EDITORIAL

It is a sincere pleasure to communicate again with the readers of the *Journal of Intelligent & Fuzzy Systems* (*IFS*). With this issue we conclude our first year of publication, and thus far all of our initial expectations for interest in the journal have been exceeded! We continue to receive high-quality papers from a highly diverse and competent group of authors, our reviewers are responding in a professional and timely manner to our pleas for quick turn-around, and our readers are entering personal and institutional subscriptions at a steady pace. All signs point to a successful professional publication, and we are most grateful.

In this first year we have instituted at least two of the recommendations of our Advisory Board and our Honorary Editor, Dr. Lotfi Zadeh. In this year-end issue we are including a list of names and affiliations of the reviewers who contributed their valuable time and efforts to help ensure the quality of papers in our first volume. We are especially grateful to these individuals; because of their efforts, professionals around the world are reading the journal with interest and excitement. In addition, this year-end issue also includes a key-words index that facilitates access to papers for archival purposes. We continue to rely heavily on our Associate Editors to assist us in locating reviewers, acting as reviewers, and administering some reviews. We want to again thank this hard-working group of professionals. Finally, the editors-in-chief are indebted to our editorial manager, Ms. Nancy Gillan, without whose Herculean efforts in organizing our databases, in corresponding with authors, reviewers, and publisher, and in assisting numerous authors on editorial style and content, this journal would not enjoy the position that it does today.

For our second year, we plan to add dates to each paper indicating when the paper was received for review and when it was approved for publication; that will allow us and our readers to track the length of the review process and the backlog time for publication. We are very proud of the first year's review- and publication-cycle times, and we hope to maintain this positive record in the future.

During our first year we received an incredible diversity of papers in many different disciplines and from many different parts of the world. Although it is difficult to label the discipline-specific character of any paper, general categories have been assigned for purposes of generating some useful statistics. In our first volume (four issues), we published 27 high-quality papers: six on controls engineering; five on mathematics; four on systems engineering; three each in the areas of civil engineering and mechanical engineering; two on computer science; and one each in the fields of computer engineering, industrial engineering, chemical engineering, and medical science. The geographical breakdown is equally varied: on 13 papers the senior author is from the United States, four papers were from authors in Japan, three from Korea, and one each from Brazil, Canada, Germany, Greece, India, Singapore, and Taiwan. Although *IFS* plans to publish works from any field that uses intelligent systems, the preponderance of papers in our first year dealt with fuzzy systems: 24 papers described topics in fuzzy systems, two contained neural networks topics, and one paper documented a conventional expert system.

This issue, our fourth in Volume I, contains nine papers. To assist the reader, the papers have been arranged into two groups. The five papers in the first group discuss topics ranging from knowledge representation using object-oriented methods to fuzzy optimization. The four papers that comprise the second group are all in the area of fuzzy control.

In the first paper, M. Vazirgiannis, K. Petrou, A. Tsobanidis, and M. Hatzopoulos describe the object-oriented extension of a knowledge representation model for use in hypermedia information systems. Hypermedia is the extension of the hypertext concept toward integration of multimedia information. The model incorporates uncertainty handling with the use of fuzzy sets. It is

illustrated by an application of a tourism-database query about the island of Crete, involving a fuzzy criteria.

Next, Hwan Jin Choi and Yung-Hwan Oh continue the natural language issue introduced in the first paper by describing the development of a word recognition system using a modular structured neural network and a contextual net, which is evaluated on 40 isolated Korean words. The contextual net is used to correct unrecognized phonemes or "vowel + consonants." The performance of this system is quantified with experiments, which obtained a word recognition accuracy of 95% on the test set; improvements in phoneme recognition accuracy were 3.7% better than that obtained using a multi-layered perceptron.

With the third paper, N. Kehtarnavaz, M. Chung, L. A. Hayman, and R. E. Wendt III follow the recognition topic from the second paper by discussing a clustering algorithm based on a "contextual thresholded fuzzy c-means" approach. The method is illustrated for the segmentation of magnetic resonance images in the human brain. The algorithm incorporates contextual information into the thresholded fuzzy c-mean algorithm by adaptively adjusting each voxel's image-membership value based on the membership context of the voxels surrounding the one being adjusted. In comparing the new algorithm with a crisp c-mean, a Bayesian method, and the k-nearest neighbor approach, the authors report that this new approach leads to better clinical segmentation of brain tissues.

The fourth paper extends the contextual basis of the first three by describing the development of a method to assess the operational reliability of software based on linguistic assessments from human users. Authors K. K. Aggarwal, M. Pavan Kumar, and B. K. Mohanty use fuzzy sets to quantify the linguistic data provided by users on the operational profile of software. The authors conclude that their fuzzy approach is advantageous because operational metrics can be assessed objectively, even though the user input is subjective and imprecise.

In the fifth paper, Sie-Keng Tan and Pei-Zhuang Wang move into the area of fuzzy optimization. The authors derive a technique to determine the optimal fuzzy set of a mathematical programming problem, based on an objective function with a fuzzy constraint. To give the paper a sense of meaning for practicing professionals, the authors provide a graphical representation of the optimal fuzzy solution when the universe of discourse for the problem is the set of real numbers.

The sixth paper leads off the second group of papers in this issue, all of which involve control. Anthony Tzes, Pei-Yuan Peng, and Farshad Khorrami describe a fuzzy neural controller for a single flexible-link manipulator. A fuzzy-cell space controller is used (a) to supervise a conventional backpropagation network, which decreases the effects of system nonlinearities such as motor static friction and saturation of the electronic amplifier; and (b) to reduce the amplitudes and repetitions of control switchings. The authors conduct simulation studies to show the effectiveness of their proposed controller.

In the seventh paper, authors Byeong-Mook Chung and Jun-Ho Oh present a learning algorithm for fuzzy inference which can tune both the input and the membership functions for a fuzzy rule-based controller. The control input and membership functions are simultaneously updated by a gradient method to minimize the performance index. The authors show that the algorithm produces efficient control with fewer rules and higher learning speed than previous methods.

The eight paper develops a fuzzy controller design procedure by combining fuzzy logic with ideas in conventional phase plane approaches and sliding mode control. With this new controller, authors Kuo-Tung Sun and Peng-Yung Woo claim that higher-order systems with hard nonlinearities such as saturation, backlash, and hysteresis can be controlled. In this sense, oscillation and tracking error can be minimized for systems using the new design procedure.

The last paper in this issue is a thoughtful discourse by Paul J. Werbos on the use of a concept called "elastic fuzzy logic" (ELF) to improve the intelligence of neurocontrol systems. Such neurocontrol systems can be thought of as hybrid systems which attempt to combine the best features of fuzzy logic using ELF and neural networks. The author suggests that truly intelligent control would involve advanced learning techniques which make it possible to perform true planning or optimization over time on an adaptive basis. The paper illustrates some ideas in ELF with pseudocode, which will undoubtedly become quite useful for practicing control engineers.

As we said in our first editorial, in the inaugural issue, we hope that *IFS* demonstrates to pros-

pective authors, reviewers, and readers our intention to share the practical applications of various theories and methods developed in the fields of intelligent and fuzzy systems. We continue to solicit comments from all interested parties in our goal to make this journal an effective, enlightening, and provocative platform, both for learning and for the expeditious transfer of technology to the research and commercial worlds.

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