content selection to optimize work experiences and extras. Integrated a VLM feedback loop for formatting refinement and visual consistency.

Education

University of Toronto, Bachelor of Applied Science — 09/2021 - 05/2026

Machine Intelligence, cGPA: 3.94/4.00

- Relevant Courses: Data Structures & Algorithms, Probability and Statistics, Reinforcement Learning, Digital and Computer Systems, Introduction to Machine Learning, Matrix Algebra and Optimization, Probabilistic Reasoning, Software and Neural Networks, Introduction to Databases.

Skills

- **Programming: Python**, C, MATLAB, **PyTorch**, **TensorFlow**, **Keras**, **scikit-learn**, **Hugging Face Transformers**, NumPy, Pandas, Matplotlib, Seaborn, **OOP**, Bash/Linux, Git, Docker, CI/CD, ML Ops, GCP, ONNX, OpenCV, Postgres, mySQL.
- **Languages:** English (Native/Bilingual Proficiency), Mandarin (Native/Bilingual Proficiency), German (Limited Work Proficiency).