

# Game Theory for Security



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# Problem



Big Data



Limited Resources



Diverse Objectives



Strategic Competitors

# Game Theory for Security

	Target #1	Target #2
Target #1	5, -3	-1, 1
Target #2	-5, 5	2, -3

Model: Game Theory

$$\begin{aligned}
 & \max \quad d \\
 & \text{s.t.} \quad \sum_{j \in J} x_j = 1 \\
 & \quad \mathbf{d} - \mathbf{DPx} - \mathbf{U}_d^u \leq (1 - \mathbf{a})\mathbf{M} \\
 & \quad \mathbf{k} - \mathbf{APx} - \mathbf{U}_a^u \leq (1 - \mathbf{a})\mathbf{M} \\
 & \quad \mathbf{k} - \mathbf{APx} - \mathbf{U}_a^u \geq 0 \\
 & \quad \sum_{t \in T} a_t = 1 \\
 & \quad \mathbf{x}, \mathbf{a} \geq 0, \quad a_t \in \{0, 1\}
 \end{aligned}$$

Algorithms



Real-world Security Domain



In use for multiple years



# Current Deployments

Scale-up and Behavioral Models

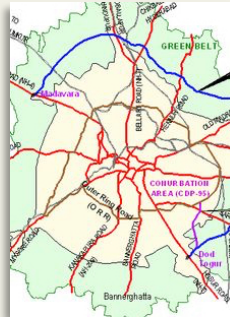
Airports



Flights



Roads



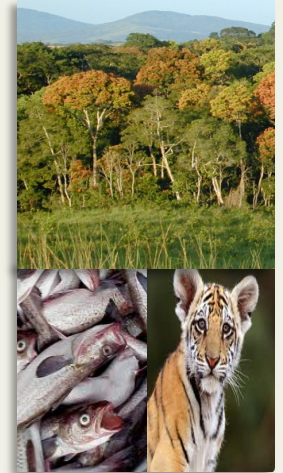
Ports



Trains



Environment



2007

2009

2011

2012

2013

2014-



ARMOR

IRIS

PROTECT

TRUSTS

PAWS



# Opportunities

Law Enforcement/  
Homeland Security



Campus/Event  
Security



Cyber  
Security



Social  
Marketing



ARMOR  
System

Wildlife  
Security



Audits

