Matt Beton

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EDUCATION

Queens' College, University of Cambridge   **Cambridge, UK**
Bachelor's in Mathematics   *October 2020 - June 2023*
First Class (83%), 18th of 243 in the year. Foundation Scholar on account of academic performance

Master of Mathematics   *October 2023 - June 2024*
Distinction (81%), Foundation Scholar on account of academic performance

Master's degree essay (dissertation): Transfer Learning for Timeseries Data, supervised by Mihaela van der Schaar

- Explores a novel setting for transfer learning between domains of different dimensions, called 'embedded transfer'
- The essay defines and formalises this setting, where source domain is a dimension-wise slice of the target domain
- Applied embedded transfer to ECG classification, using single-lead and 12-lead (12 independent electrodes) data
- Building on existing works with ECG classification with deep learning, I train a model for single-lead ECG classification, which is then transferred to the 12-lead domain
- When we have scarce data in the 12-lead (target) domain, embedded transfer techniques perform much stronger than without transfer learning
- Drawing inspiration from *Houlsby et. al. (2019)*, I introduce adapters to handle target-domain data with strong self-correlation. This model performs better than the original transfer model on semi-synthetic data augmented by Perlin noise

Wilmslow High School   **Wilmslow, UK**
A-Levels – 3A*s in Mathematics, Further Mathematics, Physics   *September 2013 - June 2020*
STEP Entrance Exam: 1 in STEP 2, S in STEP 3

PROFESSIONAL EXPERIENCE

Jane Street Asia Ltd.   **Hong Kong**
Trading Intern   *June 2023 – September 2023*

- Interned for 10 weeks in Hong Kong, during which I worked on 2 different projects; one using statistical modelling to predict price movements as a result of market volume, and another related to market microstructure during the opening auction
- Learnt research methodologies, data science skills, and quantitative trading concepts
- Chose the 'modelling' elective to focus deeper on machine learning and statistics, studying modern statistical methods in both a theoretical and applied setting

P Capital Ltd.   **Online**
Director, Shareholder and Developer   *August 2022 – June 2023*

- Cofounded proprietary trading company after noticing an inefficiency on the Arbitrum Curve.fi DEX; arbitrageurs were always trading with a constant volume
- Using Curve V2 whitepaper alongside Vyper smart contract implementation, built a method for optimising trade sizes off-chain. This allowed us to produce tighter quotes than any other market participant
- Built a proprietary system for building our centralised and decentralised trades and broadcasting them efficiently. This required understanding of optimally utilizing Go multithreading to ensure most critical operations were prioritised first
- Took inspiration *Optimal Routing for Constant Function Market Makers* to extend our trading to more exchanges; building a general framework to describe a DEX, can optimize trades across an arbitrary number of exchanges via gradient descent
- The ideal implementation of a multi-leg arbitrage uses a relay smart contract, ensuring all trades are executed in the same block. This avoids issues of price slippage between trades
- Received Arbitrum airdrop for frequent on-chain market participation, production trades yielded a t-statistic of 34

IMC Trading B.V.   **Amsterdam, Netherlands**
Trading Intern   *June 2022 – August 2022*

- Interned for 9 weeks on the Cryptocurrency Options desk, building a strategy to trade ETH-BTC volatility spreads
- Built all tools from scratch, including data analysis, backtesting framework and live trading system
- First IMC intern to ever trade with actual money; my strategy was traded live for the final weeks of the internship

Daresbury Laboratory   **Warrington, UK**
Mathematical Work Experience   *July 2019*

- Worked with and learnt from Professor David Emerson in the scientific computing department
- Jacobi iteration to solve heat diffusion equations analytically, machine learning to identify solubility of organic compounds

PROGRAMMING PORTFOLIO

EIP-7579 Subscription Service *March 2024*
Automated subscription payments using Modular Smart Accounts https://ethglobal.com/showcase/subhub-q0jrr
Recipient of Nethermind prize for best use of Account Abstraction

Bitcoin Miner *June 2022*
A Bitcoin miner & SHA256 implementation, written from scratch in C++ https://www.youtube.com/watch?v=r1xBsG9zv6k

ETH Amsterdam Hackathon *April 2022*
Extended staking-deposit-cli to increase private key resilience https://ethglobal.com/showcase/horcrux-et4ox

VOLUNTEERING AND LEADERSHIP

Cambridge Blockchain Society **Cambridge, UK**
Committee Member *October 2021 – Present*

Queens' College Boat Club **Cambridge, UK**
Social Secretary, Webmaster *June 2021 – June 2023*

Wilmslow High School & Cambridge University **Wilmslow, UK**
Voluntary Academic Tutoring *September 2021 – Present*

- Since being at university, have strived to help others with university admissions, where none was provided to me; being from a state school in the north of England, there was very few resources for applying to Oxbridge available to me
- Each year, I return to my school to provide tutoring and advice on applying to Oxford and Cambridge
- At Cambridge, I act as a math subject contact, providing advice and assistance (and my notes!) to younger math students
- Helped with the STEP Support Programme; the STEP entrance exam is a large barrier for state school students to get into Cambridge Maths, and the STEP Support Programme gives assistance to state schoolers by running outreach days

CoderDojo **Wilmslow, UK**
Volunteer Programming Teacher *June 2014 – August 2019*

- Acted as a youth mentor at the local CoderDojo, running classes and providing one-to-one tutoring to other teenagers learning to program
- During high school also volunteered as a math tutor to younger students in lunch breaks and after school

SKILLS, ACTIVITIES AND INTERESTS

University Activities: Cambridge Blockchain Society committee member, Queens' Boat Club committee member, Orienteering Club, Anglo-Japanese Society
Skills: Intermediate C#, Python, GoLang. Basic C++, Rust, Assembly and Web Dev. Strong understanding of cryptocurrencies
Interests: Japanese language, Drumming, Bass guitar, Poker, Theatre, Running, Music, Climate, Electronic Music/DJing

FURTHER INFORMATION

Cambridge Courses Taken

Part IA (rank 86/250)*:* Groups, Numbers & Sets, Analysis, Probability, Differential Equations, Vectors & Matrices, Vector Calculus, Dynamics & Relativity
Part IB (rank 11/243)*:* Linear Algebra, Groups Rings and Modules, Mathematical Methods (multidimensional Des), Complex Methods, Quantum Mechanics, Electromagnetism, Fluid Mechanics, Markov Chains, Variational Calculus, Optimization
Part II (rank 18/243)*:* Principles of Quantum Mechanics, Applications of Quantum Mechanics, Quantum Information & Computation, Further Complex Methods, General Relativity, Classical Dynamics, Electrodynamics, Asymptotic Methods, Statistical Mechanics, Applied Probability (Markov Processes)
Part III: Information Theory, Quantum Computation, Symmetries and Particles (Lie Algebra and Representation Theory), Quantum Field Theory, General Relativity, Black Holes, String Theory

Audited *Distributed Ledger Technologies* from Department of Computer Science in 2024