International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249-8958 (Online), Volume-8 Issue-6, August, 2019

Retrieval of Context and Content based Images using Enhanced Crow Search Optimization

T.Y.Srinivasa Rao, P.Chenna Reddy

Abstract*: *In late decades, Content-Based Image Retrieval (CBIR) has been one on the most distinctive research zones in the field of Computer applications. The critical goal of this examination is to improve the recovering presentation of CBIR framework by fusing advancement strategies to foresee suitable centroid in Fuzzy C-Means (FCM).The expectation of consolidating streamlining method to anticipate FCM centroids positively decrease intricacy and computational time. The outcomes clear that consolidation of ECSO with FCM uncovers better outcomes over challenge procedures when compared with existing procedures like PWO, SSO and CSO.

***Keywords*: Crow Search Optimization, PWO, SSO, CSO, FCM.**

I. INTRODUCTION

Content Based Image Retrieval (CBIR) frameworks concentrate highlights from the crude pictures and register a subsidiary measure (comparability or disparity) between an inquiry picture and database pictures reliant on these highlights [1]. CBIR is the system by which a structure normally picks a lot of pictures from a conceivably extensive aggregation that organizes a customer's tendency, imparted either in words or as a visual inquiry [2]. Image recovery procedures can be commonly ordered into two classes: the strategy subject to worldwide highlights i.e. global features and, the systems reliant on nearby highlights i.e. local features.It is significant that, regardless of whether worldwide highlights or neighborhood includes, the extraction of the fundamental visual highlights is one of the key issues in picture recovery [3].The component extraction accepts a basic occupation in CBIR whose reasonability depends on the strategy grasped for separating highlights from given pictures [4]. The element vectors encode picture properties, for instance, shading, surface and shape. The likeness between two pictures is figured as a component of the separation between their element vectors [5]. To recover the pictures that have similar visual components from a question picture has been a trying subject in the zone of Computer vision and AI and has been begat CBIR [6].

The standard CBIR can moreover extend by the imaginative procedure in an indistinguishable manner as the content based recovery is broadened. Here, no content information is accessible, and simply visual highlights are used. The CBIR finds the important articles as the content based recovery performs in the multimodal approaches. Explanations and ROIs in the recovered pictures can be arranged by the comment recognizer and starting their use re-audits the outcomes [7].The Annotation-put together recovery depends with respect to the picture metadata or watchwords that relate to the visual substance or the attributes of the picture document. A champion among the most well-known clustering calculations is Fuzzy C-Means (FCM); it is a solo learning system that is anything but difficult to execute and can keep up a greater number of information from the dataset than various techniques [8,9].The centroid enhancement in FCM using particular improvement calculations and the centroid esteems are taken. So as to beat the issues brought by using single element and upgrade the recovery precision, a picture recovery technique which circuits shading, surface and shape, these three essential highlights is proposed, clients can in conclusion get satisfied question results as demonstrated by the applicable criticism results [10].

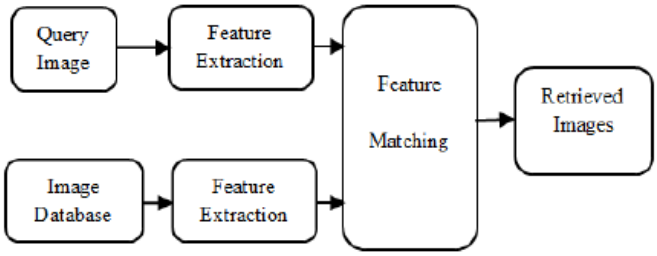


Fig. 1: CBIR model

II. CONTENT BASED IMAGE RETRIEVAL

A. Introduction

Content-based picture recovery, otherwise called inquiry by picture content (QBIC) is the utilization of PC vision methods to the picture recovery issue, that is, the issue of scanning for computerized pictures in huge databases. Content-based picture recovery is against customary idea based methodologies. "Content-based" implies that the inquiry dissects the substance of the picture as opposed to the metadata, for example, watchwords, labels, or depictions related with the picture.

