Duncan C McElfresh

Curriculum Vitae

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Education

2021	Ph.D. Applied Mathematics, University of Maryland, College Park Dissertation Title: Practical Algorithms for Resource Allocation and Decision Making Dissertation Advisor: John P Dickerson
2013	M.Sc. Applied Physics, Colorado School of Mines
2013	B.Sc. Engineering Physics, Colorado School of Mines

Work Experience

2021 - Present	*Postdoctoral Fellow*, Stanford University & VA Palo Alto Health Care System VA Fellowship in Health Services Research and Development.
2017 - 2021	*Graduate Research Assistant* (Computer Science), University of Maryland, College Park Using optimization, machine learning, and market design to address applied problems of resource allocation and decision making. Advised by John P Dickerson.
Summer 2019	*Research Intern*, Facebook, Core Data Science Used optimization, machine learning, and simulation to improve the notification strategy for Facebook's Blood Donation product. In collaboration with the Blood Donation product team.
Summer 2018	*Visiting Scholar*, University of Southern California Center for Artificial Intelligence in Society (CAIS) Applied optimization and machine learning to improve policies for allocating housing resources to homeless youth, with the Los Angeles Homeless Services Authority (LAHSA).
2014 - 2016	*Imagery Scientist*, National Geospatial-Intelligence Agency Developed analysis and exploitation techniques for remote sensing data. Built analysis tools using Envi, ArcMap, IDL, and Python.

Consulting

2022 - Present	Abacus.AI AutoML and recommender systems research.
2020 - Present	FinRegLab Studying applications of machine learning in financial services.
2018 - 2019	Facebook (via Pro Unlimited) Research Scientist with Facebook Core Data Science.

Publications & Presentations

Conference Publications

This section contains papers published in competitive "top-tier" Computer Science conferences. These conferences are the primary publication venue for Computer Science, they are subject to rigorous peer review, and acceptance rates are typically between 15% and 30%. Entries marked with "𝔸" use alphabetical author ordering, which is common in operations research and theoretical computer science. Otherwise author ordering reflects the authors' level of contribution, which is common in AI and ML.

1. **D.C. McElfresh**, L. Chan, K. Doyle, W. Sinnott-Armstrong, V. Conitzer, J.S. Borg, J.P Dickerson, "Indecision modeling." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI).* 2021
2. (𝔸) H. Aziz, Á. Cseh, J.P. Dickerson, **D.C. McElfresh**, "Optimal Kidney Exchange with Immunosuppressants." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2021
3. **D.C. McElfresh**, M. Curry, T. Sandholm, and J.P. Dickerson, "Improving Policy-Constrained Kidney Exchange via Pre-Screening." *Advances in Neural Information Processing Systems 33: Annual Conference on Neural Information Processing Systems* (NeurIPS), 2020
4. D. Saha, C. Schumann, **D.C. McElfresh**, J.P. Dickerson, M.L Mazurek and M.C. Tschantz. "Measuring Non-Expert Comprehension of Machine Learning Fairness Metrics." *Proceedings of the Thirty-seventh International Conference on Machine Learning (ICML)*. 2020
5. **D.C. McElfresh**, C. Kroer, S. Pupyrev, E. Sodomka, K.A. Sankararaman, Z. Chauvin, N. Dexter, J.P. Dickerson. "Matching Algorithms for Blood Donation" *The 21st ACM Conference on Economics and Computation (EC)*. 2020
6. (𝔸) H. Bidkhori, J. P Dickerson, K. Ren, and **D.C. McElfresh**. "Kidney exchange with Inhomogeneous Edge Existence Uncertainty." *Conference on Uncertainty in Artificial Intelligence (UAI)*. 2020
7. L. Chan, K. Doyle, **D.C. McElfresh**, V. Conitzer, J.P. Dickerson, J.S. Borg and W. Sinnott-Armstrong. "Artificial Artificial Intelligence: Measuring Influence of AI "Assessments" on Moral Decision-Making." *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES).* 2020
8. D. Saha, C. Schumann, **D.C. McElfresh**, J. P Dickerson, M.L. Mazurek and M.C. Tschantz. "Human Comprehension of Fairness in Machine Learning." *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES).* 2020
9. **D.C. McElfresh**, H. Bidkhori, and J.P. Dickerson. "Scalable Robust Kidney Exchange." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI).* 2019
10. **D.C. McElfresh**, and J.P. Dickerson. "Balancing lexicographic fairness and a utilitarian objective with application to kidney exchange." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI).* 2018
11. J. Bach, A. Meyer, **D.C. McElfresh**, and J. Anemüller. "Automatic classification of audio data using nonlinear neural response models." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. 2012

