Third International Conference on Soft Computing and Pattern Recognition (SoCPaR 2011)

14-16, October 2011
Dalian, China

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Welcome from SoCPaR 2011 Chairs

After the success of the Second International Conference of Soft Computing and Pattern Recognition (SoCPaR 2010), SoCPaR 2011 is organized to bring together worldwide leading researchers and practitioners interested in advancing the state of the art in Soft Computing and Pattern Recognition, for exchanging knowledge that encompasses a broad range of disciplines among various distinct communities. It is hoped that researchers and practitioners will bring new prospects for collaboration across disciplines and gain inspiration to facilitate novel breakthroughs. The themes for this conference are thus focused on "Innovating and Inspiring Soft Computing and Intelligent Pattern Recognition".

The Conference is jointly organized by the Machine Intelligence Research Labs (MIR Labs), USA; Dalian Maritime University, China; Dalian University of Technology, China and Tsinghua University, China. The conference is technically sponsored by IEEE Systems, Man and Cybernetics Society – Spanish Chapter and IEEE Signal Processing Society – Tainan Chapter. The conference is financially supported by the National Science Foundation of China (NFSC), China.

SoCPaR 2011 received nearly 200 contributions from more than 30 countries. Each paper was sent to at least 5 reviewers from our International Program Committee in a standard peer-review evaluation. Finally, 100 papers were accepted based on the recommendations by the independent peer reviewers. The technical program consists of 5 plenary talks by world-class experts followed by technical sessions covering various topics in the soft computing and pattern recognition fields.

All accepted papers will be included in the conference proceedings published by the IEEE. We have also teamed up with several reputed International Journals to publish special issues from the Conference. This conference would not have been possible without the hard work of many people. Please allow us to present our heartfelt thanks to all authors for their submissions, special session organizers and chairs for their valuable responsibilities, the reviewers for their quality appraisal, the invited speakers for significant remarks, the attendees for their support and last but not least we are grateful to all the committee members for their tireless efforts towards the success of SoCPaR 2011.

The General Chairs and the Programme Chairs along with the entire team cordially invite you to attend the International Conference on Soft Computing and Intelligent Pattern Recognition to be held on October 14-16 in Dalian, China.

General Co-Chairs

Ajith Abraham, Machine Intelligence Research Labs (MIR Labs), USA

Hongbo Liu, Dalian Maritime University, China

Fuchun Sun, Tsinghua University, China

Programme Co-Chairs

Chen Guo, Dalian Maritime University, China

Seán McLoone, National University of Ireland, Ireland

Emilio Corchado, University of Salamanca, Spain

Honorary Chair

Lotfi A. Zadeh, University of California- Berkeley, USA
Zuwen Wang, Dalian Maritime University, China

General Chairs

Ajith Abraham, MIR Labs, USA
Hongbo Liu, Dalian Maritime University, China
Fuchun Sun, Tsinghua University, China

Program Chairs

Cheng Guo, Dalian Maritime University, China
Seán McLoone, National University of Ireland, Maynooth, Ireland
Emilio Corchado, University of Salamanca, Spain

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Publication Chairs

Weijiang Liu, Dalian Maritime University, China
Xiuguo Zhang, Dalian Maritime University, China
Zhihua Cui, Taiyuan University of Science and Technology, China

October 13, 2011	
14:00~18:00 Bayshore Hotel Dalian (First Floor)	Registration and Welcome Reception

October 14, 2011	
08:30~09:00 Beauty Crystal Palace-A (4th Floor)	Opening Ceremony
09:00~10:00 Beauty Crystal Palace-A (4th Floor)	Plenary Talk 1 Henri Prade National Center for Scientific Research (C.N.R.S.), France Logical Handling of Analogical Proportions in Commonsense and Transductive Reasoning
10:00~11:00 Beauty Crystal Palace-A (4th Floor)	Plenary Talk 2 Francesco Marcelloni University of Pisa, Italy Multi-Objective Evolutionary Fuzzy Systems
11:00~11:20	Coffee Break
11:20~12:20 Beauty Crystal Palace-A (4th Floor)	Plenary Talk 3 Fuchun Sun Tsinghua University, China Robust Visual Tracking with Applications to Shared Control in Robotic Tele-Operation
12:30~14:00 Sea View Hall (4th Floor)	Lunch
14:00~15:00 Beauty Crystal Palace-A (4th Floor)	Plenary Talk 4 Jeng-Shyang Pan National Kaohsiung University of Applied Sciences, Taiwan Overview of Swarm Intelligence

