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Decision and Game Theory for Security

7th International Conference, GameSec 2016
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Proceedings

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Preface

Communication and information technologies have evolved apace. Recent advances feature greater ubiquity and tighter connectivity for systems exchanging increasingly larger amounts of social, personal, and private information. Indeed, cyberspace, constructed on top of these technologies, has become integral to the lives of people, communities, enterprises, and nation states.

Yet protecting the various assets therein to ensure cybersecurity is a difficult challenge. First, and no differently from physical security, a wide variety of agent utilities abound, including adversarial and antithetical types. Second, being constructed upon heterogeneous, large-scale, and dynamic networks, cyberspace is fairly complex, offering adversaries a large attack surface and ample room for evasive maneuvers, even within carefully designed network and software infrastructure. Nonetheless, security is critical and warrants novel analytic, computational, and practical approaches to thought, planning, policy, and strategic action so we can protect systems and the critical assets they contain, minimize risks and maximize investments, and ultimately provide practical and salable security mechanisms. Collectively our aim is to enhance the trustworthiness of cyber-physical systems.

Recently the analytic and modeling framework of modern game theory has yielded powerful and elegant tools for considering security and the effects of non-cooperative and adversarial types. The problems of security and cybersecurity by necessity must confront the challenging adversarial and worst-case outcomes. To address these, researchers have brought to bear diverse methodologies from control, mechanism design, incentive analysis, economics, and data science to co-evolve advances in game theory, and to develop solid underpinnings of a science of security and cybersecurity.

The GameSec conference brings together academic, industry, and government researchers to identify and discuss the major technical challenges and present recent research results that highlight the connections between and among game theory, control, distributed optimization, and economic incentives within the context of real-world security, trust, and privacy problems. The past meetings of the GameSec conference took place in Berlin, Germany (2010), College Park Maryland, USA (2011), Budapest, Hungary (2012), Fort Worth Texas, USA (2013), Los Angeles, USA (2014), and London, UK (2015). GameSec 2016, the 7th Conference on Decision and Game Theory for Security took place in New York, USA, during November 2–4, 2016. This year we extended the two-day format to a three-day program, allowing GameSec to expand topic areas, include a special track and a poster session.

Since its first edition in 2010, GameSec has attracted novel, high-quality theoretical and practical contributions. This year was no exception. The conference program included 18 full and eight short papers as well as multiple posters that highlighted the research results presented. Reviews were conducted on 40 submitted papers. The selected papers and posters were geographically diverse with many international and transcontinental authorship teams. Whith the geographical diversity underscoring the

global concern for and significance of security problems, the papers this year demonstrated several international efforts formed to address them.

The themes of the conference this year were broad and encompassed work in the areas of network security, security risks and investments, decision-making for privacy, security games, incentives in security, cybersecurity mechanisms, intrusion detection, and information limitations in security. The program also included a special track on “validating models,” which aims to close the gap between theory and practice in the domain, chaired by Prof. Milind Tambe. Each area took on critical challenges including the detection/mitigation problems associated with several specific attacks to network systems, optimal and risk-averse management of systems, the increased concern of data integrity, leakage, and privacy, strategic thinking for/against adversarial types, adversarial incentives and robust and novel designs to counter them, and acting/decision making in partially informed adversarial settings.

Collectively the conference presents many novel theoretical frameworks and impacts directly the consideration of security in a wide range of settings including: advanced persistent threat (APT), auditing elections, cloud-enabled internet of controlled things, compliance, crime and cyber-criminal incentives, cyber-physical systems, data exfiltration detection, data leakage, denial of service attacks (DOS), domain name service (DNS), electric infrastructures, green security, Internet of Things (IoT), intrusion detection systems (IDS), patrolling (police and pipeline), privacy technology, routing in parallel link networks, secure passive RFID networks, social networking and deception, strategic security investments, voting systems, and watermarking.

We would like to thank NSF for its continued support for student travel, which made it possible for many domestic and international undergraduate and graduate students to attend the conference. We would also like to thank Springer for its continued support of the GameSec conference and for publishing the proceedings as part of their *Lecture Notes in Computer Science* (LNCS) series. We hope that not only security researchers but also practitioners and policy makers will benefit from this edition.

November 2016

Quanyan Zhu
Tansu Alpcan
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Contents

Network Security

Resilience of Routing in Parallel Link Networks	3
<i>Eitan Altman, Aniruddha Singhal, Corinne Touati, and Jie Li</i>	
Deception-Based Game Theoretical Approach to Mitigate DoS Attacks	18
<i>Hayreddin Çeker, Jun Zhuang, Shambhu Upadhyaya, Quang Duy La, and Boon-Hee Soong</i>	
Data Exfiltration Detection and Prevention: Virtually Distributed POMDPs for Practically Safer Networks	39
<i>Sara Marie Mc Carthy, Arunesh Sinha, Milind Tambe, and Pratyusa Manadhata</i>	
On the Mitigation of Interference Imposed by Intruders in Passive RFID Networks	62
<i>Eirini Eleni Tsiropoulou, John S. Baras, Symeon Papavassiliou, and Gang Qu</i>	

