Journée Fédération Charles Hermite :
Gestion des risques cyber

Vendredi 8 décembre 2023
IECL, Salle de Conférences
Campus, Boulevard des Aiguillettes
54506 Vandœuvre-lès-Nancy

Programme

9h30 - 9h45 : *Présentation de la journée*

9h45 - 10h30 : *Differential analysis of a cipher using Constraint Programming.*
Marine Minier (LORIA, Université de Lorraine, Nancy)
Résumé : The aim of this presentation is to show the problems raised by modeling a differential attack on a given cipher. The main obstacle lies on the difficulty of correctly modeling the XOR operator that increases the size of the search tree. For this, we will first use high-level the language Minizinc and a SAT solver then the constraint programming language written in Java, Choco.

10h30 - 11h00 : Pause café.

11h00 - 11h45 : *A Stackelberg viral marketing design for two competing players.*
Constantin Morãrescu (CRAN, Université de Lorraine, Nancy)
Résumé : A Stackelberg duopoly model in which two players compete to maximize their market share is considered. The game is over a network of individuals that are spread over several geographical regions (e.g., countries, provinces, or states). Each region has its own characteristics: "spreading" and "recovery" rates with respect to the propagation of the players actions. We consider that the spreading rate can be controlled by each player and is subject to some investment that they do in each region. One of the main objectives of this work is to characterize the ressource allocation strategy for each player across regions to maximize the corresponding market share when competing. To achieve this goal we propose a Stackelberg game model that is relatively simple while capturing the main effects of the competition. By characterizing the strong/weak Stackelberg equilibria of the game, we provide the associated budget allocation strategy. The results are established under the assumption that the solution of the game is the so-called "winner takes all". Numerical results expand upon our theoretical findings and we provide the equilibrium characterization for an example.

11h45 - 12h30 : *A stochastic differential take on the Colonel Blotto game and applications.*
Amine Hazzami (IECL, Université de Lorraine, Metz)
Résumé : The Colonel Blotto game is a resource allocation game where players decide where to focus their "forces" between different "battlefields". We extend the standard Colonel Blotto game to a stochastic and dynamic setting, in a continuous-time, two-player, zero-sum game. Using the dynamic programming principle, we explicitly characterize some Nash equilibrium strategies as well as the value of the game through a Hamilton-Jacobi-Bellman equation that admits a smooth solution. We formulate the game generally enough to allow for various rewards, as well as various drivers of randomness. We also present an application to cyber security using graph theory, where a player would take the role of the hacker attacking a cyber network and the other that of the defender, the battlefields being the edges of the graph. The goal could for example be for the defender to maximize the algebraic connectivity of the subgraph with only the edges that they won. This is a joint work with Nabil Kazi-Tani (IECL) and Vineeth Satheeskumar Varma (CRAN, CNRS).

12h30 - 14h00 : Déjeuner (Buffet).

14h00 - 14h45 : *Panorama général sur l'assurance du risque cyber.*
Thierry Cohignac (Caisse Centrale de Réassurance, Paris)
Résumé : Nous donnerons dans cet exposé les caractéristiques des contrats d'assurance et de réassurance du risque cyber ainsi que le type de clauses rencontrées.
Nous nous intéresserons en particulier aux spécificités du marché français.

14h45 - 15h30 : *Cyber-contagion model with network structure applied to insurance.*
Caroline Hillairet (ENSAE-Paris, CREST)
Résumé : In this talk we propose a model that aims to describe the impact of a massive cyber attack on an insurance portfolio, taking into account the structure of the network. Due to the contagion, such an event can rapidly generate consequent damages, and mutualization of the losses may not hold anymore. The composition of the portfolio should therefore be diversified enough to prevent or reduce the impact of such events, with the difficulty that the relationships between actor are difficult to assess. Our approach consists of introducing a multi-group epidemiological model which, apart from its ability to describe the intensity of connections between actors, can be calibrated from a relatively small amount of data, and through fast numerical procedures. We show how this model can be used to generate reasonable scenarios of cyber events, and investigate the response to different types of attacks or behavior of the actors, allowing to quantify the benefit of an efficient prevention policy. Joint work with Olivier Lopez.

15h30 - 16h30 : *Conclusion et Discussions.*

L'inscription est gratuite. Merci de confirmer votre participation à l'adresse :
https://evento.renater.fr/survey/inscription-a-la-jou...-dz6kayqu
Organisateurs : Nabil Kazi-Tani (nabil.kazi-tani@univ-lorraine.fr et Vineeth S Varma (vineeth.satheeskumar-varma@univ-lorraine.fr).