October 14, 2011		
15:10~16:30	Session A: Optimization Techniques – I Venue: Beauty Crystal Palace-A (4th Floor)	Session B: Optimization Techniques – II Venue: Victoria Hall (4th Floor)
16:30~17:30	Coffee Break and Poster Session A & B (4th Floor)	
18:30~21:00	Conference Banquet Venue: Beauty Crystal Palace-A (4th Floor)	

October 15, 2011		
08:30~10:10	Session C: Computer Vision & Image Processing – I Venue: Billow View Hall-A (4th Floor)	Session D: Computer Vision & Image Processing – II Venue: Victoria Hall (4th Floor)
10:10~10:30	Coffee Break	
10:30~12:20	Session E: Approximate Reasoning & Information Retrieval Venue: Billow View Hall-A (4th Floor)	Session F: Machine Learning & Computation Venue: Victoria Hall (4th Floor)
12:30~14:00	Lunch Venue: Sea View Hall	
14:00~15:30	Session G: Ambient Intelligence and Applications – I Venue: Billow View Hall-A (4th Floor)	Session H: Hybrid Intelligent Systems and Applications Venue: Victoria Hall (4th Floor)
15:30~15:50	Coffee Break	
15:50~17:00	Session I: Ambient Intelligence and Applications – II Venue: Billow View Hall-A (4th Floor)	Session J: Web Service and Applications Venue: Victoria Hall (4th Floor)
17:00~17:30	Tea Break and Closing Ceremony (4th Floor)	
18:30~20:00	Dinner Venue: Universe Western Dining Hall (25th Floor)	

October 16, 2011	
8:30~12:00	Dalian City Tour (Lunch)

Plenary Talks

Logical Handling of Analogical Proportions in Commonsense And Transductive Reasoning

Henri Prade
National Center for Scientific Research (C.N.R.S.), France

Abstract: Analogies play an important role in many reasoning tasks. The presentation will introduce a recently proposed modeling for analogical proportions, i.e. statements of the form “A is to B as C is to D”, which put four situations into comparative relations. The logical representation used for encoding such proportions takes both into account what the four situations have in common and how they differ. Thanks to the use of a propositional logic modeling extended with suitable fuzzy logic connectives, the approach can deal with situations described by features that may be binary- or multiple-valued. Moreover, it will be shown that analogical proportions are related to other logically expressible proportions that are also of interest. The presentation will emphasize the interest of the approach for handling a large variety of forms of reasoning ranging from the solving of IQ tests, to case-based reasoning, interpolative and extrapolative reasoning, and transductive reasoning for classification. Potential for analogical argumentation will be also briefly discussed. The approach does not just rely on the exploitation of similarities between two cases, but rather takes advantage of the parallel made between a situation to evaluate or complete and three other situations.

Multi-Objective Evolutionary Fuzzy Systems

Francesco Marcelloni
Department of Information Engineering
University of Pisa

Abstract: In the last two decades, fuzzy rule-based systems (FRBSs) have been successfully applied to different engineering fields such as control, pattern recognition, system identification and signal analysis. FRBSs consist of a linguistic rule base (RB), a data base (DB) containing the fuzzy sets associated with the linguistic terms used in the RB and a fuzzy logic inference engine. Several methods have been proposed in the literature to generate the RB and the DB of an FRBS from available data (typically, input-output samples). At the beginning, such generation was generally performed with the unique objective of maximising the accuracy. Soon, however, the researchers realised that these accuracy-driven approaches typically produce FRBSs characterized by a high number of rules and by linguistic fuzzy partitions with a low level of comprehensibility, thus loosing that feature which makes FRBSs preferable to other approaches in real applications, namely interpretability. To overcome this problem, in the last decade, new methods have been proposed to generate FRBSs taking not only accuracy, but also interpretability of RB and DB into consideration.

