Christian Kroer | Curriculum Vitae

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US green card holder

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

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

Employment and Internships

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

Published papers..

[1]   Alex Peysakhovich, Christian Kroer, and Adam Lerer. Robust multi-agent counterfactual prediction. In *NeurIPS*, 2019.

[2]   Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Optimistic regret minimization for extensive-form games via dilated distance-generating functions. In *NeurIPS*, 2019.

[3]   Christian Kroer, Alexander Peysakhovich, Eric Sodomka, and Nicolas E Stier-Moses. Computing large market equilibria using abstractions. In *EC*, 2019.

[4]   Christian Kroer, Debmalya Panigrahi, Okke Schrijvers, Eric Sodomka, Nicolas E Stier-Moses, and Chris Wilkens. Pacing equilibrium in first-price auction markets. In *EC*, 2019.

[5]   Gabriele Farina, Christian Kroer, Noam Brown, and Tuomas Sandholm. Regret circuits: Composability of regret minimizers. In *ICML*, 2019.

[6]   Gabriele Farina, Christian Kroer, Noam Brown, and Tuomas Sandholm. Stable-predictive optimistic counterfactual regret minimization. In *ICML*, 2019.

[7]   Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Online convex optimization for sequential decision processes and extensive-form games. In *AAAI*, 2019.

[8]   Alberto Marchesi, Gabriele Farina, Christian Kroer, Nicola Gatti, and Tuomas Sandholm. Quasi-perfect stackelberg equilibrium. In *AAAI*, 2019.

[9]   Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Faster algorithms for extensive-form game solving via improved smoothing functions. *Mathematical Programming Series A*, 2018.

[10]   Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Solving large sequential games with the excessive gap technique. In *NeurIPS (spotlight presentation)*, 2018.

[11]   Christian Kroer and Tuomas Sandholm. A unified framework for extensive-form game abstraction with bounds. In *NeurIPS*, 2018.

[12]   Vincent Conitzer, Christian Kroer, Eric Sodomka, and Nicolas E. Stier-Moses. Multiplicative pacing equilibria in auction markets. In *WINE*, 2018.

[13]   Gabriele Farina, Alberto Marchesi, Christian Kroer, Nicola Gatti, and Tuomas Sandholm. Trembling-hand perfection in extensive-form games with commitment. In *IJCAI*, 2018.

[14]   Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Robust stackelberg equilibria in extensive-form games and extension to limited lookahead. In *AAAI*, 2018.

[15] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Regret minimization in behaviorally-constrained zero-sum games. In *ICML*, 2017.

[16] Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Theoretical and practical advances on smoothing for extensive-form games. In *EC*, 2017.

[17] Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Smoothing method for approximate extensive-form perfect equilibrium. In *IJCAI*, 2017.

[18] Noam Brown, Christian Kroer, and Tuomas Sandholm. Dynamic thresholding and pruning for regret minimization. In *AAAI*, 2017.

[19] Christian Kroer and Tuomas Sandholm. Imperfect-recall abstractions with bounds in games. In *EC*, 2016.

[20] Christian Kroer, Miroslav Dudík, Sébastien Lahaie, and Sivaraman Balakrishnan. Arbitrage-free combinatorial market making via integer programming. In *EC*, 2016.

[21] Christian Kroer and Tuomas Sandholm. Sequential planning for steering immune system adaptation. In *IJCAI*, 2016.

[22] Christian Kroer, Kevin Waugh, Fatma Kılınç-Karzan, and Tuomas Sandholm. Faster first-order methods for extensive-form game solving. In *EC*, 2015.

[23] Christian Kroer and Tuomas Sandholm. Limited lookahead in imperfect-information games. In *IJCAI*, 2015.

[24] Christian Kroer and Tuomas Sandholm. Discretization of continuous action spaces in extensive-form games. In *AAMAS*, 2015.

[25] Christian Kroer and Tuomas Sandholm. Computational bundling for auctions. In *AAMAS*, 2015.

[26] Christian Kroer and Tuomas Sandholm. Extensive-form game abstraction with bounds. In *EC*, 2014.

[27] 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.

[28] Christian Kroer, Martin Kjær Svendsen, Rune M Jensen, Joseph Kiniry, and Eilif Leknes. Symbolic configuration for interactive container ship stowage planning. *Computational Intelligence*, 2014.

