

Editorial

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Special Issue on Innovative Applications of AI

During the last 25 years, Artificial Intelligence (AI) has been one of the most studied scientific fields, in relation with Information Technology, in Mexico. This issue, titled “*innovative applications of AI*”, comprehends a sample of the research conducted in this country, which includes about the hottest research topics in Mexico, namely: pattern discovery and recognition, information extraction, machine learning probabilistic intelligent systems, optimization, education and automated reasoning. To conform this issue, we launched an open call for papers. We received 52 articles and, after a careful and a thorough two-round process review, we selected only eight papers. Some are theoretical, such as the optimization of cutting paper rolls. We briefly describe the selected papers below.

Reyes *et al.* introduce a two-step approach for solving continuous, or hybrid, Markov decision processes (MDPs), which aims at reducing the complexity of the state space associated with a solution. In the first step, the authors apply sampling for exploring the environment and thereby obtain a preliminary qualitative abstraction. In the second step, such abstraction is iteratively refined using local information: state utility variance. This approach has been integrated into AssistO, a support systems for the operation of power plants.

Ibargüengoyta *et al.* provide an inventory of successful applications of probabilistic intelligent systems, developed at Instituto de Investigaciones Eléctricas (IIE), to power industry. Applications include fault diagnosis systems, planning systems and decision support systems. They were all developed for Comisión Federal de Electricity, a company of the Mexican government that generates, transmits, distributes and commercialises almost 80% of the power energy in Mexico.

Téllez *et al.* present an approach based on machine learning, which first identifies written, new reports, related to natural disasters (text categorization) and then extracts from them relevant and meaningful information (information extraction). These techniques have integrated into an automated system, named TOPO, which has been successfully validated using reports from on-line Mexican newspapers, generated from 1996 to 2004.

Herrera & Zaragoza introduce methods for the lossless compression of data files. The methods work by discovering patterns that are not apparent, possibly immersed or surrounded by secondary information. The methods depart from classical compressing methods, based on Shannon's information theory, and hence are able to compress information, where the distribution of symbols is quasi-uniform or where there are no predefined grammatical rules.

Baidyk *et al.* introduce two neural classifiers for recognizing images in two processes of micro-mechanics, namely: assembly and manufacturing. One is a permutation coding neural classifier and the other is a limited receptive area neural classifier. Both classifiers showed a good performance in the recognition of work pieces and their positions.

Osorio *et al.* survey the application of para-consistent logics, especially the G'3 logic, to non-monotonic reasoning which attempts to solve or at least conciliate the presence of vagueness, imprecision, uncertainty and even inconsistency in information. In addition, they study the use of G'3 in two approaches to the construction of non-monotonic semantics.

Martínez & Valenzuela show the application of simulated annealing, together with a heuristic of their own, to an optimization problem: minimizing waste in paper roll cutting. Results show that this technique is capable of fully satisfying actual client orders (specified in terms of weight, width, external and internal diameter) and that they achieve a 30% reduction in paper waste and a 100% reduction in inventory.

Zayas & Cox study the effects of information location and user interaction through a virtual desktop environment (DVE) in learning and retention of declarative knowledge about safety measures to be observed in a laboratory. Experimental results indicate that, unlike user interaction, information location contributes positively and prompts a greater exploration of the DVE.

This issue also includes a PhD, abstract by Jorge A. Ruiz Vanoye, which addresses transforming instances as well as complexity metrics between two NP-problems: bin-packing and two-partition. Ruiz's main contributions include the development of formal languages and a methodology for capturing instances of both above-mentioned problems.

Guest Editors
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