Automated Trading on Financial Instruments with Evolved Neural Networks

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ABSTRACT

This paper presents an approach to single-position, intraday automated trading based on a neuro-genetic algorithm. An artificial neural network is evolved which provides trading signals to a very unsophisticated automated trading agent.

Categories and Subject Descriptors

I.6.3 [**Computing Methodologies**]: Simulation and Modeling—*Applications*

General Terms

Algorithms

Keywords

Evolutionary Algorithms, Neural Networks, Automated Financial Trading

1. PROBLEM DESCRIPTION

Trading rules are widely used by practitioners as an effective mean to mechanize aspects of their reasoning about stock price trends. Recent developments in the automation of exchanges and stock trading mechanisms have generated substantial interest and activity within the evolutionary algorithms community, in which the use of genetic algorithms and genetic programs has proven capable of overcoming the problems of trading rules. In this work an evolutionary approach has been developed to optimize the profit generated by applying automated trading rules.

2. NEURO-GENETIC APPROACH

A profit-taking strategy is defined in this approach, by waiting until market close unless a stop-loss strategy is triggered. Either short or long positions are considered, and the entry strategy is during the opening action at market price. A trading simulator is used to evaluate the performance of a trading agent; it supports sell and buy operations, and allows short selling.

The approach defines a population of traders, the individuals, encoded through neural network representations. The evolutionary algorithm [1] evolves traders population by using the joint optimization of neural network structure and
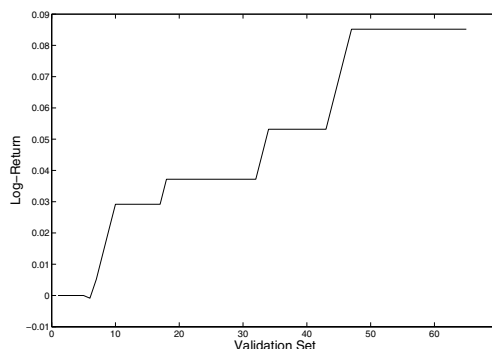
Figure 1: Cumulative log-return for the strategy.

weights, and takes advantage of the backpropagation algorithm as a specialized decoder.

The neural networks use open, high, low, and close quotes of the selected financial instrument from the previous day, as well as a selection of the most popular technical indicators, to decide whether to take a single long or short position at market open. The position is then closed as soon as a given profit target is met or at market close.

3. EXPERIMENTAL RESULTS

The neuro-genetic algorithm has been validated on the trading of stock of Italian car maker FIAT. Experimental results indicate that, despite its simplicity, both in terms of input data and in terms of trading strategy, such an approach to automated trading may yield significant returns. Figure 1 graphs the compounded log-return such a trading strategy would have earned. This opens up the opportunity for many extensions, improvements, and sophistications both on the side of input data and indicators, and of the technicalities of the trading strategy.

4. REFERENCES

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