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Review on Swarm Intelligence Algorithms

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ABSTRACT

Swarm intelligence (SI) is artificial intelligence based on the collective behavior of decentralized, self-organized systems. SI systems are typically made up of a population of simple agents interacting locally with one another and with their environment. This paper summarizes the research status of swarm intelligence optimization algorithms.

Keywords: Swarm Intelligence, Image Processing

I. INTRODUCTION

The main objective of image segmentation is to partition the image into parts of strong correlation with objects or areas of the real world image Clustering of an image entails the division or separation of the image into regions of similar attribute. The basic attribute for clustering is image amplitude-luminance for a monochrome image and color components for a color image. Image edges and textures are also useful attributes for segmentation. The result of image segmentation is a set of regions that collectively cover the entire image, or a set of contours extracted from the image. Segmentation does not involve classifying each segment. The segmentation only subdivides an image; it does not attempt to recognize the individual segments or their relationships to one another. For image segmentation we can use swarm intelligence approaches.

II. OPTIMIZATION ALGORITHMS

swarm intelligence is and emerging field and now it has gradually received more and more attentions of research scholars. The concept is inspired by swarm intelligence of ants, geese and other social behaviors produced by groups of organisms. Swarm Intelligence is a group may communicate directly or indirectly with each other. Swarm intelligence algorithm use these features to solve certain types of problems, particularly provide the basis for distributed problems and can get satisfactory results. Characteristics of swarm intelligence algorithm have practical significance, which aim to improve the deficiencies of the algorithm and to improve the performance of the algorithm. Characteristics of swarm intelligence algorithm are as follows: (1) Strong robustness [11][12]: Swarm intelligence algorithm crowd control are distributed, there is no central control. Thus their work environment is in a wide range, one or some individual problems can not have an impact on the group, strong robustness. (2)Simple Execution of each individual operation is simple and easy to implement. (3) Better scalability The amount of information of each individual sensing is limited. (4)Self- organization is strong The complex behaviors exhibited by group are the result of individual interactions. (5)Potentially parallelism and distributed features.

III. REVIEW OF LITERATURE

In order to have clarity in the satellite images [1] used Particle Swarm Optimization technique to segment it. When incorporated with traditional clustering algorithms, problems such as local optima and sensitivity to initialization are reduced, thus exploring a greater area using global search. This

segmented image is further classified using Kappa coefficient.

As an extended research for satellite image segmentation, In order to progress precision, researchers have applied different kinds of classification techniques. According to the database of skilled knowledge for a more focused satellite image classification, a hybrid biologically inspired method was adapted that was presented by Lavika Goel [2]. This work presents in [2] presents a hybrid biologically inspired technique that can be adapted according to the database of expert knowledge for a more focused satellite image classification. It also presents a comparative study of hybrid intelligent classifier with the other recent Soft Computing Classifiers such as ACO [3], Hybrid Particle Swarm Optimization-cAntMiner (PSO-ACO2) [4], Fuzzy sets, Rough-Fuzzy Tie up [5] and the Semantic Web Based Classifiers and the traditional probabilistic classifiers such as the Minimum Distance to Mean Classifier (MDMC) and the Maximum Likelihood Classifier (MLC).

As a competent land cover classifier for satellite image, a hybrid FPAB/BBO based algorithm has been presented by Navdeep Kaur Johal *et al.* [6]. It deals with image classification by using swarm computing technique. In [6], a new swarm data clustering method was used based upon flower pollination by artificial bees to cluster the satellite image pixels. The aim of clustering is to separate a set of data points into self-similar groups. Those clusters will be further classified using Biogeography Based Optimization(BBO).

Bacterial Foraging Optimization (BFO) has been widely accepted as a global optimization technique. This technique is proposed by K.M.Passino in 2002 to handle complex problems of the real world. A FPAB/BFO based algorithm for the categorization of satellite image has been presented by Parminder Singh *et al.* [7]. The main aim of this work is to classify the satellite image using the theory of BFO. One key step in BFO is the computational Chemotaxis, where a bacterium takes steps over the foraging landscape in order to reach regions with high nutrient content. The Chemotactic movement of a bacterium may be viewed as a guided random walk. A new design of a new algorithm is based on Bacterial Foraging Optimization which is used to classify the satellite image presented in [39]. Firstly we use a swarm data clustering method based upon Flower Pollination by Artificial Bees (FPAB) to cluster the satellite image pixels. Those clusters will be further classified using BFO.

Traditionally, methods based on statistical parameters have been widely used, although they show some disadvantages. Nevertheless, some authors indicate that those methods based on artificial intelligence, may be a good alternative. Thus, fuzzy classifiers, which are based on Fuzzy Logic, include additional information in the classification process through based-rule systems. To choose the optimal and minimum set of fuzzy rules, the use of a Genetic Algorithm (GA) has been presented by O. Gordo *et al.* [40] and to categorize remotely sensed images using a fuzzy classifier. This work makes the use of a Genetic Algorithm (GA) to select the optimal and minimum set of fuzzy rules to classify remotely sensed images. Input information of GA has been obtained through the training space determined by two uncorrelated spectral bands (2D scatter diagrams), which has been irregularly divided by five linguistic terms defined in each band.