[29] Paolo Viappiani and Christian Kroer. Robust optimization of recommendation sets with the maximin utility criterion. In *ADT*, 2013.

[30] 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.

[31] Christian Kroer and Yuri Malitsky. Feature filtering for instance-specific algorithm configuration. In *ICTAI*, 2011.

Workshop papers

[1] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Optimistic regret minimization for extensive-form games via dilated distance-generating functions. In *7th International Workshop on Strategic Reasoning (SR 2019) at IJCAI*, 2019.

[2] Alexander Peysakhovich and Christian Kroer. Fair division without disparate impact. In *3rd Workshop on Mechanism Design for Social Good at EC*, 2019.

[3] Duncan Mcelfresh, Christian Kroer, Sergey Pupyrev, Eric Sodomka, and John Dickerson. Matching algorithms for blood donation. In *3rd Workshop on Mechanism Design for Social Good at EC*, 2019.

[4] Duncan Mcelfresh, Christian Kroer, Sergey Pupyrev, Eric Sodomka, and John Dickerson. Matching algorithms for blood donation. In *AI for Social Good at IJCAI 2019*, 2019.

[5] Gabriele Farina, Christian Kroer, Noam Brown, and Tuomas Sandholm. Regret circuits: Composability of regret minimizers. In *AAAI-19 Workshop on Reinforcement Learning in Games*, 2019.

[6] Alberto Marchesi, Gabriele Farina, Christian Kroer, Nicola Gatti, and Tuomas Sandholm. Quasi-perfect stackelberg equilibrium. In *AAAI-19 Workshop on Reinforcement Learning in Games*, 2019.

[7] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Online convex optimization for sequential decision processes and extensive-form games. In *AAAI-19 Workshop on Reinforcement Learning in Games*, 2019.

[8] Christian Kroer, Gabriele Farina, and Tuomas Sandholm. Solving large sequential games with the excessive gap technique. In *AAAI-19 Workshop on Reinforcement Learning in Games*, 2019.

[9] Christian Kroer and Tuomas Sandholm. A unified framework for extensive-form game abstraction with bounds. In *AI$^\beta$ workshop at IJCAI*, 2018.

[10] 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.

[11] 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.

[12] Gabriele Farina, Christian Kroer, and Tuomas Sandholm. Regret minimization in behaviorally-constrained zero-sum games. In *Algorithmic Game Theory Workshop at IJCAI*, 2017.

[13] Noam Brown, Christian Kroer, and Tuomas Sandholm. Dynamic thresholding and pruning for regret minimization. In *Algorithmic Game Theory Workshop at IJCAI*, 2016.

[14] Christian Kroer and Tuomas Sandholm. Imperfect-recall abstractions with bounds. In *Algorithmic Game Theory Workshop at IJCAI*, 2015.

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

Invited talks

2019: Computing Large Market Equilibria using Abstractions. INFORMS Annual Conference

2019: Competitive Equilibrium without Disparate Impact. INFORMS Annual Conference

2019: AI and ML methods for Market Equilibrium. Machine Learning for Science and Engineering (MLSE)

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

IEOR E4004 Optimization Models and Methods	**Columbia University**
Professor	*2019*
Electronic Negotiation	**Carnegie Mellon University**
Vertical mentor	*2017*
Electronic Negotiation	**Carnegie Mellon University**
Vertical mentor	*2016*
Graduate Artificial Intelligence	**Carnegie Mellon University**
TA	*2016*
Electronic Negotiation	**Carnegie Mellon University**
Vertical mentor	*2015*
Artificial Intelligence	**Carnegie Mellon University**
TA, Nominated for TA award	*2015*

Electronic Negotiation	**Carnegie Mellon University**
Vertical mentor	*2014*
Intelligent Systems Programming	**IT University of Copenhagen**
TA	*2012*
Algorithm Design	**IT University of Copenhagen**
TA	*2011*

Service

Senior Program Committee: AAAI 2020

Program Committee: AAAI 2019, DAI 2019, EC 2019, IJCAI 2016, 2018, 2019, WWW 2019, Computer Poker Workshop at AAAI 2017

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, 2019

Societies: INFORMS, AAAI, ACM

2017 - 2018: Member of the CMU CSD Speakers Club

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

2013: CMU CSD Immigration Course coordinator

Programming

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

Medium experience: R, SQL, C, HTML, CSS

Familiar with: 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.