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Hybrid Swarm Intelligence Method for Post Clustering Content Based Image Retrieval

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Abstract

Content Based Image Retrieval is one of the most promising method for image retrieval where searching and retrieving images from large scale image database is a critical task. In Content Based Image Retrieval many visual feature like color, shape, and texture are extracted in order to match query image with stored database images. Matching the query image with each image of large scale database results in large number of disc scans which in turns slows down the systems performance.

The proposed work suggested an approach for post clustering Content Based Image Retrieval, in which the database images are clustered into optimized clusters for further retrieval process. Various clustering algorithms are implemented and results are compared. Among all, it is found that hybrid ACPSO algorithm performs better over basic algorithms like k-means, ACO, PSO etc. Hybrid ACPSO has the capability to produce good cluster initialization and form global clustering.

This paper discusses work-in-progress where we have implemented till clustering module and intermediate results are produced. These resulted clusters will further be used for effective Content Based Image Retrieval.

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Keywords: Content Based Image Retrieval **(CBIR);** Image Clustering**;** Ant Colony Optimization **(ACO);** Particle Swarm Optimization **(PSO);** Hybrid ACPSO**.**

1. Introduction

Content-Based Image Retrieval (CBIR) systems retrieve images similar to a user-defined specification or pattern (e.g., shape sketch, image example). Lots of attracting works has been done in database of art work which is grabbing the attention of users from the field of geography, medicine, architecture, advertising, design, fashion, and publishing [10]. The importance of Content Based Image Retrieval is act in a specific way by increasing the aim for retrieving images from abundentely large Database over the Internet.

Data clustering is often took as a step for speeding up image retrieval and improving accuracy especially in large database. Clustering is a process of separating a dataset into groups in such a way that the object in one group is

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more similar to those objects in the other group. A cluster is a collection of objects, which are similar in some pattern to each other and are dissimilar to the objects in other clusters.

In CBIR, feature vector are extracted from images. Query feature vector are matches with the stored feature vector on one to one basis. This results in slow down the processing time.

To improve the speed of executing and better result many researchers are paying attention to uses the clustering algorithm for CBIR.

Clustering is a process of separating a dataset into groups in such a way that the object in one group is more similar to those objects in the other group [4].

CBIR with the clustering algorithms gives the optimize result for image clustering. Images clusters are formed based on the features extracted from images such as color, shape and texture.

- *CBIR using colour features*: In this techniques colors are extracted from the image. And extracted colours are considered as a feature vector. This color feature of images can be extracted in many ways like Histogram , Color moments , Color Correlogram , color coherence vector etc.[2]
- *CBIR using texture feature*: In this techniques image texture are used as a feature vector.
- *CBIR using shape feature:* In this techniques edges are used as a feature vector. Robert, Sobel, Prewitt, Kirsch, Robinson, Marr-Hildreth, LoG and Canny,this are diferent kind of Edge Detection techniques which are use for feature vector [2].

CBIR with clustering algorithm is proven to be a better option for getting the optimum results. Number of clustering algorithm **is** available. K-means is the basic clustering algorithm but in case k-means is very sensitive for initial clustering and sensitive to outliers and noise [4, 7]. Also to form the clusters, K-mean depends on initial condition, which causes the algorithm to give suboptimal solution. As compare to K-means Ant colony algorithm are more prominent for initializing the cluster. Due to the global optima nature of Particle swarm optimization algorithm give the optimum solution for clustering. These most prominent features of Ant colony algorithm and particle swarm optimization are used for clustering.

This paper presents the Content based image retrieval using Ant colony and Particle swarm Optimization clustering algorithm. The proposed algorithms are hybridization of Ant Colony and Particle Swarm Algorithm for Optimization in Image Clustering.

The paper is organized as follows: Section 2 presents proposed system for optimal data clustering. Section 3 presents the experimental results and final conclusion is given in section 4.

2. Proposed System

Proposed work is based on combination of CBIR and Data Clustering techniques. This uses the CBIR technique and hybrid ACPSO algorithm for searching and fast retrieval of Images.

In Proposed system, images are stored in database. Feature vector are generated from images based on shape and these feature vector are stored in the database. Using clustering algorithm images are grouped and clusters are formed. Input query image are passed as an input and depending on similarity it will assign to the cluster.

Proposed system shown in Fig. 1 consists of the following step.

Image Database- Image database collected from CORAL database [9]. Images are colour images and already pre-processed.