Mohammed S. M. Altae et al. [8], proposed Ant Colony System With Median Based Partitioning for image segmentation and classification in. A novel median based method was presented in [8] as primary stage for image segmentation, in which the image is partitioned into fixed sized quadrants called kernels. The size of kernels in a specific image is determined according to the spectral uniformity measurements. Later, Ant Colony Optimization (ACO) is used to find out the optimal number of

classes that may exist in the image, and then classify the image in terms of the determined classes.

The majority of the methods proposed for segmentation require *a priori* knowledge, which is difficult to obtain. Furthermore, they assume the existence of models that can estimate its parameters and fit to the given data. However, such a parametric approach is not robust, and its performance is severely affected by the correctness of the utilized parametric model. In [9], a new multicomponent image segmentation method is developed using a nonparametric unsupervised artificial neural network called Kohonen's self-organizing map (SOM) and hybrid genetic algorithm (HGA). SOM is used to detect the main features that are present in the image; then, HGA is used to cluster the image into homogeneous regions without any *a priori* knowledge.

ABC algorithm is gaining an increasing applications in image segmentation methods. [10] Describes the method of image segmentation using Artificial Bee Colony Optimization (ABC). This optimization technique is motivated by intelligent behavior of honey bees and it provides a population based search procedure. In [10] Gaussian Mixture Model (GMM) is used and each pixel class is represented by a single Gaussian function and a mix of Gaussian functions is used to segment the gray image by approximating the image histogram. The parameters of this model are estimated by ABC. Intersecting point of the Gaussian functions is considered as the threshold point. The optimization technique is compared with the popular Fuzzy C Means (FCM).

IV. CONCLUSION

Swarm Intelligence algorithms can be used algorithm for image clustering. In this paper a review of different clustering algorithms are explained. In future work Multi Kernel FCM with ABC algorithm can be implemented to improve the accuracy

V. REFERENCES

[1]. Jagdeep Kaur, "Remote Image Classification Using Particle Swarm Optimization", International Journal of Emerging Technology and Advanced Engineering, Volume 2, Issue 7, July 2012.

[2]. Lavika Goel,"Land Cover Feature Extraction using Hybrid Swarm Intelligence Techniques - A Remote Sensing Perspective," ACEEE Int. J. on Signal & Image Processing, Vol. 01, No. 03, Dec 2010

[3]. R.S. Parpinelli, H.S. Lopes and A.A. Freitas, " Data Mining with an Ant Colony Optimization Algorithm",IEEETrans.OnEvolutionarycomputation, Special issue on Ant Colony algorithms, pp. 321-332, 2002.

[4]. Shelly Bansal, Daya Gupta, V.K. Panchal ,Shashi Kumar,"Remote Sensing Image Classification by ImprovedSwarmInspired Techniques" , International Conference on Artificial Intelligence and Pattern Recognition (AIPR-09), Orlando, FL, USA, 2009.

[5]. Panchal VK, Singhal Naresh, Kumar Shashi, Bhakna Sonam, "Rough-Fuzzy Sets Tie-Up for Geospatial Information" Proceedings of International Conference on Emerging Scenarios in Space Technology and Applications (ESSTA2008), vol-I, 2008

[6]. Navdeep Kaur Johal, Samandeep Singh, Harish Kundra, "Hybrid FPAB/BBO Algorithm for Satellite Image Classification," International Journal of Computer Applications, pp.0975-8887, Vol.6, No.5, September 2010.

[7]. Parminder Singh, Navdeep Kaur, Loveleen Kaur,"SatelliteImage Classification by Hybridization of FPAB Algorithm and Bacterial Chemotaxis,"International Journal of Computer Technologyand Electronics Engineering (IJCTEE), Vol.1, No.3, 2011.

[8]. Mohammed S. M. Altae et al., "Ant Colony SystemWithMedian Based Partitioning For Image SegmentationAndClassification", Iraqi

Journal of Science, Vol.52, No.2, 2011, pp 247-258.

[9]. Mohamad Awad, Kacem Chehdi, and Ahmad Nasri, "Multicomponent Image Segmentation Using a Genetic Algorithm and Artificial Neural Network", IEEE Geoscience And Remote Sensing Letters, VOL. 4, NO. 4, OCTOBER 2007.

[10]. Ankita Bose, Kalyani Mali, "A Comparative Study onImage Segmentation Based on Artificial Bee ColonyOptimizationandFCM", IJARCSSE, Volume 4, issue 3, March 2014.

[11]. Brambilla M, Ferrante E, Birattari M, et al.Swarm robotics:areview from the swarm engineering perspectiveJ].SwarmIntelligence,2013,7(1):1-41.

[12]. Derrac J, García S, Molina D, et al. A practical tutorial on the use of nonparametric statistical tests as a methodology for comparing evolutionary and swarm intelligence algorithmsJ]. Swarm and Evolutionary Computation, 2011, 1(1): 3-18.