

Summary

The habilitation thesis entitled *Information fusion with applications in automation* (author conf. Cornel Barna) presents the results of the scientific research activity carried out after obtaining the scientific title of Doctor, as well as a plan for the development of professional, academic and scientific career.

The thesis consists of two abstracts in Romanian and English, four chapters, a list of abbreviations, a bibliography of the fields of interest and an Annex, with the main contributions and scientific works grouped according to the topics addressed.

Chapter 1 provides a summary of the main methods of information fusion. A definition of fusion as a summary of results from various sources of information is presented at the outset, in which data of various types are taken into account to obtain a plausible estimate of the set of available values. In the following is a description of the classifications of the fusion methods by the level of processing at which they are performed, the techniques used in the result relationship, or the level of ranking on which the data sources are involved. The following type of technique used to establish the merger are presented:

- a) fusion by probabilistic methods
- b) fusion by statistical methods
- c) fusion by fuzzy methods
- d) use by heuristic methods
- e) merger by means of possibilities
- f) Fusion by methods using the Dempster-Shafer terror

Chapter 2 exemplifies in a few applications the use and usefulness of the use of information fusion for different fields. In this regard, it summarizes applications of information fusion in establishing optimal conditions in greenhouses by fuzzy methods. The second application presents methods for assessing interconnecting thermal power plants and an assessment of them. In a subchapter, he details techniques to prevent server denial-of-access cyberattacks called DDoS. The following sub-chapter analyzes various classifiers used for the anticipation of



customer satisfaction based on previously recorded behavior. Subchapter Saxon deals with techniques for forecasting the concentration of the ozone layer by methods of training artificial neuron networks. The latest subchapter looks at ways to detect spam emails to avoid information overload and prevent cyber attacks.

Chapter 3 is a presentation of ongoing research that continues previous research and opens up new topics that arise as a result of the global development of areas of interest. In the paper, as an example of these concerns are described two studies that are among my current concerns:

- a) methods of fusion between video systems and PIR systems, in which methods and performance are analyzed that are achieved in a complex system for monitoring and warning enclosures. The process is grouped into two stages, one of a lower level in which three fusion operations are performed by three different methods: Heuristic, fuzzy and confirmed, and one of a higher level in which the result of the merger is established using two types of methods: hard and soft
- b) methods of measuring uncertainty by similarity coefficient, which contain research in the field of determining uncertainty in the determination of the label applied to objects appearing in images. The study is based on a metric of similarity defined on fuzzy sets applied to the first and second prototype of recognition ordered upward in the context of the metric application. A level of uncertainty is determined according to the ratio of these distances.

Chapter 4 aims to present the professional and scientific career development plan, a presentation that is structured on two parts:

- a) Professional activity to date 1980-2020
- b) prospects for professional career development after 2020

The application in automation of modern methods and theories such as artificial intelligence, image recognition, fuzzy set theory or machine learning, offers new areas of study with major effects on industrial activities. In this direction, the main research areas addressed over the years are:

- a) information fusion
- b) fuzzy systems
- c) neural networks

- d) recognition of images
- e) suboptimal algebraic algebraic
- f) Sintesys

Detailed topics in selective lists of scientific contributions and works, as well as in presentations from the participations in scientific events.

At the end of the thesis are briefly presented some topics that could be considered for further research, such as: Automatic processing of natural language, the study of smart buildings using the Internet of things IOT, artificial intelligence applications: Hybrid systems, soft Computing or warehouses intended for cultivation and automatic picking for different crops, using robots equipped with manipulators and multiple vision systems.

