John P Dickerson

Curriculum Vitae

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Education

2016	Ph.D.	Carnegie Mellon University	Computer Science (expected)
2014	M.Sc.	Carnegie Mellon University	Computer Science (expected)
2008	B.Sc.	University of Maryland	Computer Science
2008	B.Sc.	University of Maryland	Mathematics

Areas of Expertise

Stochastic optimization, computational economics, machine learning, multi-agent systems, mechanism design, kidney exchange, policy and information technology

Work Experience

2013–*Present*	Optimized Markets	Consultant
2010–*Present*	CMU	Electronic Marketplaces Lab
2012–2013	GeoQuera	Founder & CTO
2008–2012	UMD	Laboratory for Computational Cultural Dynamics (LCCD)
2007–2008	UMD	Graphics and Visual Informatics Lab (GVIL)
2006	UMD	Center for Advanced Transportation Technologies (CATTLab)
2005	IBM	Global Contract Preparation System (GCPS)
2003–2004	NSA	Bioinformatics and security R&D, *cleared TS/SCI*

Awards

2012–*Present*	NDSEG Fellowship	Full tuition, fees, & stipend for 3 years	$218,410
2014–*Present*	NSF SBIR Phase I	Principal Investigator, Award #1345567	$150,000
2012–*Present*	Travel Funds	AAAI, SoCS, AAMAS	$2,160

Selected Projects

2011+: Dynamic Clearing & Automated Abstraction in TV Advertising

Can we use automated abstraction to deal with channel explosion in online and television advertising markets? In the case where bidders bid asynchronously and bids can be accepted or rejected in an online fashion, can we tractably look to the future to yield better expected revenue for the seller or fairness for the bidder(s)? I'm exploring tradeoffs between optimality and tractability in the context of dynamic market clearing of campaigns and abstraction of concrete channels.
Toward this end, I'm building an optimization engine and cloud-based combinatorial market system for selling television advertising campaigns. Our system is in the proof-of-concept stage with one of the world's largest cable operators (MSOs). The technology applies to cable operators (MSOs), broadcast networks, cable networks, TV over Internet, and cross-media advertising.

2011+: Social Networking and Gorillas

Given 50 years of data, I am studying how the social hierarchies of gorilla groups evolve over time.
Relevant Publications: Check back later this year! *Joint work with Dian Fossey Gorilla Fund.*

2010+: Kidney Exchange

I am the lead graduate student (on the computational side) for the national kidney exchange, a massive donation program where needy patients can swap incompatible donors to receive life-saving kidneys. By 2013, we had over 130 participating hospitals in the exchange! Kidney exchange is a type of barter exchange, and presents many problems in (in)tractable optimization and mechanism design. I'm now working on dynamic kidney exchange, where the matching algorithm must

take into account possible futures when matching in the now. This is an experimentally intractable stochastic optimization problem that, when solved, will increase the efficacy of fielded exchanges.

Media Coverage: The first nationwide kidney exchange took place in Nov. 2010, and was covered by the *International Business Times*. See the CMU press releases in November and December.

Relevant Publications: [2, 3, 6, 7, 17, 18, 25, 26, 27, 28, 29, 30, 31, 32]

2007+: National Security & Counterterrorism

Science, *Scientific American*, *The Register*, *R&D Magazine*, and many others covered my work on how virtual worlds can be used to help policy and defense analysts. See my paper in *Science* (link), my interview in *Scientific American* (link), or coverage in the satirical magazine *The Register* (link).

Relevant Publications: [1, 5, 8, 14, 20, 21, 22, 23]

2009–2012: IED Cache Detection

The Spatial-Cultural Abductive Reasoning Engine (SCARE) is a project I helped develop that analyzes patterns of improvised explosive device (IED) attacks in a war zone. The final product is currently being tested in Afghanistan.

Media Coverage *Nature*, *Popular Science*, *The Baltimore Sun*, and many others covered SCARE. See the articles in *Popular Science* (link) and *The Baltimore Sun* (link). The *Nature* article is here.

