Dr. Dominic Duxbury, PhD

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A Data Scientist/Engineer and AI researcher with experience working on real-time decision support systems and state of the art ML techniques. Specifically in the eCommerce and military domains. In the former I delivered a hotel ranking service, provably increasing revenue for the company, and a recommendation engine. As a researcher, I have deployed my own novel decision-making algorithms toward an end-to-end solution, facilitating user experiments to deliver meaningful research output during the COVID period.

Experience

Senior Data Engineer - Netacea

Feb 2022 - Present

I have led the development of a new platform for delivering real-time models at Netacea. This platform has leveraged pyFlink to create a new modular strategy for delivering data products that can scale up to billions of requests per day. The platform fits as part of a data mesh strategy to enable self-serve data and standardised consumption of high velocity data throughout the business. My leadership experience includes creating tickets, planning sprints and leading meetings to prioritise work for a team of six.

Data Scientist - Laterooms.com

Jun 2015 - Dec 2017

I joined Laterooms as a 3-month industrial placement initially, then moved to a permanent role for a total of two years, working as part of a small data science team to identify areas of opportunity, design, and implement solutions, including part-time work whilst I finished my degree. This position involved working closely with other teams, including hotel relations, front-end and back-end teams, and infrastructure teams. In this role I cultivated excellent communication skills, working with technical and non-technical stakeholders, to deliver valuable results in an iterative, agile manner.

- Created architecture to allow the comparison of mobile and website behaviour in real-time to help stakeholders understand how best to cater to mobile customers whilst this customer segment grew and the Laterooms app was developed.
- Worked with infrastructure teams to restructure and centralise event streams and databases using Kafka, improved deployments and scalability using Docker, and utilised

microservices architecture as a means to integrate with Google Cloud Platform. Allowing us to deliver real value from modern artificial intelligence methodologies.
- Contributed towards the overhaul of the search ranking system. This was a multi-team effort to build a new search system, to allow increased personalisation, new revenue channels, and optimisation of existing KPIs. Leading to £0.90 more commission per search, a 21% increase.

Education

PhD, Dynamic Decision Making - University of Manchester

Sponsored by BAE Systems

Oct 2017 - Oct 2021

As part of a PhD, I investigated methodologies for combining stream processing engines with decision support algorithms to enable the production of dynamic decision support systems. The research was proposed by BAE Systems, to enhance decision making in dynamic command and control scenarios. I was focused on high-stakes domains where a human is required to make the final call, equipping these systems with explainable and trustable AI.

- A framework for dynamic decision making was created then illustrated using a train journey case study.
- Software supporting the planning of routes for drones was produced. These drones were utilised to improve situational awareness in a harbour.
- A cloud architecture including a Flink cluster was used to deliver a user experiment during coronavirus restrictions. This architecture enabled novel decision making algorithms to be executed in real-time.
- Metrics were collected and analysed using ETL techniques across this architecture to quantitatively assess the effect of decision support features on trust and its antecedents.
- A headless version of this software was designed to provide comparison between algorithms for decision support.

BSC, Computer Science and Mathematics - University of Manchester

Oct 2013 - Jun 2017

BA (Hons) 1st Class

- For my mathematics options I focused on statistics and pure mathematics, including group theory and information theory.
- As a final year project I analysed the effect of twitter sentiment on the price of bitcoin. A pipeline was produced, using the twitter API and NLP techniques to extract features from tweets. These features were used to classify the sentiment of tweets in real-time, and the number of positive/negative tweets were used along with other predictors to forecast small changes in bitcoin price.

A Levels - Cardinal Newman College, Preston

2011 - 2013

AAA in Maths, Further Maths and Chemistry
79% in AS Level Economics

GCSE - Holy Cross Catholic College, Chorley

2006 - 2011

6 A*, including 3 A* in sciences and an A* in maths
5 A, including English

Publications

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Dynamic Decision Making for Situational Awareness using Drones

Under peer review

https://track.authorhub.elsevier.com/?uuid=0c39b9f0-8b24-4010-a249-46a128c98c69

In this paper we present five desiderata for dynamic decision support and we compare methods with regards to the consistency of trade-offs between criteria and the stability of results under small changes to criteria values.

Trusted and Auditable Decision Aids over Data Streams

Proceedings of the Workshops of the EDBT/ICDT 2019 Joint Conference

https://ceur-ws.org/Vol-2322/dsi4-3.pdf

This paper investigates approaches for bringing together stream management and decision support systems in a way that is both auditable and trustable.

Software Preferences

Web Development: TypeScript, React, Redux, SQL, Git.

Streaming Software: Java, Apache Flink, Apache Kafka.

Machine Learning: Python, Scikit-learn, Matplotlib, TensorFlow.

Personal interests

Bouldering, gardening, and video games.