

Evaluation of the Parameterized-Response Differential Evolution Trader-Agent

George Herbert
Department of Computer Science
University of Bristol
Bristol, United Kingdom
cj19328@bristol.ac.uk

Abstract—This paper evaluates the Parameterized-Response Differential Evolution (PRDE) trader-agent.

Index Terms—Automated Trading, Financial Markets, Adaptive Trader-Agents

I. INTRODUCTION

A. Trader-Agents

Parameterized-Response Zero Intelligence (PRZI) traders [1] are a nonadaptive generalisation of ZIC [2] traders—the difference lies in the probability mass function (PMF) used to generate quote prices. Each individual ZIC trader samples their quote price from a fixed uniform distribution, whereas each PRZI trader is governed by a strategy parameter $s \in [-1, 1] \in \mathbb{R}$ that determines the PMF the trader samples from; the shape of this PMF determines how ‘urgent’ or ‘relaxed’ the trader acts. As $s \rightarrow 1$ the distribution is evermore biased towards ‘urgent’ quote prices—those closest to the least profitable price for the trader, but most likely to attract a willing counterparty—conversely, as $s \rightarrow -1$, the distribution is biased towards ‘relaxed’ quote prices—those that generate the most profit for the trader, but are considerably less likely to attract a counterparty. When $s = 0$, the PMF is uniform, identical to that of a ZIC trader.

PRZI Stochastic Hillclimber (PRSH) [1] is an extension to the PRZI automated-trader algorithm. The strategy parameter s is dynamically altered by the algorithm in an attempt to increase profitability. Each PRSH trader maintains a private local population \mathcal{K} of k strategy parameters; each of which it evaluates for a specific period of time via a loop to identify which is most profitable. The most profitable strategy s_0 is ‘mutated’ $k - 1$ times—these k values comprise the new elements of set \mathcal{K} .

Parameterized-Response Zero Intelligence (PRDE) is further extension of the PRZI algorithm, and a successor to PRSH; it replaces the simple stochastic hill-climber with a differential evolution (DE) optimisation system [3]. Each PRDE trader maintains its own DE system with a population of candidate s -values of size $NP \geq 4$.

B. Differential Evolution

In a DE system there are a population of candidate solutions; in PRDE, each of these candidate solutions is a strategy parameter $s \in [-1, 1]$.

II. EXPERIMENTS

[4] [5]

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