Relevant Publications: [13, 24]

Publications

Books

1. Subrahmanian, V, A Mannes, A Sliva, J Shakarian, and JP Dickerson (2012). *Computational Analysis of Terrorist Groups: Lashkar-e-Taiba*. New York: Springer. ISBN: 978-1-4614-4768-9.

Conference papers

2. Dickerson, JP, AD Procaccia, and T Sandholm (2014). Price of Fairness in Kidney Exchange. In: *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*.
3. Dickerson, JP, AD Procaccia, and T Sandholm (2013). Failure-Aware Kidney Exchange. In: *Conference on Electronic Commerce (EC)*.
4. Dickerson, JP and T Sandholm (2013). Throwing darts: Random sampling helps tree search when the number of short certificates is moderate. In: *Conference on Artificial Intelligence (AAAI)*. Late-breaking paper.
5. Dickerson, JP, A Sawant, M Hajiaghayi, and V Subrahmanian (2013). PREVE: A Policy Recommendation Engine based on Vector Equilibria Applied to Reducing LeT's Attacks. In: *International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*.
6. Dickerson, JP, AD Procaccia, and T Sandholm (2012). Dynamic Matching via Weighted Myopia with Application to Kidney Exchange. In: *Conference on Artificial Intelligence (AAAI)*.
7. Dickerson, JP, AD Procaccia, and T Sandholm (2012). Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. In: *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*.
8. Dickerson, JP, GI Simari, V Subrahmanian, and S Kraus (2010). A Graph-Theoretic Approach to Protect Static and Moving Targets from Adversaries. In: *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*.
9. Simari, GI, JP Dickerson, and V Subrahmanian (2010). Cost-based Query Answering in Action Probabilistic Logic Programs. In: *International Conference on Scalable Uncertainty Management (SUM)*.

Journal papers

10. Fisher, A, E Thiessen, K Godwin, H Kloos, and JP Dickerson (2013). Assessing selective sustained attention in 3- to 5-year-old children: Evidence from a new paradigm. *Journal of Experimental Child Psychology* **113**.
11. Simari, GI, JP Dickerson, A Sliva, and V Subrahmanian (2013). Parallel Abductive Query Answering in Probabilistic Logic Programs. *ACM Transactions on Computational Logic (TOCL)*.
12. Patro, R, JP Dickerson, S Bista, SK Gupta, and A Varshney (2012). Speeding Up Particle Trajectory Simulations under Moving Force Fields using GPUs. *ASME Journal of Computing and Information Science in Engineering (JCISE)* **12**(2), 021006:1–021006:8.

13. Shakarian, P, JP Dickerson, and V Subrahmanian (2012). Adversarial Geospatial Abduction Problems. *ACM Transactions on Intelligent Systems and Technology (TIST)* **3**(2), 34:1–34:35.
14. Subrahmanian, V and JP Dickerson (2009). What Can Virtual Worlds and Games Do for National Security? *Science* **326**(5957), 1201–1202.

Workshop and smaller conference papers

15. Dickerson, JP (2014). Robust Dynamic Optimization with Application to Kidney Exchange. In: *Doctoral Consortium at AAMAS-2014*.
16. Dickerson, JP, J Goldman, J Karp, AD Procaccia, and T Sandholm (2014). The Computational Rise and Fall of Fairness. In: *Exploring Beyond the Worst Cast in Computational Social Choice (EXPLORE) workshop at AAMAS-2014*.
17. Dickerson, JP, AD Procaccia, and T Sandholm (2014). Empirical Price of Fairness in Failure-Aware Kidney Exchange. In: *Towards Better and more Affordable Healthcare: Incentives, Game Theory, and Artificial Intelligence (HCAGT) workshop at AAMAS-2014*.
18. Dickerson, JP and T Sandholm (2013). Liver and Multi-Organ Exchange. In: *IJCAI-2013 Workshop on Constraint Reasoning, Planning and Scheduling Problems for a Sustainable Future (COPLAS)*.
19. Dickerson, JP and T Sandholm (2013). Throwing darts: Random sampling helps tree search when the number of short certificates is moderate. In: *International Symposium on Combinatorial Search (SoCS)*.
20. Dickerson, JP, A Mannes, and V Subrahmanian (2011). Dealing with Lashkar-e-Taiba: A Multi-Player Game-Theoretic Perspective. In: *International Symposium on Open Source Intelligence and Web Mining*.
21. Dickerson, JP, MV Martinez, D Reforgiato, and V Subrahmanian (2008). CIG: Cultural Islands and Games. In: *International Conference on Computational Cultural Dynamics*.

