

Christian Kroer | Curriculum Vitae

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Research interests

Fields: Artificial intelligence, algorithms, operations research, economics.

Specific: Equilibrium computation, mechanism design, auctions, prediction markets, convex optimization, machine learning, robust optimization, and practical applications.

Education

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| Carnegie Mellon University <i>Ph.D. in computer science, PA, USA</i> | Pittsburgh 2012–2018 |
| IT University of Copenhagen <i>M.Sc. IT - software development and technology, Denmark</i> | Copenhagen 2009–2012 |
| Aalborg University <i>B.A. human-centered informatics, Denmark</i> | Aalborg 2006–2009 |

Employment and Internships

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| Postdoc <i>Facebook, Core Data Science</i> | 2018–2019 |
| Research Assistant <i>Carnegie Mellon University</i> | 2012–2018 |
| Research Scientist (part-time position) <i>Facebook, Core Data Science</i> | 2016–2018 |
| Research Intern <i>Facebook, Core Data Science</i> | Summer 2016 |
| Research Intern <i>Microsoft Research New York City</i> | Summer 2015 |
| Research Assistant (short-term contractor position) <i>Aalborg University</i> | 2012 |
| Teaching Assistant <i>IT University of Copenhagen</i> | 2011–2012 |
| Systems Developer <i>Netmester A/S</i> | 2010–2011 |

Honors and Awards

2016 - 2018: Facebook Fellowship in economics and computation. One given worldwide per year. Full tuition, fees, stipend, and travel grant for two years, \$183,168.

2017: Runner-up in the Informs Computing Society Student Paper Competition

Publications

Working papers.....

- [1] Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Faster algorithms for extensive-form game solving via improved smoothing functions. In *revise and resubmit at Mathematical Programming Series A*, 2018.
- [2] Vincent Conitzer, Christian Kroer, Eric Sodomka, and Nicolas E. Stier-Moses. Multiplicative pacing equilibria in auction markets. 2018.
- [3] Christian Kroer, Nam Ho-Nguyen, George Lu, and Fatma Kılınç-Karzan. Performance evaluation of iterative methods for solving robust convex quadratic problems. In *Optimization for Machine Learning Workshop and work-in-progress*, 2018.

Published papers.....

- [1] Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Solving large sequential games with the excessive gap technique. In *NIPS (spotlight presentation)*, 2018.
- [2] Christian Kroer and Tuomas Sandholm. A unified framework for extensive-form game abstraction with bounds. In *NIPS*, 2018.
- [3] Gabriele Farina, Alberto Marchesi, Christian Kroer, Nicola Gatti, and Tuomas Sandholm. Trembling-hand perfection in extensive-form games with commitment. In *IJCAI*, 2018.
- [4] Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Robust stackelberg equilibria in extensive-form games and extension to limited lookahead. In *AAAI*, 2018.
- [5] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Regret minimization in behaviorally-constrained zero-sum games. In *ICML*, 2017.
- [6] Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Theoretical and practical advances on smoothing for extensive-form games. In *EC*, 2017.
- [7] Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Smoothing method for approximate extensive-form perfect equilibrium. In *IJCAI*, 2017.
- [8] Noam Brown, Christian Kroer, and Tuomas Sandholm. Dynamic thresholding and pruning for regret minimization. In *AAAI*, 2017.
- [9] Christian Kroer and Tuomas Sandholm. Imperfect-recall abstractions with bounds in games. In *EC*, 2016.
- [10] Christian Kroer, Miroslav Dudík, Sébastien Lahaie, and Sivaraman Balakrishnan. Arbitrage-free combinatorial market making via integer programming. In *EC*, 2016.

- [11] Christian Kroer and Tuomas Sandholm. Sequential planning for steering immune system adaptation. In *IJCAI*, 2016.
- [12] Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Faster first-order methods for extensive-form game solving. In *EC*, 2015.
- [13] Christian Kroer and Tuomas Sandholm. Limited lookahead in imperfect-information games. In *IJCAI*, 2015.
- [14] Christian Kroer and Tuomas Sandholm. Discretization of continuous action spaces in extensive-form games. In *AAMAS*, 2015.
- [15] Christian Kroer and Tuomas Sandholm. Computational bundling for auctions. In *AAMAS*, 2015.
- [16] Christian Kroer and Tuomas Sandholm. Extensive-form game abstraction with bounds. In *EC*, 2014.
- [17] Bruce DeBruhl, Christian Kroer, Anupam Datta, Tuomas Sandholm, and Patrick Tague. Power napping with loud neighbors: optimal energy-constrained jamming and anti-jamming. In *WiSec*, 2014.
- [18] Christian Kroer, Martin Kjær Svendsen, Rune M Jensen, Joseph Kiniry, and Eilif Leknes. Symbolic configuration for interactive container ship stowage planning. *Computational Intelligence*, 2014.
- [19] Paolo Viappiani and Christian Kroer. Robust optimization of recommendation sets with the maximin utility criterion. In *ADT*, 2013.
- [20] Kevin Tierney, Amanda Jane Coles, Andrew Coles, Christian Kroer, Adam M Britt, and Rune Møller Jensen. Automated planning for liner shipping fleet repositioning. In *ICAPS*, 2012.
- [21] Christian Kroer and Yuri Malitsky. Feature filtering for instance-specific algorithm configuration. In *ICTAI*, 2011.

