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Título: Configuration of the global responsibility profile with unsupervised learning techniques for value creation

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3 - Configuration of the glocal responsibility profile with unsupervised learning techniques for value creation

Alicia Zanfrillo, Rebeca Yuan, Ezequiel Gribaudo, Victoria Leuci, Carola Sosa

Faced with the challenges of the Sustainable Development Goals and the global alerts for food safety, socially responsible behavior becomes a source of attraction for suppliers and customers, making it a strategic resource for organizations. The current models of Corporate Social Responsibility (CSR) redefine the hierarchy of factors and its components, innovating in the incorporation of glocal responsibilities, which include the environment, socio-cultural issues, technology users and political nature, resulting in a subject of interest both to comply with the demands of the environment and to identify competitive advantages. The present study consists of characterizing the new glocal factor of CSR of the international model in its four dimensions, for the salting and processing plants of Buenos Aires anchovy (Engraulis Anchoita) in the city of Mar del Plata today. The work proposes to define indicators to quantify the communication of the companies about the new factor and the comparison between the organizations that make up the fishery, making their actions visible through the multiple correspondence analysis. Different asymmetries are observed, particularly in the technological and political dimensions of the communication of CSR practice, which account for a slow penetration of Industry 4.0.

4 - Liner health prediction using intelligent two-stage machine learning models

Sourav Bhunia, Shoban Babu Balasubramani, Tuhin Kanti Mondal

Crushers are a crucial equipment for pre-processing of lime stones in cement industries. Due to high-impact process, the liners of the crushers often suffer from ware and tares. Usually, these crusher liners are monitored on need basis and, replaced once the liner's performance is not in acceptable range. An intelligent predictive model could help the maintenance engineers to predict the health upfront and plan the maintenance activities appropriately.

In our approach, we have developed a two-stage machine learning model to predict the health of the crusher liners and its next replacement time. Challenged by limitation of crusher inspection information, at first, a weighted prediction model was generated to estimate crusher ware & tare using uncontrollable variables. Next, in actual health prediction model, results of first estimation model was fed, and a final ensemble model was developed.

Result of our analysis showed that our model performed around 20% more accurate compared to existing model used by clients. Also, the model performance showed significant improvement on recent data compared to older data proving that the health of crusher liner has been successfully incorporated in model. This model can equip the operator to get an idea of the changes in liner wear at any instant, leading to the manual tuning of the controllable parameters of the plant within a certain acceptable limit and thus extending the remaining useful life of the roller liners.

■ MD-29

Monday, 14:30-16:00 - Virtual Room 29

Dynamics and Games 1

Stream: Dynamics and Games
Invited session
Chair: *Alberto Pinto*

1 - A Search Game in Discrete Locations

Jake Clarkson, Kyle Lin, Kevin Glazebrook

Consider a two-person zero-sum search game between a hider and a searcher. The hider chooses where to hide among n discrete locations, and the searcher successively visits individual locations until finding

the hider. A search at a location takes a known location-dependent search time and will find the hider—if hidden there—independently with a known, location-dependent detection probability. The hider aims to maximize the expected length of the search, while the searcher aims to minimize it.

Due to the search game being semi infinite and hence difficult to solve, most work in the current literature is limited to two locations or locations searched in unit time. Using novel proof techniques, we develop a comprehensive theory for the fully-general search game by extending much of the existing work and uncovering new properties along the way.

We prove the existence of the optimal strategy for each player. In particular, the hider's optimal mixed strategy hides in each location with a nonzero probability, and the searcher's optimal mixed strategy can be constructed with up to n simple search sequences. We also develop an algorithm to compute an optimal strategy for each player, and we investigate numerically how the optimal hiding strategy compares with the simple hiding strategy that gives the searcher no preference over any location at the beginning of the search.

2 - Playing Stackelberg Security Games in Perfect Formulations

Pamela Alejandra Bustamante Faúndez

Protecting critical infrastructure from intentional damage requires considering the behavior of attackers. This problem can be formulated as a Stackelberg security game. Here, a "defender" must protect specific targets with limited resources, maximizing its expected utility and considering that a second player, called "attacker", responds optimally. One of the challenges in solving Stackelberg games in real applications is the size of the problem. In general, finding optimal strategies for Stackelberg games is NP-Hard. Our primary goal is to establish the connections between the algorithmic implications of the polyhedral structure of the defender's strategy set and the development and implementation of efficient solution methods and algorithms on a large scale. The first point relates to analyzing the difficulty of solving a Stackelberg security game and the defender's strategy space structure. To this end, we study security games with defender strategies that can be modeled as perfect formulations, such as b-matchings and schedules of size 2. The second point implies evaluating efficient solution methods. In this context, we use formulations that either describe the set of pure strategies explicitly or describe the space through marginal probabilities. We develop branch&price and branch&cut schemes to deal with large instances, and we study several algorithmic enhancements as stabilization methods and heuristics to get good initial feasible solutions.

3 - Horizontal differentiation in a Hotelling Network with uncertainty on costs.

João Almeida, Alberto Pinto

We develop a theoretical framework to study the location-price competition under uncertainty of firms' production costs. Firms compete in a two-stage Hotelling- type network game, with linear transportation costs. We show the existence of a Bayesian-Nash equilibrium price if, and only if, some explicit conditions on the ex- pected production costs and on the network structure hold. Furthermore, we prove that the local optimal location of the firms are at the nodes of the network.

■ MD-30

Monday, 14:30-16:00 - Virtual Room 30

System Dynamics Modeling and Simulation - Session 2

Stream: System Dynamics Modeling and Simulation
Invited session
Chair: *Markus Schwaninger*
Chair: *Camilo Olaya*