DR JACK MUMFORD

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RESEARCH INTERESTS

My research focuses on the challenge of advancing XAI systems that can provide rationales for their outputs. I am interested in building machine learning that is logically coherent and investigating the extent to which such learning can accommodate rational argumentation semantics in order to engender greater trust in the output. In particular, I focus on applying argumentation and state-of-the-art machine learning techniques to legal frameworks for case and rule-based approaches, evaluating the effectiveness of various semantics for modelling legal reasoning in terms of predictive power, tractability and explainability for data-driven learning.

EDUCATION

📅 *2016 – 2017*   MSc in Intelligent Systems
King's College London, Department of Informatics, UK
Distinction

📅 *2012 – 2016*   BSc in Mathematics
The Open University, School of Mathematics and Statistics, UK
1st Class (Honours)

RESEARCH

📅 *2021 –*   Research Associate in Computational Models of Argument
University of Liverpool, Department of Computer Science, UK
Research focus: Exploring the effectiveness of argumentation semantics in modelling legal reasoning and predicting case outcomes.
Line Manager: Professor Katie Atkinson.

📅 *2017 – 2022*   PhD in Computer Science
King's College London, Department of Informatics, UK
Thesis: Learning How to Defeat Arguments Using Data-Driven Neural Argumentation Networks.
Supervisors: Professor Simon Parsons (School of Computer Science, University of Lincoln), Dr Elizabeth Black (Department of Informatics, King's College London) and Dr Isabel Sassoon (Department of Computer Science, Brunel University London).

TEACHING EXPERIENCE

📅 *2017 – 2020*   Graduate Teaching Assistant
King's College London, Department of Informatics, UK
Modules: • Machine Learning • Data Mining • Software Measurement & Testing • Introduction to Robotics • Simulation & Data Visualisation.

📅 *2014 – 2016*   GCSE and A-Level Mathematics Tutor
West Midlands, UK

PROFESSIONAL EXPERIENCE

📅 *2012 – 2014*   Programme Co-ordinator/Operations Co-ordinator
University of Warwick, Warwick Business School, UK

📅 *2010 – 2012*   Customer Services Officer
HSBC Bank, Stratford-upon-Avon, UK

AWARDS & GRANTS

📅 *2022 – 2023*   Awarded £1609.76 from the *Early Careers Researcher Fund Award* (University of Liverpool).

📅 *2022 – 2023*   Awarded £2000 from the *Post-Doctoral Enrichment Award* (Alan Turing Institute).

📅 *2022 – 2023*   Awarded grant from the *Prosper programme* (University of Liverpool).

📅 *2021*   Awarded grant for the *1st Munich Legal Tech Summer School* (Volkswagen Foundation).

📅 *2020*   Recipient of *King's Education Award* (King's College London).

📅 *2019*   Nominated for *King's Education Award* (King's College London).

📅 *2019*   *Outstanding Teaching Assistant Award* (Deptartment of Informatics, King's College London)

📅 *2017 – 2020*   *PhD studentship* (EPSRC).

📅 *2017*   *Prize for the best overall performance on the MSc in Intelligent Systems* (Department of Informatics, King's College London).

ACADEMIC SERVICE

📅 *2022*   **Co-founder and co-organiser** 1st Workshop on Argumentation and Machine Learning (ArgML 2022).
Co-organiser COMMA SSA 2022 Student Program.
Reviewer Journal of Applied Non-Classical Logics.
Additional reviewer 9th International Conference on Computational Models of Argument (COMMA 2022).

📅 *2020*   **Additional reviewer** 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2021).
TA Representative Department of Informatics TA Liaison Committee (King's College London).

📅 *2019 –*   **Co-Founder & Editor** Online Handbook for Argumentation in Artificial Intelligence (OHAAI).

📅 *2019 – 2021*   **Co-Founder & Member** Argumentation Reading Group (King's College London).

📅 *2016 – 2017*   **Student Representative & Co-chair (*from 2017*)** Department of Informatics Postgraduate Staff Student Liaison Committee (King's College London).

