

# Aayush Bajaj

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## Education

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**University of New South Wales**  
*Master of Statistics*

*Sydney, Australia*  
*Feb 2027 – Dec 2029*

**University of New South Wales**  
*Bachelor of Computer Science (AI), Minor Mathematics*

*Sydney, Australia*  
*Feb 2021 – Sept 2025*

## Skills

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**Deep Learning:** PyTorch, TensorFlow, HuggingFace Transformers, nnU-Net, U-Net, CNNs, LLMs, RAG

**ML Engineering:** Python, CUDA, HPC (H200/A200), Distributed Training, Model Optimisation, Hyperparameter Tuning

**Computer Vision:** Semantic Segmentation, 3D Medical Imaging, Data Augmentation, Preprocessing Pipelines

**LLM & GenAI:** LangChain, LangGraph, LlamaIndex, smolagents, OpenAI API, Prompt Engineering, Fine-tuning, RAG

**MLOps & Cloud:** Docker, AWS, Azure, Git, Experiment Tracking, Model Deployment

## Projects

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### Biomedical Semantic Segmentation

*KiTS19*

Production-grade kidney and tumour segmentation from 3D CT scans on official KiTS19 leaderboard.

- Achieved 0.9129 Dice score (ranked #57 globally) by implementing nnU-Net with systematic hyperparameter optimisation on H200 GPUs.
- Reproduced state-of-the-art 3D medical imaging pipeline end-to-end; published technical report with ablation studies comparing 2D vs 3D architectures.

### **Full-Stack LLM Chat Application**

Production-ready conversational AI with RAG pipeline, streaming responses, and persistent context.

- Architected full-stack chat application using TypeScript, Bun, Svelte, and Prisma ORM with PostgreSQL; integrated OpenAI GPT API with streaming.
- Implemented security middleware with rate limiting, response caching, and structured logging; validated with Zod schemas and comprehensive test suite.

### Neural Networks: Zero to Hero

*Karpathy*

From-scratch implementations of neural networks culminating in a GPT language model.

- Built micrograd (autograd engine), makemore (character-level LM), and nanoGPT following Andrej Karpathy's curriculum.
- Implemented backpropagation, attention mechanisms, and transformer architecture from first principles in pure Python/PyTorch.

### Dead Tree Segmentation

*Kaggle*

Semantic segmentation of live/dead trees from satellite imagery with severe class imbalance.

- Achieved 0.71 IoU on 97% imbalanced dataset by implementing U-Net from scratch (31M parameters) with Dice + Focal loss combination.
- Parallelised training pipeline on CUDA-enabled HPC; applied morphological post-processing for boundary refinement.

### Augmenting Infrastructure

*Monorepo*

Technical knowledge platform with ML/AI research notes, graduate-level mathematics, tutorials, and paper summaries.

- Architected full-stack content platform with Hugo static generation, Emacs org-mode authoring, and bidirectional linking across 1,073+ pages.
- Built literate programming environment with org-babel for executable Python/Julia notebooks, replicating Jupyter workflows with version control.

## Certificates

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**AWS Solutions Architect (SAA-C03)**  
*Amazon Web Services*

*Jan 2026 – Feb 2026*

**AI Agents Course**  
*Hugging Face*

*Jan 2026 – Jan 2026*