Since interpretability is a subjective concept, a worldwide agreed definition and consequently a universal measure of interpretability cannot be provided. Thus, researchers have focused their attention on discussing some factors which characterize interpretability and on proposing some constraints which have to be satisfied for these factors: a common approach is to distinguish between interpretability of the RB, also known as complexity, and interpretability of fuzzy partitions, also known as integrity of the DB. Hence, the generation of FRBSs taking accuracy and interpretability into account requires to solve a multi-objective optimization problem.

Multi-Objective Evolutionary Algorithms (MOEAs) have been so extensively used in this framework that the term “Multi-Objective Evolutionary Fuzzy Systems” (MOEFSs) has been coined to identify the hybridization of FRBSs with MOEAs. MOEAs are employed to generate FRBSs with different trade-offs between accuracy and interpretability by learning the overall RB or by selecting subsets of rules from heuristically determined initial RBs, and by learning the overall DB or by tuning a DB proposed by the experts.

The talk aims to introduce the main methods which have been proposed in the literature for generating FRBSs by MOEAs. First of all, we will discuss how interpretability of an FRBS has been evaluated in the MOEFSs proposed so far. Second, we will introduce a taxonomy of MOEFSs based on how RB and DB are processed during the evolutionary process. For each node of the taxonomy, we will describe the most relevant approaches proposed in the literature by highlighting strengths and weaknesses. Finally, we will discuss hot topics and new challenges.

Robust Visual Tracking with Applications to Shared Control in Robotic Tele-operation

Fuchun Sun
Department of Computer,
Tsinghua University, China

Abstract: Currently visual tracking has received significant attentions due to its crucial value in practical applications. It has been shown that for tracking scenario, constant subspace assumption is more reasonable than constant brightness or color assumptions. Many works have been developed to construct suitable likelihood function based on the subspace representation, but how to design a robust likelihood remains an open challenging problem.

In this talk, we will present a new particle filter visual tracking approaches by which better robustness and real-time performance can be obtained. This approach utilizes the sparsity induced similarity to construct the likelihood function. This similarity depends on two basic assumptions: Linearity and Sparsity. Linear assumption claims that any feature vector in a class can be represented as a linear combination of some other feature vectors in the same class. Sparsity assumption claims that given a feature vector, its sparsest representation is achieved when all the basis feature vectors belong to the same class as the feature vector. Compared with state-of-the-art, the advantage of this approach is that the sparse representation needs to be calculated for only once and therefore the time cost is dramatically decreased.

Further, we incorporated the proposed visual tracking algorithm into the free-floating space robotics test-bed. This test-bed consists of a dual-arm robot floating on air bearings to emulate micro-gravity in two dimensions. The remote operator sends continuous command flow to the robots and controls the tips of the manipulators to reach desired position to grasp the target. The SONY EVI D70P camera is equipped on the top of the robotic platform and provides the local visual information. It is well known that the body base of the space robot is strongly coupled with the manipulators and therefore the target will often deflect from the center of the focus of vision. The role of active vision is to correct this deflection by autonomously controlling the pan and tilt parameters. In this sense, the manipulator is tele-operated by operator but the camera is autonomously controlled to lock the target and a natural shared control structure is formed. This is a novel application of active visual tracking in the robotic tele-operation and we demonstrate by experiments that the application of active visual tracking module dramatically decreases the operation burden.

Overview of Swarm Intelligence

Jeng-shyang Pan
Department of Electronic Engineering
National Kaohsiung University of Applied Sciences, Taiwan

Abstract: Swarm intelligence (SI) is based on collective behavior of self-organized systems. Typical swarm intelligence schemes include particle swarm optimization (PSO), ant colony system (ACS), stochastic diffusion search (SDS), bacteria foraging (BF), the bees algorithm, swarm robotics, etc. Besides the applications to conventional optimization problems, SI can be used in controlling robots and unmanned vehicles, predicting social behaviors, enhancing the telecommunication and computer networks, etc. Indeed, the use of swarm optimization can be applied to a variety of fields in engineering and social sciences. This talk reviews some popular algorithms in the field of swarm intelligence for problems of optimization. The overview and experiments of Particle Swarm Optimization (PSO), Artificial Bee Colony (ABC), Ant Colony System (ACS) and Cat Swarm Optimization (CSO) are given. The parallel versions of ACS, PSO and CSO are also introduced. In addition, some comparisons are made between these algorithms.