

Using Genetic Algorithms to Outline Crop Rotations and a Cropping-System Model

Authors : Nicolae Bold, Daniel Nijloveanu

Abstract : The idea of cropping-system is a method used by farmers. It is an environmentally-friendly method, protecting the natural resources (soil, water, air, nutritive substances) and increase the production at the same time, taking into account some crop particularities. The combination of this powerful method with the concepts of genetic algorithms results into a possibility of generating sequences of crops in order to form a rotation. The usage of this type of algorithms has been efficient in solving problems related to optimization and their polynomial complexity allows them to be used at solving more difficult and various problems. In our case, the optimization consists in finding the most profitable rotation of cultures. One of the expected results is to optimize the usage of the resources, in order to minimize the costs and maximize the profit. In order to achieve these goals, a genetic algorithm was designed. This algorithm ensures the finding of several optimized solutions of cropping-systems possibilities which have the highest profit and, thus, which minimize the costs. The algorithm uses genetic-based methods (mutation, crossover) and structures (genes, chromosomes). A cropping-system possibility will be considered a chromosome and a crop within the rotation is a gene within a chromosome. Results about the efficiency of this method will be presented in a special section. The implementation of this method would bring benefits into the activity of the farmers by giving them hints and helping them to use the resources efficiently.

Keywords : chromosomes, cropping, genetic algorithm, genes

Conference Title : ICICS 2016 : International Conference on Information and Communications Security

Conference Location : San Francisco, United States

Conference Dates : June 09-10, 2016