Christian Raymond

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EDUCATION

Victoria University of Wellington

- **Doctor of Philosophy (PhD)** in Artificial Intelligence; ***Feb. 2021 – Jun. 2024***
  Thesis: Meta-Learning Loss Functions for Deep Neural Networks
- **Bachelor of Science Honours (BSc Hons)**; First Class; GPA 8.75/9.00 (A+) ***Feb. 2020 – Nov. 2020***
  Computer Science specialising in Artificial Intelligence
- **Bachelor of Science (BSc)**; Triple majoring in: ***Feb. 2016 – Nov. 2019***
  Computer Science, Information Systems, and Philosophy

WORK EXPERIENCE

Applied Scientist Intern ***Sep. 2024 – Mar. 2025***

Amazon – International Machine Learning

Automating the labor-intensive process of creating 3D assets for Amazon's storefront by designing and implementing a foundation model for 3D geometry and material generation, reducing artist production times by $\sim$50-70%.

- **Machine Learning**: Developing and training a generative model based on a latent diffusion transformer architecture, taking a single 2D image and creating a high-resolution 3D mesh.
- **Research:** Developed a 3D inpainting method that applies diffusion blending over non-spatial latents using learned projection layers, enabling artists to locally regenerate assets with greater control and precision.
- **Model Training**: Performing large-scale distributed model training using AWS EC2 and EFS.
- **Business**: Managing and communicating with stakeholders from Amazon Central Machine Learning and artist teams at Amazon Visual Innovation.

Doctoral Researcher ***Mar. 2021 – Jun. 2024***

VUW – Centre for Data Science and Artificial Intelligence

Developed meta-learning algorithms for deep neural networks, enabling artificially intelligent learning systems to rapidly adapt and generalize to new learning tasks.

- **Algorithm Design**: Developed 4 novel AI/ML algorithms that demonstrated significant performance improvements compared to past techniques. Increased few-shot learning accuracy by over $\sim$13%.
- **Model Training**: Trained neural networks in excess of 100 million parameters (convolutional, recurrent, transformers, etc.) for computer vision and natural language processing tasks using distributed GPU clusters.
- **Optimisation**: Improved the algorithmic efficiency of a class of meta-learning algorithms, reducing the runtime from 171 days to 1.7 days.
- **Software Engineering**: Designed 4 large software packages for meta-learning using PyTorch.
- **Data Engineering**: Designed data preprocessing pipelines to process over 100+ GB of training data, containing over 14 million images from 10 distinct sources.

Teaching Assistant ***Mar. 2021 – Nov. 2022***

VUW – School of Engineering and Computer Science

Graduate teaching assistant for 2 courses on theoretical and applied AI/ML (200+ students each): "Fundamentals of Artificial Intelligence" and "Machine Learning Tools and Techniques".

- **Teaching**: Conducted tutorials and guest lectured for undergraduate and graduate-level courses.
- **Curriculum Development**: Structured and designed course materials. Led an initiative to create internal course resources that streamlined assignment marking and tutorial delivery, enhancing grading consistency.
- **Grading**: Marking students' assignments and projects, providing detailed constructive feedback, and conducting code reviews.

Research Assistant ***Nov. 2018 – Mar. 2020***

VUW – Evolutionary Computation Research Group

Enhanced the generalization of symbolic regression techniques, which are used to discover mathematical expressions from data, using statistical learning theory and evolutionary computation.

- **Writing**: 3 first-author publications written as an undergraduate accepted at international AI/ML conferences specializing in evolutionary computation.
- **Algorithm Design**: Developed 3 new symbolic regression techniques with improved generalization in the high-dimensional regime. Applied methods to analyze concrete density data, deriving actionable insights.
- **Data Analysis**: Conducted statistical analysis on experimental results, employing hypothesis testing and data visualization techniques.

PUBLICATIONS

- **Raymond, C.** (2025). Meta-Learning Loss Functions for Deep Neural Networks. Doctoral Dissertation. *Victoria University of Wellington Library*. **Doctoral Dean's List**.
- **Raymond, C.**, Chen, Q., Xue, B., & Zhang, M. (2024). Meta-Learning Neural Procedural Biases. arXiv:2406.07983 (Preprint). *Submitted to Neural Information Processing Systems (NeurIPS)*.
- **Raymond, C.**, Chen, Q., Xue, B., & Zhang, M. (2024). Online Loss Function Learning. arXiv:2301.13247 (Preprint). *To be submitted to Transactions on Machine Learning Research (TMLR)*.
- **Raymond, C**., Chen, Q., Xue, B., & Zhang, M. (2023). Learning Symbolic Model-Agnostic Loss Functions via Meta-Learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*.
- **Raymond, C**., Chen, Q., Xue, B., & Zhang, M. (2023). Fast and Efficient Local-Search for Genetic Programming Based Loss Function Learning. *ACM Genetic and Evolutionary Computation Conference (GECCO)*. **Nominated for Best Paper**.
- **Raymond, C.**, Chen, Q., Xue, B., & Zhang, M. (2022). Multi-objective Genetic Programming with the Adaptive Weighted Splines Representation for Symbolic Regression. *European Conference on Genetic Programming (EuroGP)*.
- **Raymond, C**., Chen, Q., Xue, B., & Zhang, M. (2020). A New Representation for Genetic Programming Based Symbolic Regression. *ACM Genetic and Evolutionary Computation Conference (GECCO)*.
- **Raymond, C.**, Chen, Q., Xue, B., & Zhang, M. (2019). Genetic Programming with Rademacher Complexity for Symbolic Regression. *IEEE Congress on Evolutionary Computation (CEC).*

AWARDS

- Doctoral Dean's List — Exceptional Thesis and Outstanding Contribution to Field (2025)
- Wellington Doctoral Submission Scholarship (2024)
- IEEE Postgraduate Symposium Runner-up Best Presentation Award (2022)
- Wellington Doctoral Scholarship (2021)
- Wellington Graduate Award (2020)
- Summer Research Scholarship (2018, 2019)
- Faculty of Science Dean's List (2018, 2019)

PROFESSIONAL ACTIVITIES

- ICLR Program Committee Member (2025)
- IJCAI Program Committee Member (2024)
- AAAI Program Committee Member (2024, 2025)
- AI Researchers Association NZ (2022, 2023, 2024, 2025)