Daniel Fan

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SUMMARY & SKILLS

Applied Scientist and Senior Machine Learning Engineer with expertise in **transformers, reinforcement learning, LLM fine-tuning, and prompt engineering**. 10+ years of hands-on research and engineering across GPT, T5, BERT, RoBERTa and NLP techniques. Proven record of training, quantizing, and deploying domain-specific LLMs to **tens of thousands of users**, publishing peer-reviewed research, and optimizing distributed systems to deliver both **scientific innovation** and **production impact**.

Core Skills:

- **LLMs & Research:** Transformers, BERT, RoBERTa, T5 · RLHF · LoRA/PEFT · Quantization · Multi-label NLP
- **Infrastructure:** PyTorch · AWS (SageMaker, EC2, Lambda) · Containerized Microservices
- **Other:** Reinforcement Learning · NLP · Python · SQL

EXPERIENCE

Senior Machine Learning Engineer | *Swayable, Seattle, WA* | 2022 – Present

- Built and scaled a training system running **thousands of ML models weekly**, accelerating research velocity and deployment.
- Designed and deployed an **LLM-powered moderation system** that outperformed human benchmarks, cutting moderation costs by **50%**.
- Collaborated with researchers to integrate **alignment, evaluation, and prompt engineering workflows** into production systems.

Head of AI / Senior ML Engineer | *Advanced Learning Ltd. (Writer's Toolbox), Auckland, NZ* | 2020 – 2025

- Led applied research on **transformer architectures (GPT-2, T5, BERT, RoBERTa)** for complex educational NLP tasks.
- **Trained, fine-tuned, and quantized 10+ custom LLMs**, serving **30,000+ concurrent users** worldwide.
- Applied **LoRA/PEFT, prompt engineering, and quantization** to improve controllability and efficiency of deployed LLMs.
- Developed a **multi-label classification model (BERT)** achieving **98% accuracy** across an educational taxonomy.
- Secured **$500K in R&D funding** via successful research proposals.

Data Scientist | *Fonterra, Auckland, NZ* | 2018 – 2020

- Built predictive analytics models that reduced transport costs by **$800K annually**.
- Implemented anomaly detection systems that cut manufacturing downtime by **20%**.

Machine Learning Engineer | Debatebot | Remote · 2017–2019

- Ingested and processed **60M+ academic papers** into Neo4j, enabling large-scale knowledge graph construction.
- Built research infrastructure for experimentation with transformer-based models in applied argumentation tasks.

SELECTED RESEARCH PROJECTS

- **Multi-Objective Grammar Error Detection** – Trained a T5 achieving **87% accuracy** on noisy learner-generated text.
- **Prompt Engineering for Education AI** – Designed and tested domain-specific prompts to improve LLM reliability and alignment with pedagogical goals.
- **LLM Infrastructure Research** – Applied quantization + LoRA for efficient transformer fine-tuning, enabling scalable deployment.
- **Echo State Networks (M.S. Thesis)** – Designed selective neuron update algorithms, advancing time-series prediction.

RESEARCH & PUBLICATIONS

- Fan, D., Hunter, I., & Liu, B. (2024). **Model and Algorithm Development for Paragraph Quality and Logic Assessment in Student Writing.** Stage 2 Research Report, Advanced Learning Ltd.
- *Fan, H.-T.* (2023). **Efficient Fine-Tuning of Domain-Specific LLMs with LoRA and Quantization.** Technical Report, Advanced Learning Ltd.
- *Fan, H.-T.* (2022). **Multi-Objective Grammar Error Detection with T5 Transformers.** Internal Whitepaper, Advanced Learning Ltd.
- *Fan, H.-T., Dobbs, C., & Hunter, I.* (2020). **Building Transformer-based Models for Automated Essay Scoring and Technology-Enhanced Language Learning**. Research Report in Support of Advanced Learning R&DTI Application.
- *Fan, H.-T.; Wang, W.; Jin, Z.* (2017). **Performance Optimization of Echo State Networks through Principal Neuron Reinforcement.** *IJCNN 2017*, pp. 1717–1723.
- *Wang, W.; Fan, H.-T.; Jin, Z.* (2017). **Structure Optimization of Dynamic Reservoir Ensemble using Genetic Algorithm.** *IJCNN 2017*, pp. 2193–2200.
- *Fan, H.-T.* (2017). **Evolution of Echo State Networks with Anti-Oja Plasticity Rules.** M.S. Thesis, Binghamton University.