Security Risks and Investments

Risk Averse Stackelberg Security Games with Quantal Response	83
<i>Renaud Chicoisne and Fernando Ordóñez</i>	
Optimal and Game-Theoretic Deployment of Security Investments in Interdependent Assets	101
<i>Ashish R. Hota, Abraham A. Clements, Shreyas Sundaram, and Saurabh Bagchi</i>	
Dynamics on Linear Influence Network Games Under Stochastic Environments	114
<i>Zhengyuan Zhou, Nicholas Bambos, and Peter Glynn</i>	

Special Track-Validating Models

Patrolling a Pipeline	129
<i>Steve Alpern, Thomas Lidbetter, Alec Morton, and Katerina Papadaki</i>	
Optimal Allocation of Police Patrol Resources Using a Continuous-Time Crime Model	139
<i>Ayan Mukhopadhyay, Chao Zhang, Yevgeniy Vorobeychik, Milind Tambe, Kenneth Pence, and Paul Speer</i>	

A Methodology to Apply a Game Theoretic Model of Security Risks Interdependencies Between ICT and Electric Infrastructures	159
<i>Ziad Ismail, Jean Leneutre, David Bateman, and Lin Chen</i>	

Decision Making for Privacy

On the Adoption of Privacy-enhancing Technologies	175
<i>Tristan Caulfield, Christos Ioannidis, and David Pym</i>	
FlipLeakage: A Game-Theoretic Approach to Protect Against Stealthy Attackers in the Presence of Information Leakage	195
<i>Sadegh Farhang and Jens Grossklags</i>	
Scalar Quadratic-Gaussian Soft Watermarking Games	215
<i>M. Kivanç Mihçak, Emrah Akyol, Tamer Başar, and Cédric Langbort</i>	
Strategies for Voter-Initiated Election Audits	235
<i>Chris Culnane and Vanessa Teague</i>	

Security Games

Combining Graph Contraction and Strategy Generation for Green Security Games.	251
<i>Anjon Basak, Fei Fang, Thanh Hong Nguyen, and Christopher Kiekintveld</i>	
Divide to Defend: Collusive Security Games	272
<i>Shahrzad Gholami, Bryan Wilder, Matthew Brown, Dana Thomas, Nicole Sintov, and Milind Tambe</i>	
A Game-Theoretic Approach to Respond to Attacker Lateral Movement	294
<i>Mohammad A. Nouredine, Ahmed Fawaz, William H. Sanders, and Tamer Başar</i>	
GADAPT: A Sequential Game-Theoretic Framework for Designing Defense-in-Depth Strategies Against Advanced Persistent Threats	314
<i>Stefan Rass and Quanyan Zhu</i>	

Incentives and Cybersecurity Mechanisms

Optimal Contract Design Under Asymmetric Information for Cloud-Enabled Internet of Controlled Things.	329
<i>Juntao Chen and Quanyan Zhu</i>	
Becoming Cybercriminals: Incentives in Networks with Interdependent Security	349
<i>Aron Laszka and Galina Schwartz</i>	

A Logic for the Compliance Budget	370
<i>Gabrielle Anderson, Guy McCusker, and David Pym</i>	
A Game-Theoretic Analysis of Deception over Social Networks Using Fake Avatars	382
<i>Amin Mohammadi, Mohammad Hossein Manshaei, Monireh Mohebbi Moghaddam, and Quanyan Zhu</i>	
Intrusion Detection and Information Limitations in Security	
Network Elicitation in Adversarial Environment	397
<i>Marcin Dziubiński, Piotr Sankowski, and Qiang Zhang</i>	
Optimal Thresholds for Anomaly-Based Intrusion Detection in Dynamical Environments	415
<i>Amin Ghafouri, Waseem Abbas, Aron Laszka, Yevgeniy Vorobeychik, and Xenofon Koutsoukos</i>	
A Point-Based Approximate Algorithm for One-Sided Partially Observable Pursuit-Evasion Games	435
<i>Karel Horák and Branislav Bošanský</i>	
Consensus Algorithm with Censored Data for Distributed Detection with Corrupted Measurements: A Game-Theoretic Approach	455
<i>Kassem Kallas, Benedetta Tondi, Riccardo Lazzeretti, and Mauro Barni</i>	
Poster Abstracts	
A Game-Theoretical Framework for Industrial Control System Security	469
<i>Edward J.M. Colbert, Quanyan Zhu, and Craig G. Rieger</i>	
Risk Minimization in Physical Surveillance: Playing an Uncertain Cops-and-Robbers Game	471
<i>Stefan Schauer, Sandra König, Stefan Rass, Antonios Gouglidis, Ali Alshawish, and Hermann de Meer</i>	
Game-Theoretic Framework for Integrity Verification in Computation Outsourcing	472
<i>Qiang Tang and Balázs Pejó</i>	
On the Vulnerability of Outlier Detection Algorithms in Smart Traffic Control Systems	474
<i>Rowan Powell, Bo An, Nicholas R. Jennings, and Long Tran-Thanh</i>	
Author Index	477