DGS II 2013 - International Conference and Advanced School Planet Earth
Dynamics, Games and Science II

28 August to 6 September 2013

Calouste Gulbenkian Foundation (FCG) and
Instituto Superior de Economia e Gestão, Universidade Técnica de Lisboa (ISEG-UTL)
Lisboa, Portugal

Keynote Speakers and school lecturers
Elvio Accinelli, UASLP, Mexico
Michel Benaim, Université de Neuchâtel, Switzerland
Fabio Chalub, Universidade Nova de Lisboa, Portugal
Jim Cushing, University of Arizona, USA
João Lopes Dias, Universidade Técnica de Lisboa, Portugal
Pedro Duarte, Universidade de Lisboa, Portugal
Marta Faias, Universidade Nova de Lisboa, Portugal
Loren Imhof, University of Bonn, Germany
Yunping Jiang, City University of New York, USA
José Martins, I.P. Leiria, Portugal
Bruno Oliveira, Universidade do Porto, Portugal
Jorge Pacheco, Universidade do Minho, Portugal
Joana Pais, ISEG/Technical University of Lisbon, Portugal
Alberto A. Pinto Universidade do Porto, Portugal
Martin Shubik, Yale University, USA
Renato Soeiro, Universidade do Porto, Portugal
Satoru Takahashi, National University of Singapore
Jorge Zubelli, IMPA, Brasil

Organized by The International Center of Mathematics CIM - Portugal
data and the locations where the species is known to be present, to forecast the probability of infestation.

We have also constructed a model of the spread of the infestation in the particular urban environment of Angra do Heroísmo, Azores, using an agent based modeling approach. The model was built in steps of increasing complexity taking into account the ecology of the species and with a continuous cross-checking of the results obtained with the field data. We have also introduced different control strategies and evaluated their costs.

We find that, in general, the probability of occurrence is higher near the coastline, where the majority of the towns and villages are located so that infestation has potential to spread to yet unaffected towns and islands.

Our model of the spread of the infestation predicts a region of infestation that is similar to the known map of infestation. The model predicts that virtually no houses inside the infested region can remain uninfested, even when the probability of infestation is relatively low, and this is indeed what is observed in the field. Some preliminary results suggest that coordination of the pest control agents is important to provide a solution to the problem.

Dynamics, Modelling and Optimisation
Organizer: João Paulo Almeida
Instituto Politécnico de Bragança
September 2nd, 14:15-15:15 and 15:30-16:30, Sala 1

Solving Flexible Job Shop Scheduling using Genetic Algorithm
Ana I. Pereira 1,2, Ana Curralo 1, José Barbosa 1,3, Paulo Leitão 1,4
1 Instituto Politécnico de Bragança, Portugal.
2 Algoritmi, Universidade do Minho, Portugal.
3 Univ. Lille Nord de France, France & UVHC, TEMPO research center, France.
4 LIACC, Portugal.

This work addresses a real assembly cell: the AIP-PRIMECA cell at the Université de Valenciennes et du Hainaut-Cambrésis, in France. This system can be viewed as a Flexible Job Shop, leading to the formulation of a Flexible Job Shop Scheduling Problem (FJSSP). This FJSSP offers the possibility to create the products "AIP", "LATE" and "BELT" using by five workstations, each one being able to perform a set of operations, that are linked using a conveyor system. The transportation between stations is achieved using a shuttle which is able to transport one product at the time, being released after the product processing conclusion.

The problem consists in finding a operations schedule on the machines, taking into account the precedence constraints minimizing the batch makespan, i.e., the finish time of the last operation completed in the schedule.

To solve the flexible job shop the genetic algorithm (GA) was used to obtain the global solution. As opposed to many other optimization methods, genetic algorithm works with a population of solutions instead of one single solution. In the GA the solutions are combined to obtain new solutions until obtain a satisfactory solution. The genetic algorithm is a stochastic method, whose mechanism is based on the simplifications of evolutionary process observed in nature: crossover, mutation and selection.