ALEXANDRE KAISER

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EDUCATION

New York University – Courant Institute of Mathematical Sciences NYC, NY
Master of Science in ***Computer Science*** (GPA: 3.9) Sept 2022 - May 2024
Thesis: *On Continual Learning using Deep Linear Networks* [pdf]

Northwestern University Evanston, IL
Bachelor of Science in ***Applied Mathematics*** Sept 2018 – Jun 2022
Major Concentration in ***Artificial Intelligence and Machine Learning*** and Minor in ***Economics***
Kellogg Certificate Program for Undergraduates, ***Financial Economics***

EXPERIENCE

Researcher - NYU Courant, Arthur Jacot Jun 2023 – Jun 2024

- Second authored paper titled *Hamiltonian Mechanics of Feature Learning: Bottleneck Structure in Leaky ResNets* that proves and characterizes the low dimensional bias of regularized neural networks [arXiv]

Data Science Consultant – Neuron7 Jun-Aug 2023

- Developed a codebase for rapid prototyping of Retrieval-Augmented Generation (RAG) solutions on client data, evaluating the mixed performance of traditional NLP techniques and 12 modern embedding methods (SBERT, E5)
- Improved search accuracy by up to 20% for relevant document retrieval and up to 30% for multilingual texts
- Led quality check for real client search results to verify the labeling accuracy of the client's proprietary records

Assistant Modeling Engineer - Prophesee Jun-Aug 2022

- Designed a model to replicate the experimental noise profile of the company's proprietary vision system. Along with making the model an interactive tool, the hardware teams were able to optimize 7 sensor parameters
- Analyzed the impact of signal noise on the product error rate across 100+ different test conditions, influencing the direction of future research by the product team
- Compiled a thorough 45-page documentation for continued use by the team once the internship had ended

Software Engineer - T4G Limited Jun-Sept 2019

- Managed Microsoft Azure cloud resources, and manipulated SQL databases to implement data solutions for clients
- Built a *Unity* game object using *Virtual Reality*, including 500+ lines of code; presented a 14-page report

Algorithms Graduate Tutor - NYU Courant, Ernest Davis Sept-Dec 2023

- Personalized instruction for 14 weeks to enhance master's students' understanding of advanced algorithmic concepts
- Facilitated breaking down problem statements and simulating algorithmic decision for 3-4 problems weekly

Instructor/Counselor - Future Stars July-Aug 2021

- Selected, designed and led 14 sports-related activities, adapted to the camper's changing needs and the Covid situation
- Motivated and inspired groups of adolescents by leading with energy and positivity for all 8-hours of the day

KEY PROJECTS

Debrief – News Aggregator App [Github] Present

- Built a News Aggregator app processing 100+ articles daily, enhancing summaries and reducing bias via exposition

Text2RelationalGraph [Github] Dec 2023

- Created an app to convert long-form texts into hierarchical relational graphs, for use in summarization and search

Large Language & Vision Model Seminar Sept – Dec 2023

- Analyzed cutting-edge research in Foundation Models and presented lectures on Llama 2 [slides|paper], Imagen Video [slides|paper], DINOv2 [slides|paper] and high resolution image synthesis [slides|paper]

Discretization gives Uniformity: Survey of a Universal Algorithm for OCO [pdf] May 2024

- Surveyed proposal to consolidate top OCO algorithms, achieving optimal guarantees across all 3 convex geometries

Survey of Online Learning and Approachability Theory [pdf] May 2023

- Uncovered how Blackwell's Approachability Theory silently provides the foundation of machine learning

Adam Limitation Study [pdf] May 2024

- Explored the reasons for Adam's empirical dominance by proving dynamical properties in 4 regimes of importance

CORE SKILLS

Programming: Python, MATLAB, C++, SQL, LLM Prompt Engineering, RAG, PyTorch, HuggingFace
Mathematics: Perfect 800 SAT Math and 170 GRE Quantitative, 1st place Math Olympiad, Creteil, France, 2017