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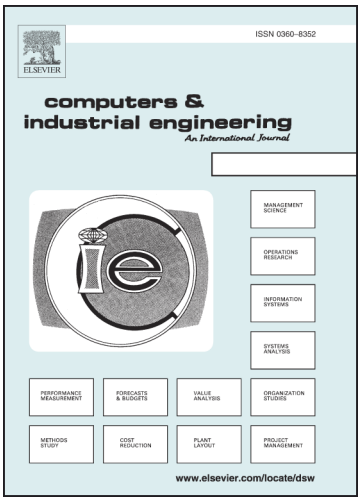

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ACCEPTED MANUSCRIPT

Optimal solutions for the online time series search and one-way trading problem with interrelated prices and a profit function

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Abstract

We consider the online problems of time series search and one-way trading with interrelated prices. We derive two algorithms PUND and PDIV which extend the solutions found in literature with profit functions, derive the competitive ratio and prove optimality. For the new as well as for the established online algorithms, we give a numerical example. For the time series search problem with interrelated prices, we present another algorithm UND*. This algorithm has constant time complexity and an explicit formula for the competitive ratio and selected period to sell. The current solution in literature has linear time complexity and no such explicit formulas.

Keywords: time series search, one-way trading, online algorithm, competitive analysis, profit function, interrelated prices

1. Introduction

In the *time series search problem* (P1) an investor sells one unit of an asset in a time period $i = 1, \ldots, n$; if selling in various periods of time i in fractions s_i is allowed, then this problem is denoted as *one-way trading problem* (P2). Note that P1 is a special case of P2 (see Dochow [1, pp. 15]). We consider P1 and P2 to be maximization problems, i.e. the investor wants to select the highest

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