Book chapters

22. Dickerson, JP, GI Simari, and V Subrahmanian (2013). "Using Temporal Probabilistic Rules to Learn Group Behavior". In: *Handbook of Computational Approaches to Counterterrorism*. Ed. by V Subrahmanian. Springer New York.
23. Simari, GI, JP Dickerson, A Sliva, and V Subrahmanian (2013). "Policy Analytics Generation using Action Probabilistic Logic Programs". In: *Handbook of Computational Approaches to Counterterrorism*. Ed. by V Subrahmanian. Springer New York.
24. Shakarian, P, JP Dickerson, and V Subrahmanian (2012). "Geospatial Abduction with Adaptive Adversaries". In: *Geospatial Abduction: Principles and Practice*. Ed. by P Shakarian and V Subrahmanian. Springer. Chap. 4.

Invited talks

25. Dickerson, JP (Aug. 2013). *Failure-Aware Kidney Exchange*. Tsinghua University, Beijing, China.
26. Dickerson, JP, AD Procaccia, and T Sandholm (2013). Failure-Aware Kidney Exchange. In: *INFORMS Annual Conference*. Invited talk, Auctions cluster.
27. Dickerson, JP, AD Procaccia, and T Sandholm (2012). Dynamic Matching via Weighted Myopia with Application to Kidney Exchange. In: *INFORMS Annual Conference*. Invited talk, Computational Stochastic Optimization cluster.
28. Dickerson, JP, AD Procaccia, and T Sandholm (2012). Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. In: *INFORMS Annual Conference*. Invited talk, Market Mechanisms and their Applications session.

Other publications and presentations

29. Dickerson, JP, AD Procaccia, and T Sandholm (2013). Optimizing Kidney Exchange with Transplant Chains: Theory and Reality. In: *American Transplant Congress (ATC)*. Abstract of poster.
30. Dickerson, JP, AD Procaccia, and T Sandholm (2013). Results About, and Algorithms For, Robust Probabilistic Kidney Exchange Matching. In: *American Transplant Congress (ATC)*. Abstract of poster.
31. Dickerson, JP and T Sandholm (2013). Liver and Multi-Organ Exchange. In: *INFORMS Annual Conference*. Contributed presentations.
32. Dickerson, JP and T Sandholm (2013). Liver and Multi-Organ Exchange. In: *American Transplant Congress (ATC)*. Abstract of poster.
33. Fisher, AV, ED Thiessen, JP Dickerson, and LC Erickson (2013). Development of Selective Sustained Attention: Conceptual and Measurement Issues. In: *Biennial Meeting of the Cognitive Development Society (CDS)*.

34. Thiessen, ED, JP Dickerson, LC Erickson, and AV Fisher (2012). Eyes as the windows of cognition: The Track-It paradigm and selective attention. In: *SRCD Themed Meeting on Developmental Methodology*.
35. Vargas-Baron, E, JP Dickerson, and V Subrahmanian (2009). *Country Profiles on Early Childhood Development: Sub-Saharan Africa*. Booklet for the 4th International Conference on Early Childhood Development.
36. Blusewicz, K, K de Souza, JP Dickerson, B Feldman, A Gaddam, G Ganesan, C Hatch, C Hilseberg, L Kawa, K LaCurts, K Nealon, C Yu, and J Zytnick (2008). *Classification of Perceived Emotion in Music using a Computational Model of the Auditory Cortex*. University of Maryland Gemstone Interdisciplinary Research Program Thesis.

