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Research profile

My general research interests are:
- advanced processing of medical images;
- medical information systems;
- fractal analysis of data sets;
- monitoring of persons with deficiencies using sensor networks;
- management and monitoring of emergency situations.

PhD coordinator since 2019;

Scientific publications: 6 monographs / book chapters; 20 journal papers and 120 conference papers.

Research projects, grants (selection):

- 2001 – 2002, Light diffusion spectrophotometric analysis of the transformation degree in cell culture, Romanian Academy Grant

- 2017, SMART, Multispectral system for monitoring of critical area in the energy field, UEFISCDI "Innovation Check", http://mtti.pub.ro/cercetare/proiecte/smart/

- 2017, PRIMA, FPGA-based multifunction module for image processing in industrial robotics, UEFISCDI “Innovation Check”, http://mtti.pub.ro/cercetare/proiecte/prima/

- 2017, SMARD, Smart multi-sensor network for indoor monitoring, “Innovation Check”, http://smard.valahia.ro/

- 2017 – 2018, SET, Complex methods for segmentation of colour textures, GEX UPB

Management positions / Membership in scientific organizations and committees, editorial boards

- IEEE member;
- Member of the National Commission for Antarctic Research (CNCA) under the coordination of the Romanian Academy - coordinator of the national data centre;
- Member of the scientific committee at IWSSS - International Workshop On Systems Safety & Security (ECAI) 2015, 2016, 2017, 2018, 2019;
- Book editor of Automatic Research and Computers (A&C Research Book – Faculty of Automatic Control and Computers; 2010-2013), 2015;
- Associate editor at 22th International Conference on System Theory, Control and Computing (ICSTCC 2018), 10-12 October, Sinaia, Romania;
- Associate editor at 19th International Conference on Image Analysis and Processing (ICIAP), 11-15 Sept. 2017, Catania, Italy;
- Associate editor at 15th International Conference on Control, Automation, Robotics and Vision (ICARCV 2018), 18-21 November, Singapore.

Proposed PhD topics:

1. *Medical information systems*

The main concern is to develop methods of analysis and processing of biomedical images and their effective implementation in a system of real-time medical diagnosis and / or treatment follow-up. Emphasis will be placed on choosing and using the most appropriate techniques and tools for designing / implementing solutions for storage and searching in medical databases. Thus, this system will be able to identify an associated region of a disease and quantify the properties of that region, which could be used as guidance for surgeons, radiologists, etc. to increase the diagnosis and prognosis according to the patient's needs.

2. *Fractal analysis of images and time series in various fields*

The objective of the research consists in the application of fractal techniques both in image processing and time series analysis. Applications are concerned regarding: the study of biological systems and subsystems on a microscopic and macroscopic scale, the simulation of socio-economic processes, meteorological forecasts, fluid dynamics, traffic in computer networks, etc. The main purpose is to find new methods and algorithms for calculating the differential and mass color fractal dimension in the field of image processing and analysis. In addition, fractal techniques can be combined with other methods to enhance the performance of segmentation and classification algorithms in various fields of interest.

3. *Monitoring and management of natural disaster situations*

The purpose of the research is the automatic detection of events, monitoring, surveillance and inspection with the help of drones. The main concern in the field of aerial image acquisition and processing will be to approach combined methods of representing complex images (textures or fractals) with neural network classifiers, in applications for monitoring and evaluating natural disasters (floods, fires, landslides. etc.). For this purpose, it is proposed to identify and monitor the sources of risk, to evaluate the information and to analyse the situation, to elaborate forecasts, to establish the variants of action and to implement them to restore the normality situation.

4. *Smart monitoring of persons with deficiencies at home using the fusion of sensory data*

The purpose of the research consists in designing, developing and evaluating an intelligent, adaptive, monitoring and personalized assistance system for persons with deficiencies, based on the fusion of data from sensors. Such a system collects context information based on data from sensors that are applied to signal processing and recognition algorithms. The system will be based on open platforms and will integrate different technologies, such as: Edge / Fog / Cloud computing, statistical data grouping analysis to ensure rapid detection of changes in individual needs.