SCIENTIFIC TALKS

📅 *2022*   • *On the Complexity of Determining Defeat Relations Consistent with Abstract Argumentation Semantics.* 9th International Conference on Computational Models of Argument (COMMA 2022).
• *Representing and Extracting Support via Complement-based Argumentation Frameworks.* 22nd Workshop on Computational Models of Natural Argument (CMNA 2022).

📅 *2021*
- *Explaining Factor Ascription.* 34th International Conference on Legal Knowledge and Information Systems (JURIX 2021).
- *Machine Learning and Legal Argument.* 21st Workshop on Computational Models of Natural Argument (CMNA 2021).
- *Neural Argumentation Networks (NANs) – automating the learning of defeat relations from acceptability data.* Seminar for the ARK and DMML research groups, University of Liverpool, UK.
- *Complement-based argumentation.* Seminar for the UK India Education & Research Initiative (UKIERI).

📅 *2020*
- *Learning attack relations from data – the abstract argumentation way.* Seminar for the UK India Education & Research Initiative (UKIERI).
- *Building Neural Argumentation Networks (NANs) – automating the learning of attack relationships from data.* Seminar for the RAP research group, Department of Informatics, King's College London, UK.

📅 *2019*
- *Building Neural Argumentation Networks (NANs) – automating the learning of attack relationships from data.* Presentation at the Argumentation Workshop, Imperial College London, UK.
- *Argumentation Machine Learning.* Seminar for the Argumentation Reading Group, King's College London, UK.
- *Attack learning using a feedforward neural network.* Seminar for the Argumentation Reading Group, King's College London, UK.
- *Calculating Dung semantics attack relations using a feedforward neural network.* Presentation at the London Argumentation Forum, Imperial College London, UK.

📅 *2018*
- *Learning attack relations using a feedforward neural network.* Seminar for the RAP research group, Department of Informatics, King's College London, UK.

PUBLICATIONS

Published papers:

1. Jack Mumford, Isabel Sassoon, Elizabeth Black, and Simon Parsons. "On the Complexity of Determining Defeat Relations Consistent with Abstract Argumentation Semantics". *9th International Conference on Computational Models of Argument*, IOS Press, 2022.

2. Jack Mumford, Katie Atkinson, and Trevor Bench-Capon. "Explaining Factor Ascription". *34th International Conference on Legal Knowledge and Information Systems*, IOS Press, 2021.

3. Jack Mumford, Katie Atkinson, and Trevor Bench-Capon. "Representing and Extracting Support via Complement-based Argumentation Frameworks". *22nd Workshop on Computational Models of Natural Argument*, CEUR Workshop Proceedings, 2022.

4. Jack Mumford, Katie Atkinson, and Trevor Bench-Capon. "Machine learning and legal argument". *21st Workshop on Computational Models of Natural Argument*, CEUR Workshop Proceedings, 2021.

5. Jack Mumford. "Learning defeat relations from data using Neural Argumentation Networks (NANs)". *Online Handbook of Argumentation for AI: Volume 2*, pages 42–46, arXiv:2106.10832 [cs.AI], 2021.

6. Jack Mumford. "Crafting neural argumentation networks". *Online Handbook of Argumentation for AI: Volume 1*, pages 22–26, arXiv:2006.12020 [cs.AI], 2020.

Accepted for publication:

7. Jack Mumford, Katie Atkinson, and Trevor Bench-Capon. "Reasoning with Legal Cases: A Hybrid ADF-ML Approach" Accepted for publication in *35th International Conference on Legal Knowledge and Information Systems*, 2022.

Edited books:

8. Federico Castagna, Francesca Mosca, Jack Mumford, Stefan Sarkadi and Andreas Xydis (editors). *Online Handbook of Argumentation for AI: Volume 2*. arXiv:2106.10832 [cs.AI], 2021.

9. Federico Castagna, Francesca Mosca, Jack Mumford, Stefan Sarkadi and Andreas Xydis (editors). *Online Handbook of Argumentation for AI: Volume 1*. arXiv:2006.12020 [cs.AI], 2020.