Working Papers

1. **D.C. McElfresh**, C. Kroer, S. Pupyrev, E. Sodomka, K.A. Sankararaman, Z. Chauvin, N. Dexter, J.P. Dickerson. "Matching Algorithms for Blood Donation" *(Under review at INFORMS Journal on Computing. An earlier version appeared at EC2020.)*

2. P. Vayanos, **D.C. McElfresh**, Y. Ye, J.P. Dickerson, and E. Rice. "Active preference elicitation via adjustable robust optimization." *(Reject & Resubmit at Management Science.)*

Other Publications

1. **D.C. McElfresh**. "Practical Algorithms for Resource Allocation and Decision Making." *University of Maryland,* 2021. Doctoral Dissertation.
2. **D.C. McElfresh**, M. Curry, S. Booker, M. Stuart, D. Stewart, T. Sandholm, and J.P. Dickerson. "Who can be matched via kidney exchange?" (abstract). *Am J Transplant. 2021; 21 (suppl 3).*
3. **D.C. McElfresh**, M. Curry, S. Booker, M. Stuart, D. Stewart, T. Sandholm, and J.P. Dickerson. "Improving Policy-constrained Kidney Exchange Via Pre-screening." (abstract). *Am J Transplant. 2021; 21 (suppl 3).*
4. V. Nanda, **D.C. McElfresh**, and J.P. Dickerson. "Learning to Explain Machine Learning." *Workshop on Operationalizing Human-centered Perspectives in Explainable AI (at CHI21)*.
5. **D.C. McElfresh**, S. Dooley, C. Cui, K. Griesman, W. Wang, T. Will, N. Sehgal and J.P. Dickerson. "Can an Algorithm be My Healthcare Proxy?" *2020 International Workshop on Health Intelligence (at AAAI20)*. (Workshop Paper.)
6. **D.C. McElfresh**, C. Kroer, S. Pupyrev, E. Sodomka, J.P. Dickerson. "Matching Algorithms for Blood Donation." *Workshop on Mechanism Design for Social Good (MD4SG).* 2019 (Workshop paper.)
7. **D.C. McElfresh**. "Triplet exciton transport in the benzophenone-fluorene-naphthalene molecule." *Colorado School of Mines*, 2013. Masters thesis.

Presentations & Invited Talks

1. "Improving Policy-Constrained Kidney Exchange via Pre-Screening." *INFORMS Annual Meeting.* 2021. With M. Curry, S. Booker, M. Stuart, D. Stewart, T. Sandholm, and J.P. Dickerson.
2. "Kidney Exchange, AI, and Bioethics." Cleveland Clinic Fellowship in Advanced Bioethics Weekly Conference. 2021 (Invited talk.)
3. "Matching Algorithms for Blood Donation." *INFORMS Annual Meeting*. 2019. With Christian Kroer, Sergey Pupyrev, Eric Sodomka, and John P Dickerson.
4. "Optimizing Public Policy for Homelessness Assistance." *INFORMS Annual Meeting*. 2019. With Phebe Vayanos, Eric Rice, and John P Dickerson.
5. "AI & Advance Care Planning: Challenges and Opportunities." *Arizona Bioethics Network Annual Conference*. 2019 (Invited talk.)
6. "Robust Active Preference Elicitation for Learning Policy Priorities." *INFORMS Revenue Management & Pricing Workshop*. 2019. With Phebe Vayanos, and John P Dickerson.
7. "Balancing lexicographic fairness and a utilitarian objective with application to kidney exchange." At:
    - AAAI 2018 Computational Sustainability session (main technical track)
    - AAAI 2018 Health Intelligence workshop
8. "Who Gets the Kidney?" Demonstration of preference modeling and preference aggregation methods applied to kidney allocation. Participants explore their preference models and discuss how these methods help align algorithms with human values. *We Robot Conference*. 2018. With Cassi Carley.

