

Game theory: Army of agents to tackle corrupt officials, tax evaders, terrorists

October 20 2016



Credit: University of Warwick

Game theory has long been used to apply mathematical models of conflict and cooperation between intelligent rational decision-makers.

However, our world has evolved from great power conflicts to one where many of our major problems are spawned not from monolithic blocks of self-interest, but from a vast array of single entities making highly individual choices: from lone wolf terrorists to corrupt officials, tax evaders, isolated hackers or even armies of botnets and packages of malware.



Game theory needs to catch up and new research by mathematicians, led by Professor Vassili Kolokoltsov at the University of Warwick, has just found the way to do that by giving <u>game theory</u> calculations an enormous army of "agents".

In a paper, entitled 'The evolutionary games of pressure (or interference), resistance and collaboration', Professor Kolokoltsov, from Warwick's Department of Statistics, has been able to take Game Theory far beyond some of its early applications of two opposing sides in zero sum games, and equipped it with the ability to model the impact of a vast array of individual actors - an "infinite state-space of small players".

The paper says the new tool can be "applied to the analysis of the processes of inspection, corruption, cyber-security, counter-terrorism, banks and firms merging [...] and many others"

To take just one application: tax fraud costs the UK government £16bn a year, according to the National Audit. HM Revenue & Customs (HMRC) has faced questions about both how it decides to deal with individual large companies and how it balances its efforts between pursuing large corporations and individual tax payers.

This evolution of Game theory could greatly assist it in simultaneously model the best approach to manage the great number of participants in the process and create efficient disincentives for both individual and corporate tax evasion.

The modelling tools this evolution of Game Theory will provide can also deal with a tax system's budget inputs and the potential for corruption within any tax system.

Professor Vassili Kolokoltsov comments:



"Our method has a potential to be used in a variety of situations where one big player, referred to as the principal agent, confronts the behaviour of a large pool of individuals with different agendas."

"Of course, as usual for the applications of mathematical tools to socioeconomic systems, any concrete applications of the method would require a serious additional input of concrete experimental data to feed various key parameters the model relies upon," he continues.

Professor Kolokoltsov is now working with colleagues to apply the new Game Theory technique to specific types of problem such as internet Denial of Service attacks by botnets.

Provided by University of Warwick

Citation: Game theory: Army of agents to tackle corrupt officials, tax evaders, terrorists (2016, October 20) retrieved 2 May 2024 from <u>https://phys.org/news/2016-10-game-theory-army-agents-tackle.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.