Sami Hatoum

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Education

University of St Andrews *2021 – 2025*
BSc Computer Science First Class Honours, Dean's List

University College London *2025 – 2026*
MSc Artificial Intelligence and Medical Imaging Predicted Distinction

Experience

PricewaterhouseCoopers (PwC) *Jun 2024 – Aug 2024*
Software Consulting Intern (AI)

- Built a **sentiment analysis machine learning model** using **PyTorch BERT** to automate customer feedback classification for a retail client. Achieved **91% F1 score** on an imbalanced dataset (3:1 negative to positive), processing **10,000 reviews daily**
- Engineered containerised deployment with **Flask API** on **AWS EC2** with auto-scaling. Collaborated with 3 senior consultants to achieve **150 requests per second** at **400 ms average latency** under load testing
- Conducted monitoring via **CloudWatch** and automated model retraining pipeline triggered by accuracy degradation below **85% threshold**
- Optimised the preprocessing pipeline with pandas vectorisation, reducing daily batch **processing time by 60%**

Projects

Database Query Optimiser

- Developed a **PostgreSQL analysis tool** to address slow analytics queries.
- Parses **query ASTs**, evaluates **EXPLAIN plans**, and recommends indexes. Reduced query execution time from **2.4s to 420ms** on table scans over **500K rows**
- Reviewed **200+ production queries** across a **five-million-row database** across 12 tables, identifying **21 missing indexes** that reduced average query time by **65%** and removed most full table scans.
- Deployed on **AWS ECS** with **RDS PostgreSQL**, implementing **CloudWatch** alerts for query latency above 5s and configuring **auto-scaling groups** to handle traffic spikes during batch analysis runs
- Built a **D3.js dashboard** that shows execution plans and index coverage
- Added a **cost model** that ranks index impact and estimates write overhead to avoid over indexing

Food Waste Manager

- Created a **React Native app** for household food tracking with 30+ beta users across 3 months
- Deployed a Node.js REST API on **Vercel** with **RDS PostgreSQL** backend and automated daily backups
- Integrated Recipe **API integrations** with **Redis caching** and reduced response time from **1.8 seconds to 120 ms**
- Implemented push notifications through **AWS SNS** for expiry alerts and reached **68% user engagement**
- Conducted an accessibility review and verified consistent **60 FPS rendering** on mid-tier devices

Deep Learning Medical Image Segmentation

- Built a **PyTorch U-Net** system with attention and residual blocks for prostate MRI segmentation
- Added a **data augmentation pipeline** with geometric and intensity transforms to reduce class imbalance issues
- Benchmarked performance against **nnU-Net** and **MONAI** using Dice, IoU, and Hausdorff distance.

Cryptographically Secure File Server

- Designed a secure file sharing system for sensitive data storage with end-to-end **encryption** in **Java**, implementing **zero-knowledge architecture** using AES-256, RSA-2048 key exchange, and HMAC-SHA256 verification
- Designed **capability based access control** that hides all plaintext identifiers and content from the server
- Enabled **secure multi party computation** for encrypted file sharing with a **zero-trust** server model
- Load tested with **JMeter** at 50 concurrent sessions and 200 operations/second, reaching **180 ms read latency** and **450 ms upload latency** for files up to 10 MB
- Assessed security against **OWASP Top 10** with penetration testing for man in the middle and replay attacks

Skills

Programming Languages: Python, Java, JavaScript, TypeScript, SQL
Frameworks: React, Next.js, Node.js, Flask, React Native
Cloud & DevOps: AWS (Certified Cloud Practitioner), Docker, Git, Kubernetes, Jira, CI/CD
AI & Machine Learning: TensorFlow, PyTorch, BERT, NLP, U-Net, Scikit-learn, Pandas, NumPy