Workshops, Conference Sessions, and Panels

1. "Games, Agents, and Incentives." Workshop at AAMAS (2021), organized with Haris Aziz, Sofia Ceppi, John P Dickerson, Hadi Hosseini, Omer Lev, Nicholas Mattei, and Yair Zick.
2. "Matching Market Design in the Real World." Invited session at the Auctions cluster of the INFORMS Annual Meeting (2020). Organized with John P Dickerson.
3. "Optimization & Learning Approaches to Resource Allocation for Social Good." Half-day tutorial, with Faez Ahmed, Sanmay Das, John P Dickerson, and Bryan Wilder. Presented at:
    - The International Joint Conference on Artificial Intelligence (IJCAI) 2020.
    - The Conference on Artificial Intelligence (AAAI) 2020.
4. "Ok Google: Who Gets the Kidney?: Artificial Intelligence and Transplant Algorithms." Panel presentation and discussion at the annual meeting of the American Society of Bioethics and Humanities (ASBH) 2018. With Patricia Mayer, Gabriel Schnickel, and John P Dickerson.

Awards

2021 *University of Maryland College of Computer, Natural, and Mathematical Sciences (CMNS) Board of Visitors Outstanding Graduate Student Award.*
Annual award ($5,000) given to one CMNS doctoral student who has advanced to candidacy, for scholarly and research excellence.

2011 - 2014 *Science, Mathematics, and Research for Transformation (SMART) Scholarship.*
Full tuition support, $25,000 annual stipend, and summer internships with Defense agencies, through completion of my BS and MS in Engineering & Applied Physics. Administered by the US Department of Defense.

Service

Professional Service and Outreach

SPC: Conferences	AAMAS	2022
PC: Conferences	NeurIPS, AAAI, AAMAS	2020 - Present
PC: Workshops	AAMAS OptLearnMAS	2020
	IJCAI workshop on AI for Social Good	2019
	NeurIPS workshop on ML and the Physical Sciences	2019
	NeurIPS workshop on AI for Social Good	2019
Reviewer: Journals	EJOR, JAIR	2021
Poster Session Co-Organizer	Workshop on Mechanism Design for Social Good (MD4SG)	2020
Proposal Reviewer	ACM/EC Global Challenges in Economics and Computation (GCEC)	2020
Red Judge	IBM Watson AI XPRIZE	2019

Neutral Observer	IBM Watson AI XPRIZE	2019 - 2020
Site Coordinator, Mentor	Girls Excelling in Math and Science (GEMS) of Prince George's County, MD	2018 - 2019

Organization and Governance

2020 - 2021 *Co-Organizer,* Mechanism Design for Social Good (MD4SG): Working Group on Algorithms, Law, and Policy.

2019 - 2020 *Co-Organizer,* Mechanism Design for Social Good (MD4SG): Working Group on Bias, Discrimination, and Fairness.

2018 - 2020 *Student Council Member,* Department of Applied Mathematics Student Council
Organizing & managing departmental seminars, outreach events, new student orientation, and social events.

2016 - 2018 *Department Representative,* University of Maryland Graduate Student Government
Representing applied mathematics students in the graduate student government; drafting legislation; lobbying for graduate student interests; bringing opportunities to math graduate students; funding graduate student events and projects.

Programming Languages

Fluent in	Python, Matlab, IDL/ENVI
Familiar with	Java, SQL, Bash
Exposure to	C++, Fortran