Teaching

2013	Vertical Mentor	CMU	—	Negotiation, eBusiness Technology	Sandholm
2013	Teaching Asst.	CMU	15-780	Graduate Artificial Intelligence	Sandholm & Veloso
2012	Vertical Mentor	CMU	—	Negotiation, eBusiness Technology	Sandholm
2012	Teaching Asst.	CMU	15-780	Graduate Artificial Intelligence	Hebert & Procaccia
2008	Teaching Asst.	UMD	CMSC311	Computer Organization	Hugue
2007	Teaching Asst.	UMD	CMSC311	Computer Organization	Hugue
2007	Teaching Asst.	UMD	CMSC330	Organization of Prog. Languages	Herman
2006	Teaching Asst.	UMD	CMSC212	Intro to Low-Level Programming	Herman

In 2007, I was Undergraduate TA of the Year at UMD's Computer Science Department.

Community

Conferences

PC Member	EXPLORE (2014), AAAI (2013), IJCAI (2013), TinyToCS (2012)
Reviewer	CPAIOR (2013), EC (2012), AAMAS (2012)
Travel Grant	AAAI (2013), SoCS (2013), AAMAS (2012)

Journals

Reviewer	European Journal of Operations Research

Service

2013, 2014	CMU	Admissions Committee
2012	CMU	Visit Weekend planning committee
2012	CMU	President of Dec/5 (SCS graduate student organization)
2011, 2012	CMU	Artificial Intelligence Reading Group (AIRG) planning
2011	CMU	SCS Coke machine co-captain

Graduate Coursework

CMU	F2013	15-781 (A)	Machine Learning	G. Gordon & A. Smola
CMU	S2013	15-750	Graduate Algorithms	M. Blum
CMU	F2012	10-725 (A)	Optimization	G. Gordon & R. Tibshirani
CMU	F2012	15-740	Computer Architecture	T. Mowry
CMU	S2012	15-812	Semantics of Programming Languages	S. Brookes
CMU	F2011	15-744	Computer Networks	P. Steenkiste
CMU	F2011	15-892	Foundations of Electronic Marketplaces	T. Sandholm
CMU	S2011	15-780	Graduate Artificial Intelligence	G. Gordon & T. Sandholm
CMU	S2011	15-859	Mathematical Games	D. Sleator & A. Frieze
CMU	F2010	15-887	Planning, Execution, and Learning	M. Veloso & R. Simmons
CMU	F2010	15-853	Algorithms in the Real World	G. Blelloch & J. Fineman
UMD	S2009	CMSC828E	Scientific Computing on GPUs	R. Duraiswami
UMD	F2008	CMSC740	Advanced Computer Graphics	A. Varshney

Programming & Technology

Languages – Fluent

Java, C++, Python, Ruby

Languages – Experienced

C, JavaScript, Matlab, LaTeX2e, ActionScript, Flex, HTML4+, CSS2+, XML, HAML, YAML, JSON

Frameworks

Sinatra, Flask, Rails, Play, Java EE (Servlets on Tomcat or GlassFish), Git, SVN, CVS, TORQUE, MPI
I've also extensively used Blacklight, a 4096-core NUMA supercomputer at the Pittsburgh Supercomputing Center, as well as a 1404-core, 116-node cluster at UMD, and a 21-node Nvidia Tesla cluster at UMD.

Environments & Software Suites

Emacs, Eclipse, NetBeans, Visual Studio, 3d Studio Max, Adobe Creative Suite, Gimp

References

Tuomas Sandholm, Ph.D.	V.S. Subrahmanian, Ph.D.	Amitabh Varshney, Ph.D.
Professor, Computer Science	Professor, Computer Science	Director, UMIACS
Carnegie Mellon University	University of Maryland	University of Maryland
Pittsburgh, PA 15213	College Park, MD 20742	College Park, MD 20742

Sarit Kraus, Ph.D.	Ariel Procaccia, Ph.D.
Professor, Computer Science	Asst. Professor, Computer Science
Bar-Ilan University	Carnegie Mellon University
Ramat Gan, Israel	Pittsburgh, PA 15213

Extra academic and personal references available upon request!

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