Marco Lam

Dublin, Ireland

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Experience

Vaultree
Dublin, Ireland

Machine Learning Engineer
Oct 2024 - Current

- Developed and maintained a GCP-hosted Jupyter Notebook demo environment using Terraform and Docker.
- Integrated cloud services including HashiCorp KMS and GCP Buckets via API for secure data handling in private demos.
- Designed and published an open-source Python library integrating Rust using Maturin and PyO3; automated builds with GitHub Actions.
- Implemented CI tools such as Black and Ruff, and generated project documentation automatically.
- Built CUDA-based cryptographic primitives from academic papers (FHE), including NTT and Hybrid Relinearisation.
- Bridged Rust and Python using `rust-bindgen`, `ctypes`, and `nvcc`; developed and benchmarked proof-of-concept pipelines.
- Created unit and integration tests to ensure system reliability and correctness.
- Planned and managed the development roadmap for a novel ML library leveraging FHE, CUDA, and Rust.
- Represented the engineering team in external partnership calls and technical discussions.

Allied Irish Banks (AIB)
Dublin, Ireland

Data Analyst
Sept 2020 - Sept 2022

- Managed Teradata Data Warehouse and Microsoft SQL Server databases.
- Designed and built ETL pipelines to generate risk assessments and regulatory reports.
- Supported system upgrade and migration projects for data infrastructure.
- Performed A/B testing and resolved data quality issues through root-cause analysis.
- Replicated errors and validated data workflows using SSMS and Excel pivot tables.
- Integrated CI/CD practices with JIRA and custom version control systems.
- Worked in both Agile and Waterfall development lifecycles.
- Liaised with stakeholders to translate business requirements into technical specifications.
- Created and maintained internal documentation on Confluence.
- Mentored three new hires, assisting with onboarding and training.

University College Dublin
Dublin, Ireland

Research Intern - github.com/marcohoucheng/Research-in-Latent-Position-Models
June 2019 - Aug 2019

- Conducted research on Latent Position Models under the supervision of Dr. Riccardo Rastelli.
- Simulated social network models in R using Markov Chain Monte Carlo methods.
- Applied Game Theory and Bayesian Risk Theory to compare and optimise statistical models.
- Optimised algorithms to reduce computational overhead and improve model performance.

Private Tutor
Dublin, Ireland

Leaving Certificate Tutor
Sept 2017 - June 2019

- Tutored both Ordinary and Higher Level Mathematics for the Leaving Certificate.
- Taught Higher Level Applied Mathematics as an extra-curricular subject.
- Developed customised academic strategies based on individual student needs.
- Prepared weekly lesson plans and liaised with parents on student progress.

Education

University of Padova
Padova, Italy

MSc Computer Science - 1st Class Honours
Oct 2022 - July 2024

- **Grade:** 110/110 cum Laude
- **Thesis:** Algorithmic Approach to 15 Minute City
- **Courses:** Advanced Algorithms, Big Data Computing, Concurrency & Distribution, Functional Languages, Deep Learning, Computer Vision, Natural Language Processing, Data Mining, Mobile Programming

University College Dublin
Dublin, Ireland

MSc Data & Computational Science - 1st Class Honours
Sept 2019 - Sept 2020

- **Grade:** GPA 3.99
- **Courses:** Data Programming with C, R & Python, High Performance Computing, Machine Learning, Regression & Classification, Clustering, Numerical Algorithms, Bayesian Analysis, Stochastic Models

University College Dublin

Dublin, Ireland

BSc Financial Mathematics - Upper 2nd Class Honours (2.1) *Sept 2015 - May 2019*

- **Grade:** GPA: 3.45
- **Research Internship:** Latent Position Models
- **Courses:** Partial Differential Equations, Complex Analysis, Groups, Rings & Fields, Metric Spaces, Cryptography, Time Series, Bayesian Models, Linear Models

Thesis

Algorithmic Approach to 15 Minute City

MSc Thesis - github.com/marcohoucheng/Algorithmic-Approach-to-15-Minute-City *Jan 2024 - Jul 2024*

- Provide a generalised approach to determine the "15-Minute City" in any given map or city.
- Aim to design an efficient algorithm to improve on the existing solutions in literature.
- Adapt and modify popular graph search algorithms to minimise complexity such as Dijkstra's and Johnson's algorithm.
- The proposed solution will be implemented in Rust as a showcase to the theory.
- **Technical Skills:** Rust, Python, Graph Search

Projects

Brain Tumour Segmentation Prediction

github.com/marcohoucheng/Brain-Tumor-Segmentation-with-Computer-Vision *Feb 2024 - Apr 2024*

- A pipeline computer vision deep learning model with a Convolutional-Autoencoder and a U-Net model.
- Identify the region and segmentation of brain tumours through MRI scans.
- Achieved a test accuracy of 98%.
- **Technical Skills:** Python with Pytorch, cv2, pandas, multiprocessing libraries

Meta Functional Language Interpreter

github.com/marcohoucheng/ML-Interpreter *Oct 2022 - Jan 2023*

- Built an interpreter for a meta functional language following theoretical type inference and evaluation rules.
- Implemented with a type inference mechanism to ensure absolute type safety within expressions.
- Developed comprehensive understanding of the functioning of programming language compilers.
- **Technical Skills:** F#, functional languages

Gran Turismo 7 Price Tracker

github.com/marcohoucheng/Gran-Turismo-7-Price-Tracker *Dec 2023 - Mar 2024*

- Aimed to create a solution without the requirement of creating accounts on existing services.
- Automated email service to notify dynamic in-game information updates in HTML format.
- Streamlined process to create and update local databases with a scheduled web-scraper.
- **Technical Skills:** Python with pandas, urllib, smtplib, ssl and more

Computer Vision and Deep Learning Projects

github.com/marcohoucheng/Computer-Vision-and-Deep-Learning *Aug 2023 - Dec 2024*

- A series of Python Notebooks showcasing studies of various computer vision and deep learning topics.
- Models implemented including SIFT, Bag of Words, CNN, Recurrent Neural Networks, LSTM, GRU, Transformers and more.
- Utilising pre-trained models such as AlexNet, GoogLeNet and ResNet.
- **Technical Skills:** Python with Pytorch, pandas, cv2 and more

Skills

Programming	Python, Rust, C, C++, F#, Java, Swift, Javascript, SQL, VBA, R, Matlab
Frameworks & Libraries	Pytorch, Tensorflow, PySpark, Scikit-learn, Pandas, NumPy, Django
Tools	Git, Docker, CI/CD, RESTful APIs, JIRA, Confluence
Languages	English (Fluent), Cantonese Chinese (Fluent), Mandarin Chinese (Fluent) and Italian (A1).