MAGMA

Malaga Group of Multicriteria Analysis

by

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This research group was founded in 1991, within the Department of Applied Economics (Mathematics) of the School of Economics and Business of the University of Malaga (Spain). Nowadays, it is formed by doctors in Mathematics and in Economy, as well as by PhD students.

General Research Lines.

The group works in several lines within the frames of Multiobjective Programming, Goal Programming and Interactive Methods, specially with continuous problems.

We have carried out our research activity in static and dynamic problems, both linear and non linear. During these years we have been working in their theoretical and computational aspects, as well as their application to different topics within the frame of the Economy.

Since its birth, the group has been actively participating in both national and international societies and events related to MCDM. At the national level, we are members of the Spanish Society of Statistics and Operations Research (SEIO). We also are part of the Spanish Group of Multicriteria Analysis, which was born inside the SEIO society in 1997. Besides, our group was among the founders of the thematic network on Multicriteria Decision Making, which has nowadays members of 14 Spanish universities.

At the international level, we are members of the MCDM Society, and we have participated in many MCDM, MOPGP and IFORS conferences. Our group organized and hosted the second MOPGP Conference, held in Torremolinos in 1996.

Finally, we would like to point out that our group considers that the relations with researchers of other universities is highly desirable and profitable. Apart from the close relations with our Spanish colleagues, we are proud to have received in our Department the visits of many prestigious researchers. With most of them, we have produced joint works, or we are presently working together.

Main Interest Research Topics of the group.

- Multiobjective Programming and Goal Programming, especially for convex or fractional problems. We have analysed the main characteristics of their solutions, studying the relations among them, we have developed efficient algorithms to obtain such solutions, and we have carried out several applications in the field of the Economy.
- Multiobjective Stochastic Programming. We are interested in the relations among the several kinds of solutions and schemes, and in their characterization. We also intend to develop appropriate algorithms to solve these problems, and to carry out applications to environmental problems.
- Interactive Methods. We are interested in the categorization of the different existing methods, and in the determination of the relations existing among the information they require and in the solutions they provide. We are currently developing the theoretical tools in order to transfer information between methods, so as to make it easier to change the algorithm along the resolution process, keeping as much information as possible.
- Computational Implementations. Our aim is to develop software related to all the topics describe above. So far, several implementations have been carried out under Windows environment, and with a friendly interface, to apply multiobjective, goal programming and interactive methods to linear and fractional

problems. Presently, we are working in the improvement of these implementations, as well as in their extensions to wider classes of problems.

- Meta-Heuristic Methods in Multiobjective Programming. The complexity and high dimensionality of some multiobjective problems, together with the corresponding large resolution times needed, have led us to work during the last years in meta-heuristic procedures, especially in evolutive, tabu search and scatter search algorithms.
- Applications to the public sector, specially to the fields of Education Economy and Health Economy. Within this context, we have centred our attention in the development of models in order to assign monetary and human resources to different productive units that depend of a central decision unit. These models relate the budgeting with the achievement of certain objectives, so that an efficient use of the available public resources is encouraged.
- Applications to forest management. The multiple uses of the forest are incorporated through fractional goal programming models, in order to determine the equilibrium of the natural system, and taking into account economic and environmental aspects.
- Application to environmental problems. The main principles of Ecological Economy imply the simultaneous consideration of economical, social and environmental criteria. In this scenario, the use of multicriteria decision techniques seem the most natural tool for political decisions. We are presently working in an application to the Andalusian electricity supply system, and in the development of composite environmental indicators.
- Applications to the Andalusian tourist sector. The reality of the tourist sector is very complex, and it depends on many variables. Thus, strategic decisions in tourist policy have to be made taking into account many different criteria. Our aim in this field is to build an interdisciplinary research group, in order to aid the regional authorities to evaluate the present situation and the possibilities and threatens of the future, and to make decisions according to these data.

Members of the group.

Rafael Caballero, José Manuel Cabello, Teodoro Galache, Trinidad Gómez, Mercedes González, Mónica Hernández, Mariano Luque, Francisca Miguel, Julián Molina, María del Mar Muñoz, Lourdes Rey, Beatriz Rodríguez, Rafael Rodríguez, Francisco Ruiz, Ángel Torrico

Most relevant publications of the last years.

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