

# ARYAN BALLANI

Full Stack, ML, Data pipelines, and Backend focus | UBC CS + Stats

[aryanballani@gmail.com](mailto:aryanballani@gmail.com) | [aryanballani.github.io](https://aryanballani.github.io) | [linkedin.com/aryanballani](https://linkedin.com/aryanballani) | +1 (236) 997-3533

## TECHNICAL SKILLS

<b>Languages</b>	: Python, TypeScript, C, C++, Java, SQL
<b>ML &amp; Data Libraries</b>	: PyTorch, Scikit-learn, NumPy, Pandas, NLTK, XGBoost, Matplotlib
<b>Frameworks &amp; APIs</b>	: Flask, FastAPI, React, Next.js, REST, GraphQL, WebSockets
<b>Cloud &amp; Infrastructure</b>	: AWS (S3, Lambda, Bedrock), Azure, Docker, Kubernetes, Terraform, Docker
<b>Databases &amp; Data Systems</b>	: PostgreSQL, MongoDB, DynamoDB, Redis, Apache Spark
<b>Automation &amp; CI/CD</b>	: GitHub Actions, Jenkins, Azure Pipelines, CI/CD Pipelines
<b>Concepts</b>	: OOPs, Microservices, TDD, BDD, Async Programming, Distributed Systems

## WORK EXPERIENCE

### Machine Learning Engineer | Railtown AI Inc., Vancouver, BC

Jan 2025 – Present

- Developed and open-sourced Railtracks framework from scratch using **pub-sub design pattern** and **microservices** architecture: in use by 20+ developers and reducing LLM integration complexity by 40%.
- Engineered 20+ RESTful API endpoints** following DRY principles and modular design patterns, achieving scalable non-blocking async execution and supporting multi-model backends.
- Led complete backend migration** from LlamaIndex to LiteLLM architecture, demonstrating system componentization and **loose coupling design**: migration completed with no service interruption.
- Implemented comprehensive testing strategy with **200+ unit/integration tests** using Pytest, achieving **92% code coverage** and establishing **CI/CD workflows** that reduced deployment cycles by 35%.
- Built and maintained a **data ingestion pipeline** powering Root Cause Analysis (RCA) and Commit Summarizer tools, processing metadata from **10K+ commits** across GitHub repos; enabled automated issue triaging.
- Dockerized** and deployed a reproducible **benchmarking pipeline** for RCA using SWE-bench, supporting standardized evaluation across 3+ internal models.
- Packaged and deployed the RequestCompletion library to **Azure Artifacts** with **GitHub Actions** integration, streamlining internal distribution and enabling seamless versioning across 5+ microservices.

### Software Engineer in Test | BC Liquor Distribution Branch, Burnaby, BC

May 2024 – Dec 2024

- Automated **80%** of manual test cases using Selenium and Oracle SQL, raising QA throughput by **25%**.
- Enhanced application performance by **12%** through profiling and optimizing **30+ database queries** and integrating **100+ unit tests**.
- Spearheaded CI/CD integration with Azure DevOps, reducing release cycle time by **30%** across **5 QA modules**.

## RELEVANT PROJECTS

### UBC Lens | python, JavaScript, BERT, NLTK, Vue.js | [link](#)

Nov 2024

- End-to-End NLP Pipeline:** Built an ETL workflow to extract and clean 5,000+ Canvas threads via REST APIs, enabling sentiment and topic modeling using BERT and keyword extraction.
- Data Cleaning & Preprocessing:** Cleaned raw thread data using regex, NLTK, and custom filters to remove noise, null entries, and sensitive information.
- Smart Course Search Engine:** Built a Vue.js frontend with real-time search, dynamic keyword filtering, and interactive sentiment charts.
- Secure Offline Deployment:** Deployed a privacy-preserving chatbot using LLaMA 3.2 via Ollama, anonymizing inputs to support course ranking and ensure secure NLP interaction.

### WasteNet | React Native, python, flask, AWS bedrock, MongoDB | [link](#)

Oct 2024

- **GenAI Recipe Engine:** Integrated AWS Bedrock with RAG to generate 100+ personalized recipes, powering LLM responses via secure Flask endpoints and MongoDB user context.
- **Scalable API & Data Layer:** Designed 10+ RESTful APIs, modeled NoSQL schemas for efficient AI-driven filtering.
- **Cloud-Backed Architecture:** Integrated MongoDB for structured ingredient storage and implemented scalable backend services for recipe generation and recommendation.

#### Dep2Phrase | *NLP, python, NLTK trees, Penn Tree Bank, LLMs, RoBERTa, MLP classifier*

Sept 2024

- **Syntactic Chunking & Mapping:** Developed robust methods for both constituency and dependency chunking to assess syntactic correlations, engineering rule-based logic to map trees.
- **Performance Optimization:** Achieved 88% precision and 89% recall by refining rule-extraction algorithms and reverse-engineering binarization strategies to improve constituency tree accuracy.
- **Automation & Scalability:** Integrated RoBERTa embeddings with MLP classifiers to automate preprocessing pipelines and significantly scale up chunking operations across datasets.
- **Research & Collaboration:** Collaborated with a professor to align implementation with linguistic theory, performing comparative evaluations to validate model performance against theoretical benchmarks.

#### Campus Capture | *TypeScript, JavaScript, HTML, CSS* | [link](#)

Jan 2024

- **Crash-Resilient:** Developed a robust backend for querying and managing 20K+ datasets using async patterns, delivering <500ms response times and rejecting 100% of malformed inputs.
- **System Reliability & Testing:** Designed comprehensive fail-safes and implemented test-driven logic across 50+ edge cases, ensuring continuous uptime and backend stability.
- **Test-Driven Development:** Verified 100+ test cases across dataset uploads, query structures, and edge case errors following software engineering best practices.
- **RESTful API Design:** Developed modular RESTful endpoints for dataset upload, query execution, and error reporting, enabling scalable interaction across 100+ API calls in testing.

#### NYC Airbnb Regression Analysis | *R, leaps, regressio3n, Model Selection, ggplot2* | [link](#)

Jan 2024

- **Exploratory Data Analysis (EDA):** Analyzed 5,000+ NYC Airbnb listings using ggpairs, histograms, and transformations to normalize distributions and reveal behavioral patterns.
- **Feature Engineering:** Created *minimum\_price* from *price*  $\times$  *minimum\_nights* and removed multicollinearity and outliers to enhance model reliability and reduce variance.
- **Model Building & Selection:** Trained multiple regression models with Mallow's Cp, adjusted R<sup>2</sup>, and AIC; selected final model with R<sup>2</sup> = 0.676 and RMSE = 2.64 using key interaction terms.
- **Model Validation:** Applied 2-fold cross-validation and residual diagnostics to validate model assumptions and minimize overfitting for better generalization.

### LEADERSHIP

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#### Undergraduate Teaching Assistant | UBC Computer Science Dept., Vancouver, BC

Jan 2024 – Present

- Led labs for **50+ students weekly** and answered **200+ questions** on Piazza over the term, earning praise as a "Piazza beast" for daily engagement and exceptional clarity in technical communication.

#### Hackathon Mentor | *BCS Hacks 2025, UBC, Vancouver, BC*

May 2025

- **Mentored 100+ student participants** by providing guidance on project ideation, implementation, and debugging across a wide range of technologies and domains.

### EDUCATION

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#### BSc. (Computer Science and Statistics), University of British Columbia

Sep 2021 – Apr 2026

- Dean's Honor List sessional standing for 3 consecutive years: 4.0/4.33 GPA
- Awarded **the International Student Scholarship** for outstanding community presence and academic excellence.