Workshop papers.....

- [1] Christian Kroer, Nam Ho-Nguyen, George Lu, and Fatma Kılınç-Karzan. Performance evaluation of iterative methods for solving robust convex quadratic problems. In *Optimization for Machine Learning Workshop*, 2017.
- [2] Vincent Conitzer, Christian Kroer, Eric Sodomka, and Nicolas E. Stier-Moses. Multiplicative pacing equilibria in auction markets. In *Workshop on Algorithmic Game Theory and Data Science at EC*, 2017.
- [3] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Regret minimization in behaviorally-constrained zero-sum games. In *Algorithmic Game Theory Workshop at IJCAI*, 2017.
- [4] Noam Brown, Christian Kroer, and Tuomas Sandholm. Dynamic thresholding and pruning for regret minimization. In *Algorithmic Game Theory Workshop at IJCAI*, 2016.
- [5] Christian Kroer and Tuomas Sandholm. Imperfect-recall abstractions with bounds. In *Algorithmic Game Theory Workshop at IJCAI*, 2015.

- [6] Christian Kroer and Tuomas Sandholm. Extensive-form game abstraction with bounds. In *Workshop on Computer Poker and Imperfect Information at AAAI*, 2015.

Invited talks

- 2017:** Multiplicative Pacing Equilibria in Auction Markets. INFORMS Annual Conference
2017: Multiplicative Pacing Equilibria in Auction Markets. Duke University CS-ECON Seminar
2016: Arbitrage-Free Combinatorial Market Making via Integer Programming. INFORMS Annual Conference.
2015: Faster First-Order Methods for Extensive-Form Game Solving. INFORMS Annual Conference.
2015: Faster First-Order Methods for Extensive-Form Game Solving. 22nd International Symposium on Mathematical Programming (ISMP).
2013: Computational Bundling for Auctions. INFORMS Annual Conference.

Other talks

- 2016:** First-Order Methods for Extensive-Form Game Solving. CMU AI Seminar.
2016: Faster First-Order Methods for Extensive-Form Game Solving. INFORMS Annual Conference.
2016: Arbitrage-Free Combinatorial Market Making via Integer Programming. Facebook Operations, Economics and Computation group.
2016: Abstraction and convex optimization in sequential game solving. CMU graduate AI class.
2015: Discretization of Continuous Action Spaces in Extensive-Form Games. INFORMS Annual Conference.
2014: Sequential game solving overview. CMU undergrad AI class.
2014: Extensive-Form Game Abstraction with Bounds. CMU theory lunch.
2014: Extensive-Form Game Abstraction with Bounds. CMU open house.

Teaching

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| Electronic Negotiation <i>Vertical mentor</i> | Carnegie Mellon University 2017 |
| Electronic Negotiation <i>Vertical mentor</i> | Carnegie Mellon University 2016 |
| Graduate Artificial Intelligence <i>TA</i> | Carnegie Mellon University 2016 |
| Electronic Negotiation <i>Vertical mentor</i> | Carnegie Mellon University 2015 |
| Artificial Intelligence <i>TA, Nominated for TA award</i> | Carnegie Mellon University 2015 |
| Electronic Negotiation <i>Vertical mentor</i> | Carnegie Mellon University 2014 |

Intelligent Systems Programming

TA

IT University of Copenhagen

2012

Algorithm Design

TA

IT University of Copenhagen

2011

Service

Reviewing: AAAI 2017, ACM Transactions on Economics and Computation, 2013, 2014, 2016, 2018, AISTATS 2017, Artificial Intelligence 2018, EC 2017, ICML 2016, IJCAI 2016, 2018, Imperfect-Information Games Workshop 2018, Operations Research 2018, JAAMAS 2015, 2016, TARK 2017, Transactions on Computational Intelligence and AI in Games 2014, 2015. WINE 2015,

Societies: INFORMS, AAAI, ACM

2010: Program committee member for AAAI

2018: Program committee member for IJCAI and ECAI

2017 - 2018: Member of the CMU CSD Speakers Club

2017: Program committee member for the Computer Poker Workshop at AAAI

2016: Program committee member for IJCAI

2014 - 2016: CMU CS Ph.D. admissions committee member

2013: CMU CSD Immigration Course coordinator

Programming

Strong experience: Java, Python, C++, C#

Medium experience: SQL, C, HTML, CSS

Familiar with: R, Matlab, Scala, XSLT, Ruby, Javascript

Frameworks

Statistics/ML: pandas, scikit-learn, tidyverse.

Version control: Git, SVN, Mercurial.

Optimization: CPLEX, Gurobi, NumPy, CVXPY.

Web: ASP.NET, React, Bootstrap, Flask.