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KEVIN ROICE

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Education

University of Alberta, Edmonton, AB, Canada — Sep 2022 – Aug 2024
MSc in Statistical Machine Learning — GPA: 4.00

- Model-based Reinforcement Learning & Temporal Abstraction research w/Adam White and Martha White.
- Alberta Innovates Scholarship recipient (CA $26,000) for scientific research important to Alberta.
- Relevant Courses: Reinforcement Learning II, Stochastic Processes, Thesis research (using **PyTorch** & **JAX**)

Durham University, Durham, UK — Sep 2019 – Jun 2022
BSc in Physics and Computer Science (Hons) — First Class Joint Honours

- 1st/442 in Calculus, 4th/170 in Theoretical Physics, and in the top 5% for Linear Algebra & Data Science.
- Projects: Bias Mitigation for Credit Score Predictors; COVID-19 classifier models; TD3 with FoRK Deep RL.
- Courses: Deep Learning, Computational Physics, Alg&DataStructs. Artificial Intelligence Teaching Assistant

Publications

Goal Space Planning with Subgoal Models — Paper | JMLR 2024
Chunlok Lo*, **Kevin Roice***, Parham Panahi*, Scott Jordan, Adam White, Gabor Mihucz, Farzane Aminmansour, Martha White

- We propose a long-horizon background-planning alg. for online RL. This used compressed subgoal models (abstract in state & time) for faster long-term decision making & smarter value propagation.
- Showed how using a model for shaping improves performance in simulators in tabular, linear & deep RL.

RHapTor: Rendering Haptic Torques for Virtual Reality — Paper | SIGGRAPH 2022
Kevin Roice, George Alex Koulieris

- Presented three haptic algorithms & a new rendering paradigm for VR. Selected for the XR roundtable.
- Designed hardware and software components capable of producing statistically significant shifts in environment exploration participants via a novel rendering pipeline.

Experience

Teaching Assistant at Massachusetts Institute of Technology, MA, USA — Jun 2023 – July 2023

- Volunteered to develop sea-bed physics reconstruction tools with Waymo to monitor kelp populations.
- Led daily standups and provided 1-on-1 technical guidance. Deployed model on Seattle aquarium's data.

Research Mentee at Google Research, North America — Feb 2023 – May 2023

- Selected for research mentorship for historically marginalized groups in computing research pathways.
- Corresponded with a research scientist at Google New York to gain insights into in industry research.

Software Engineer Intern at Finbourne Technology, London, UK — July 2022 – Aug 2022

- Wrote and documented tools to automate anomaly detection on structured & unstructured internal data.
- Performed hypothesis tests and detected performance shifts & anomalous API calls in cloud infrastructure.
- This resulted in finding latency dips of up to 35% across all API clients after a recent database migration.
- Worked on the company's internal **CI/CD** pipeline (**Kafka**), using **Kubernetes**, **Docker**, **GitHub** and **GitLab**.

Deep Learning Undergraduate Researcher at Durham University, UK — Sep 2021 – May 2022

- Collaborated with PhDs to implement & evaluate predictive models (Bi-LSTM in **PyTorch**) for COVID cases.
- Investigated Imitation & Inverse Reinforcement learning to improve student learning behaviours.

Research Intern at Durham University Quantum Light & Matter Group, UK — Aug 2021- Sep 2021

- Developed an experimental control system for manipulating ultracold molecules.
- Designed automatic parameter optimisation algorithms & sample-efficient gaussian-fitting with numerical solvers to decide next experiment (speeding up future results up to 45%).

Astronomy Research Intern at University of Cambridge, UK — Jun 2021- Aug 2021

- Searched for blackholes from anomalous star motions, using 1.3 TB of the latest astrometric data.
- Implemented specialist queries reducing runtime by ~60% from vanilla SQL.
- Found 1000s of anomalies by statistical inference and building data models to distinguish blackholes from calibration errors by cross-matching & cross-validating and developing Gaussian mixture models.

Data Scientist at EchoVector, Edinburgh, UK — Jun 2020 – Jun 2021

- Led our start-up team to deliver a data-driven influencer promotion platform in 6 Agile SCRUM sprints.
- Sourced data & designed neural nets matching influencers & local businesses (oversaw the AI dev. cycle)
- Framed client-pairing objective as data science problem with pricing algorithm to lower market clustering.
- Refined userbase growth predictions and achieved 24% cost savings with external GDPR-compliant clients.

Machine Learning Facilitator at Google Developer Student Club, UK — Oct 2020 – Jun 2021

- Led an interactive [public lecture series](#) to teach beginners & improve career prospects in ML.
- Trained hundreds of undergrads, postgrads and faculty, using **TensorFlow** resources sponsored by Google.

Python Developer at Department of Physics, Durham University, UK — Sep 2020

- Collaborated with a team of postgrads to code 40 notebooks after close consultation with lead professors.
- Developed systems allowing 1500+ students to continue their studies remotely.
- Achieved a 68% reduction in rendering times by migrating the department to modern plotting interfaces.

Data Analyst at NASA, CERN & the Planetary Response Network via Zooniverse — Sep 2019

- Published the discovery of 90 exoplanets from brightness curves of their host star using NASA data.
- Uncovered anomalies in CERN's collision data, otherwise undetectable by computers.
- Automated the analysis of over 36,000 satellite images of Hurricane Dorian into a heat map of high-priority areas and feasible helicopter sites to help 24 Commando Royal Engineers make decisions.

Projects

Denoising Diffusion Probabilistic Model for Image Generation — [Paper](#) | [Code](#)

- Implemented generative AI model from image datasets. Developed & tested a novel sampling mechanism.

Semilarity – NLP on BBC Journalism — [Paper](#) | [Code](#)

- Analysed the semantic distance and cosine similarity between BBC news articles for a set of search terms.
- Used a neural network to embed this large-scale text corpus into a 100-dimensional vector space, trained models from open-source natural language libraries and visualised the results.

Iterra — [Code](#)

- Created a codebase of scientific computing & numerical simulations for geometries in physics and maths.
- Currently maintained with visualisation & modelling techniques for future development into a library.

Bootsnip – A Visual Studio Code extension with over 2,500 installs — [Marketplace](#)

- Made coding accessible to Microsoft's market of 72M+ learners by loading 100s of lines in seconds.
- Designed command interface to meet the user needs of elderly, physically challenged and RSI patients.

Are student loans worth it? – IBM Professional Certificate — [Code](#)

- Analysed loans to predict whether they will be paid off using simple supervised ML algorithms.
- Statistical metrics (Jaccard, F1 & Cross-Entropy loss) to compare predictions, averaging 67% accuracy.

Awards & Accomplishments

- Planning&RL Workshop paper & Talk at ICAPS '24
- Cornell, Maryland, MaxPlanck Summer School '23
- University of Cambridge Research Scholarship '21
- Durham Undergraduate Physics Awards '20 & '21
- British Education Awards 2020 Finalist

Activities & Leadership

- Reviewer for IEEE TPAMI, ICLR, CoLLAs and RLC
- Captain of Collingwood College Pool Team 2021
- Open-source contributor to sklearn & DeepMind
- Collingwood College Tech Manager 2020-21
- Panellist at Hackathon4Schools 2020