# An Introduction to the Special Issue on Computational Techniques for Trading Systems, Time Series Forecasting, Stock Market modeling, and Financial Assets Modeling

FILIPPO NERI
Editor in Chief of WSEAS Transactions on Systems
Department of Computer Science, University of Malta, Msida, MALTA
nerifil@gmail.com

The special Issue "*Computational Techniques for Trading Systems, Time Series Forecasting, Stock Market modeling, and Financial Assets Modeling*" aims to provide a picture of the current status of computational research in the use of algorithmic techniques applied to the financial assets domain.

Recently the research community in computer science and related areas has shown an increasing interest in modeling, analyzing, or forecasting the behavior of financial assets as measured in term of their price time series or related financial features by using sophisticated computational techniques for dealing with difficult and time varying domains. Most of the techniques have originated from the artificial intelligence and machine learning areas but the interest in developing sophisticated computer applications, like trading systems for instance, has emerged and involved researchers from all the fields of computer science.

In the special issues four research themes will be discussed as listed in the following.

Prof. Chang et al. develop a general model of the futures options valuation under the term structure of stochastic multi factors. The model analysis suggests that futures options function carry information about the volatility and adjustment speed of arbitrary multi factors, the correlation among multi-factors, and the time to maturity of futures and options contract. The empirical results show the term structure of arbitrary multi factors has significant effect on the futures options valuation for $CO_2$ emissions allowances.

Prof. Hajek discusses several prototype generation classifiers to predict the trend of the NASDAQ Composite index. He demonstrates that prototype generation classifiers outperform support vector machines and neural networks considering the hit ratio of correctly predicted trend directions.

Prof.Volos et al. report about the modelization of coupling between two systems of economic cycles, which adopt the idea that economic fluctuations result from endogenous interactions. The nonlinear system, which describes the economic system, is a modification of the 2-dimensional Van der Pol oscillator. The coupling strength represents the effect of the capital inflow between the two conjugated economic systems, with identical economic aggregates, such as savings, gross domestic product and foreign capital inflow. Numerical simulations reveal the richness of the coupled system's dynamic behavior, showing interesting nonlinear dynamical and synchronization phenomena.

Finally, Prof. Neri discusses a computational simulation technique based on agent based modeling and learning to closely approximate the SP500 and DJIA indexes. According to his modeling approach, the value in time of a financial asset emerges as an aggregate result of several independent investment decisions during a short period of time. The main finding is that a simple architecture for a simulator combining agent based modeling and learning produces close approximations for the SP500 and DJIA time series.

The approximation results are comparable to those observed when evaluating prediction rules learned by neural networks or particle swarm optimization. An additional characteristic of this modeling approach is that it can provide insights about the contribution of each agent to the process of value formation for a financial asset.

As it can been seen by the variety of the research themes that are represented in the special issue, the area of computation finance is ripe for challenging and interesting contributions from the computer science community. We then enjoy the reader a pleasant and interesting reading of the special issue.