Advances in Artificial Intelligence and Applications

Preface

All around the world, every year, scientists and practitioners discuss at numerous conferences dedicated to Artificial Intelligence the novel achievements and challenges. Such conferences are organized also in Poland, one of them is the International Symposium Advances in Artificial Intelligence and Applications (AAIA), organized annually within the International Multiconference on Computer Science and Information Technology framework. Selected participants of that Symposium have been invited to submit their papers to this issue of Fundamenta Informaticae. Two papers have been written especially to this issue of Fundamenta journal, three other were presented at the Symposium and are considerably extended.

The first paper, entitled "Measuring Semantic Closeness of Ontologically Demarcated Resources" is written by two teams: from Poland and Korea. Fusion of their experiences has allowed to develop an agent-based system, aimed to support workers in an organization. One of key functionalities of this system is ontological matchmaking, understood as a way of establishing closeness between resources. The system recommends which, among available resources, are relevant / of interest to the worker. Authors approach to measuring semantic closeness between ontologically demarcated information objects is discussed in the paper. A Duty Trip Support application is used as a case study. It is worth mentioning that, in computer science, ontology is a representation of a set of concepts and relationships between them within a given domain.

The second paper, "Designing Model Based Classifiers by Emphasizing Soft Targets", deals with training classifiers. Classification task is very popular in real-life problems. A number of different classification methods exists, each reveals some advantages and weakness. The authors explore the effectiveness of using emphasized soft targets with generative models, such as Gaussian Mixture Models (GMM), and Gaussian Processes (GP). Their approach seems to produce better performance and is less sensitive for parameters values.

The third paper, Improved Resulted Word Counts Optimizer for Automatic Image Annotation Problem, uses classifiers (a family of classifiers) for automatic annotation of images. It is an important research topic in pattern recognition area. In the paper, a generic approach to find correct word frequencies is proposed. The Optimizer can be used with different automatic image annotators, based on various machine learning paradigms. In the paper, a new, improved authors former method, Greedy Resulted Word Counts Optimization is proposed. The proposed method is more intuitive and it reduces

the computation requirements, comparing to the old method. The paper presents results of experiments, performed on automatic image annotators built on various machine learning paradigms. The results show that incorporation of recall quality measure into the annotator optimization routine seems to be a good choice.

The fourth paper presents application of intelligent techniques to the real, medical problem, namely modeling the relationship between EMG and force moment generated by moving upper or lower limb. The authors of this paper, entitled "Different Approaches To Model Relationship Between Emg Signals and Force Moments In Human Skeletal Muscle. Analysis for Diagnosis of Neuron muscular Disorders.", consider five different models and their abilities to describe relationship between EMG and force moment generated by moving upper or lower limb. The method can be useful for diagnostic purpose. The intension of the research was to decide which model can be used to asses current health state of the subject. Eight different sets of data gained from eight different health subjects were used in this study. The best ability to assess the health state of the patient has EMG-To-Activation model which is built to map that relationship.

The last paper, entitled "On Stability and Classification Tools for Genetic Algorithms" discusses asymptotic stability requirements as a form of convergence of genetic algorithms. As it is commonly known, the lack of mathematical foundations of genetic algorithms is their main weakness. The authors introduce some tools to measure convergence properties of genetic algorithms. They propose a classification procedure on the basis of the entropy and the fractal dimension of trajectories of genetic algorithms. The role of these quantities as invariants of the algorithm classes is discussed together with the compression ratio of points of genetic algorithms.

Naturally, the five papers presented here are not able to show all the problems, achievements, and challenges of Artificial Intelligence. I hope that this issue can stimulate the further research and will result in enlargement of young researchers involved in the field of Artificial Intelligence. Some years ago, one of my master students said that Artificial Intelligence is a fascinating research field that is quite difficult, but studying it allows to join fun with serious research.

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