Editorial

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Biographical notes: Christine Mumford is a Senior Lecturer at Cardiff University in the School of Computer Science and Informatics. Prior to joining Cardiff, she was an Assistant Visiting Professor at George Mason University, Virginia, USA, and before that she lectured at the University of Teesside in Middlesbrough, UK. She received her PhD from Imperial College London in 1995, and since then has authored many papers. Her research interests focus on metaheuristic algorithms for combinatorial optimisation problems, particularly vehicle routing, logistic network design, scheduling, timetabling and cutting and packing. She is a Senior Member of the IEEE.

1 Introduction to the second issue of *IJMHeur*

It is my great pleasure to introduce the second issue of the *International Journal of Metaheuristics*. I am delighted with the variety and high standard of papers submitted to the journal, and I encourage prospective authors to continue to submit their best work to us. As a new journal we do not as yet have a large backlog of accepted papers, thus, high quality papers will generally appear in print relatively quickly.

The scope of *IJMHeur* covers all aspects of metaheuristic methods and their applications, placing special importance on robust methodologies, so that the need for substantial parameter retuning for new problem instances is avoided. Rigorous scientific method is vitally important, and authors are encouraged to assess the limitations as well as the strengths of their proposed methods, presenting statistical validation of results whenever possible. We are interested in theory as well as practice and welcome all high quality papers that progress knowledge or stimulates discussion on metaheuristic methods.

In general, we consider a metaheuristic to be an algorithmic framework that can be directed towards a broad range of optimisation problems. Examples include evolutionary algorithms, ant systems, tabu search, simulated annealing, variable neighbourhood search, neural networks and many more. Indeed, many successful metaheuristic approaches rely on hybridised techniques and frequently embed problem-specific low level heuristics. Nevertheless, simple and elegant designs are to be preferred, and each component of an algorithm should make a measurable contribution to its success.

2 In this issue

Following up their publication in the recent inaugural issue of this journal (Glover and Hao, 2010), we are fortunate to include a second article written by Fred Glover and Jin-Kao Hao. This new paper, entitled 'Fast two-flip move evaluations for binary unconstrained quadratic optimisation problems', extends the framework introduced in the previous work from one-flip moves, to two-flip moves. Both are highly effective neighbourhood moves, and the authors introduce an ingenious technique for significantly speeding up their evaluation. The binary unconstrained quadratic optimisation problem (UQP) involves maximising a quadratic objective by suitable choice of binary (zero-one) variables, and its formulation represents a wide range of important practical applications.

The second paper: 'CODEQ: an effective metaheuristic for continuous global optimisation' by Mahamed G.H. Omran investigates a new population-based approach, as a hybrid of chaotic search, opposition-based learning, differential evolution and quantum mechanics. CODEQ is demonstrated to be effective on a range of benchmark functions, and two real-world engineering problems. Furthermore, it is robust and requires little parameter tuning. The approach has been shown to be particularly effective on problems with high dimensionality.

Paper number three: 'An evolutionary programming algorithm for finding constrained optimal disjoint paths for multihop communication networks' by Urmila Bhanja, Rajarshi Roy and Sudipta Mahapatra, presents an evolutionary programming algorithm for finding hop count and bandwidth constrained cost optimal disjoint paths in multihop communication networks. Traditional shortest path algorithms can be too slow to operate effectively in real-time, and the approach introduced in this paper is demonstrated to produce excellent results in a fast computation time.

Next, we have a paper by Jagadish Jampani, Edward A. Pohl, Scott J. Mason and Lars Mönch entitled 'Integrated heuristics for scheduling multiple order jobs in a complex job shop'. This paper considers the scheduling of semiconductor manufacturing, which is a highly complex job shop problem, involving multiple re-entrant flows, sequence-dependent setup times, and an enormous number of processing steps. The author's present constraint programming (CP), ant colony optimisation (ACO), and integrated CP-ACO approaches to minimise the sum of weighted completion times of the orders for this very difficult practical problem.

The final paper is 'Seasonality and neural networks: a new approach' by Bruce Curry and Peter H. Morgan. This paper investigates a neural network (NN) structure designed specifically to deal with seasonality. Seasonality is notoriously difficult for NNs to handle, and it is common to apply a seasonal adjustment prior to the application of a NN, whenever there is a seasonal aspect to the data. The novel approach presented here, uses three inputs involving simple sine and cosine functions of time in addition to the standard time trend itself. This technique is demonstrated to provide the network with added assistance, making a seasonal adjustment unnecessary. In addition, the authors use differential evolution to prune and optimise the modified network.

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References

Glover, F. and Hao, J-K. (2010) 'Efficient evaluations for solving large 0–1 unconstrained quadratic optimisation problems', *Int. J. Metaheuristics*, Vol. 1, No. 1, pp.3–10.