



Editorial

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Evolutionary Algorithms (EAs) are well known metaheuristics that have been applied to solve a wide variety of problems. Inspired by natural evolution, which relies on a population (set) of candidate solutions, EAs try to progressively improve solutions by applying several so-called genetic operations. The success of EAs has allowed researchers to deal with increasingly complex real world problems.

The article *DICE: a new family of bivariate estimation of distribution algorithms for binary and multary search spaces* presents a new family of Estimation of Distribution Algorithms (EDAs) for discrete search spaces. The proposed algorithms, which are called DICE (Discrete Correlated Estimation of distribution algorithms) are based, like previous bivariate EDAs, on bivariate marginal distribution models. An important difference from previous approaches is that DICE utilizes a model based on dichotomised multivariate Gaussian (DG) distributions. The performance of the proposed approach is tested on a suite of challenging combinatorial optimization problems and compared to results achieved by previous discrete-space bivariate EDA models, showing superior optimization performances, with the performance gap becoming more marked with the increase in the number of dimensions.

In the work titled *using genetic programming to evolve action selection rules in traversal-based automated software testing—results obtained with the TESTAR tool*, the authors propose the use of a genetic programming (GP) algorithm to

evolve a strategy for selecting the actions that are going to be used to automatically perform software testing. The results obtained by GP are compared with other methods on three applications, and show the potential of the approach.

Authors of the article *combining data augmentation, EDAs and grammatical evolution for blood glucose forecasting* address the problem of forecasting the future glucose levels of diabetic patients as a function of food ingestion and insulin bolus sizes. An ensemble grammatical evolution models is used on real data. The performance of the ensemble strategy introduced in this paper is tested against classical approaches, such as ARIMA, and also against other grammatical evolution based approaches. Results obtained show that the proposed strategy is able to reduce the number of potentially dangerous predictions.

In the article *approximating landscape insensitivity regions in solving ill-conditioned inverse problems*, a metaheuristic is used in order to identify regions of objective functions insensitivity (plateaus). In particular, the proposed metaheuristic consists of a multi-deme hierarchical memetic strategy coupled with random sample clustering and a local evolution process using a multi-winner selection strategy which allows to produce demes to cover each plateau separately. The proposed technique is tested on both benchmark problems and geophysical world data.

The feature selection problem is tackled in the paper *PSO surrogate models for feature selection: static and dynamic clustering-based methods*. Authors propose the use of a hierarchical clustering method in order to obtain various training sets. Such sets, also called surrogate sets, are then used in order to obtain different features sets. Particle swarm optimization is used as the search mechanism in a feature selection algorithm. Results show that the proposed strategy can choose surrogate sets in order to improve the classification accuracy obtained.

Finally, GP is used to find patterns in a cryptocurrency market in the article *finding attractive technical patterns in cryptocurrency markets*. Authors show that the inclusion of domain knowledge and a diversity preserving mechanism in the proposed approach allows to find attractive technical

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patterns, showing that GP is able to consistently find signals that are profitable and frequent.

This thematic issue gives a glimpse to the state-of-the-art applications of EAs to real-world problems. The selected papers were a result of an open call for papers as well as invitations to authors of best papers published at EvoApplications 2017 European Conference who submitted extended versions of their articles. Therefore, these six articles published in this special issue serve as an affirmation of the applicability of evolutionary computation in tackling and solving a wide range of complex real world problems. We thank the all the authors for the effort in submitting their work for consideration in this thematic issue, including authors of those papers which we were unable to accommodate in this issue.

Notes from Editor-in-Chief

The above six articles make up the thematic issue on applications of evolutionary computation. To complement this thematic issue, we include three more regular issue papers. The paper by Barkaoui describes technique for integrating information on future customer requests for dynamic vehicle routing by means of co-evolutionary approach for generating

waiting strategies. The next paper by Zhao et al. addresses a larger scale location-based social networks by capitalizing on bigger data set for more effective recommendation. Their generic recommendation approach is based on a distributed extreme learning machine framework which as reported in the paper, outperformed existing recommendation systems on large-scale friends and places-of-interest recommendation dataset. Finally, for the last paper of this issue, we include a paper by Shi, Zhang and Tsang on guided local search for more efficient combinatorial optimization by capitalizing on big valley structure of solution landscape. Subsequently, the approach is enhanced by improving the effectiveness of the guided local search penalty mechanism by means of estimating the global optimum based on elite solution. They validate their approach on symmetric travelling salesman problems. Finally, thank you to all the reviewers for their critique of the manuscripts submitted and editors who managed the review of the papers.

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