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Soft Computing in Finance and Economics

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1. Introduction

Finance and economics are areas where problems characterized by uncertainty, vagueness and complexity are the norm. In this environment, analytic solutions do not always provide appropriate solutions. For this reason, during the last few decades, there has been a growing interest in the potential applications of Soft Computing in these fields. The number of journals and conferences that are paying attention to these topics is rising steadily and the use of these techniques by practitioners is getting closer to being the norm, rather than an exception. This interest has led AI Communications to support this special track devoted to the topic.

The term Soft Computing was developed by Lotfi A. Zadeh [7,8,9,10], to make reference to a branch of computing likely to have an impact in domains where precise models are too expensive, impractical or unavailable. In his words, unlike in hard computing, *the point of departure in soft computing is the thesis that precision and certainty carry a cost and that computation, reasoning and decision making should exploit, wherever possible, the tolerance for imprecision and uncertainty.*. The broad areas identified as specially relevant to the field were fuzzy logic, probabilistic reasoning and artificial neural networks. This umbrella covers popular techniques such as roughs sets, genetic algorithms, fuzzy decision trees, bayesian networks, case based reasoning or self organizing maps, among many others.

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Standard, hybrid and ensemble versions of these approaches have been successfully used to both tackle real world problems and support theoretical analysis. Some domains where soft computing is making an impact are risk management, agent-based computational economics, experimental economics, financial data mining and engineering, time series forecasting and analysis, portfolio management, auctions, simulation of social processes or the development of trading strategies. The array of potential applications is way too ample to list. Those interested in exploring the field and learning about specific uses might find information in recent surveys [4,5,2,1] or older, but still relevant material [3,6].

2. Contents

The special track will introduce very different topics covering all the sets of instruments mentioned above.

The set of papers includes two devoted to classification problems using hybrid fuzzy methods. One of them, focused on bank failure prediction, combines the fuzzy framework with artificial neural networks. The second one introduces a modified fuzzy support vector machine in the domain the credit approval classification.

Two of the mentioned techniques, artificial neural networks and support vector machines, will also be represented in a contribution that benchmarks them against classic econometric models as predictors of spot-prices of the Italian Power Exchange. Support vectors machines, combined with Bayesian statistics are also key elements of a novel approach to rank investment opportunities that will be specially valuable to private equity investors.

There are also three papers that rely of evolutionary computation to address different problems. One of these explores the existence of long memory in financial markets. In this paper the authors study the persistence influence of certain actions

on market behaviour over time. In order to do that, they simulate co-evolutionary market dynamics using the framework of agent based computational economics. A second paper introduces a new approach to achieve robustness in financial portfolio optimization. The authors extend the canonic mean-variance model with an additional objective and rely on a resampling mechanism to mitigate the effects of uncertainty regarding basic optimization parameters. Finally, we could mention a novel work, also dealing with robustness in finance. The paper introduces a robust multi-market optimization methodology for technical trading.

We feel all these papers make substantial contributions to the state of the art, and we hope that those currently working on other topics will find them inspiring enough to consider joining us.

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