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Rethinking Exchange Market Models as Optimization Algorithms

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Abstract

The exchange market model has mainly been used to study the inequality problem. Although the human society inequality problem is very important, the exchange market models dynamics until stationary state and its capability of ranking individuals is interesting in itself. This study considers the hypothesis that the exchange market model could be understood as an optimization procedure. We present herein the implications for algorithmic optimization and also the possibility of a new family of exchange market models

Keywords: exchange market models, computational optimization, optimization meta-heuristics

1. Introduction

The basic exchange market model is an artificial society with one basic process: provide randomized encounters between pairs of individuals from the population and during this event, an certain amount of resources transfers from one agent to another based on some stochastic rule [1, 2]. When this process is applied many times a complex behavior emerges: one or a small subset of agents will get all or a large amount of society resources compared to others. The model is effective to mimic the probabilistic distribution of wealth or income that is found in many actual societies [3]. Because of this similarity, the literature about these models emphasizes them as a tool to study inequality in human societies and to design control policies for it. A recent example of this is a market model variation that evaluates the Thomas Picketty's famous r>g hypothesis [4]. But many other variations of this model exist in which different concepts are incorporated: social network [5, 6], risk aversion [7, 8], altruism [9], corruption [10], a commodity market [11], inflation [12], agent's debt [1, 13], bank [14], government and redistribution policies [15–17].

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