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A NEW CLARANS ALGORITHM BY PARTICLE SWARM OPTIMIZATION

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Abstract. CLARANS is an efficient and effective clustering method especially in spatial data mining. It is capable of locating objects with polygon shape. Inspired by its randomized searching idea, and based on the standard particle swarm optimization (PSO) algorithm together with the widely used dynamic niche technology, this paper presents a new variation of CLARANS combined with the dynamic niche sharing technique with PSO algorithm. We propose a cooperative particle swarm optimization CLARANS with cooperative multi-population.

Keywords. particle swarm optimization, CLARANS, cluster analysis, $k-$medoids, cooperative learning, niche sharing.

AMS (MOS) subject classification: 68T35.

1 Introduction

There are recently many papers focusing on theories and applications on swarm intelligence, see for example [3][5][13]. Among these swarm intelligence models and algorithms particle swarm optimization and ant colony algorithm are most popular. In particular, particle swarm optimization, the PSO, attracts more and more interests both in artificial intelligence and multimodal optimization. If we consider in the sense of evolutionary computing, particle swarm optimization is actually one of the evolutionary computation techniques. It is a population-based search algorithm and is initialized with a population of random solutions, called particles. Although in generic algorithms we use genetic operators such as cross-over, mutation and selection to maintain the evolution of the population, in PSO however, each particle flies through the search space with a velocity that is dynamically adjusted. These dynamical adjust is based on the historical behaviors of itself and other particles in the population.

The PSO is first proposed by Kennedy and Eberhart [9], [10]. It is a stochastic optimization technique inspired by the behavior of a flock of birds. Since its introduction, PSO has attracted a lot of attention from researchers around the world. A lot of research results have been reported in