Revised Manuscript Received on October 30, 2019.
* Correspondence Author
T.Y.Srinivasa Rao*, Research Scholar, CSE Department, JNTUK, Kakinada, INDIA. Email: tysr.crl@gmail.com
Dr. P. Chenna Reddy, CSE Department, JNTU, Ananthapur, INDIA. Email: pcreddy1@gmail.com

The expression "content" in this setting may allude to hues, shapes, surfaces, or whatever other data that can be gotten from the picture itself. CBIR is alluring on the grounds that searches that depend simply on metadata are reliant on explanation quality and fulfillment.

The expression "content-based image recovery" appears to have begun in 1992 when it was utilized by T. Kato to depict tests into the programmed recovery of pictures from a database, in light of the hues and shapes present. Since at that point, the term has been utilized to portray the way toward recovering wanted pictures from a huge accumulation based on grammatical picture highlights. The strategies, devices, and calculations that are utilized start from fields, for example, insights, design acknowledgment, signal preparing, and Computer vision.

B. Architecture

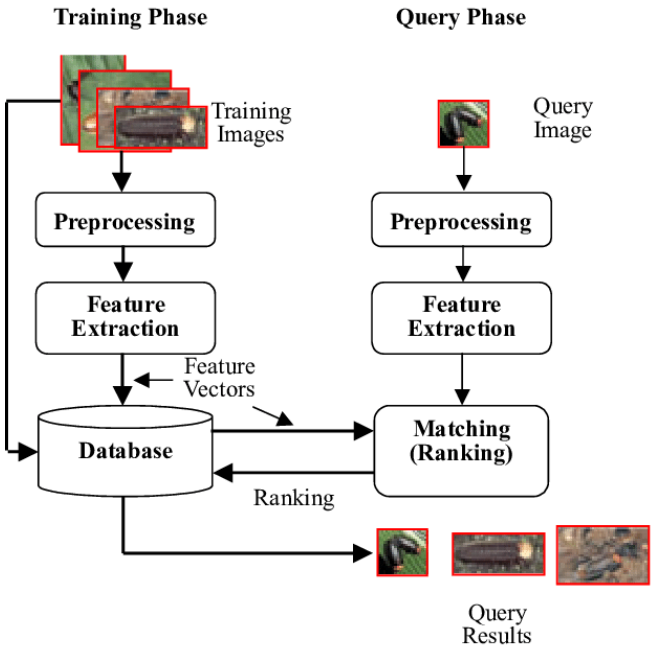


Fig. 2: CBIR architecture

C. Content comparison using distance computation

The most well-known technique for looking at two pictures in substance based picture recovery (regularly a model picture and a picture from the database) is utilizing a picture separation measure. A picture separation measure thinks about the likeness of two pictures in different measurements, for example, shading, surface, shape, and others. For instance, a separation of 0 implies a definite match with the question, as for the measurements that were considered. As one may instinctively accumulate, a worth more noteworthy than 0 demonstrates different degrees of similitude's between the pictures. List items at that point can be arranged dependent on their separation to the questioned image. Many proportions of picture separation (Similarity Models) have been created.

1. Texture

Surface estimates search for visual examples in pictures and how they are spatially characterized. Surfaces are spoken to by Texel's which are then set into various sets, contingent upon what number of surfaces are distinguished in the picture. These sets characterize the surface, yet in addition where in the picture the surface is found.

2. Color

Registering separation estimates dependent on shading similitude is accomplished by figuring a shading histogram for each picture that recognizes the extent of pixels inside a picture holding explicit values. Examining pictures dependent on the hues they contain is one of the most generally utilized methods since it tends to be finished regardless of picture size or orientation. However, Search has likewise endeavored to fragment shading extent by area and by spatial relationship among a few shading regions.

3. Shape

Shape does not allude to the state of a picture but rather to the state of a specific area that is being searched out. Shapes will frequently be resolved first applying division or edge identification to a picture. Different strategies use shape channels to recognize given states of an image. Maybe shape descriptors likewise ought to be invariant to interpretation, turn, and scale.

D. Image Retrieval

In image retrieval contexts, precision and recall are defined in terms of a set of retrieved images i.e. the list of images acquired by a web search engine for a query and a set of relevant images i.e. the list of all images on the internet that are relevant for a certain image.

Precision

Precision is the fraction of retrieved images that are relevant to the query.

$$Precision = \frac{|\{relevant\ images\} \cap \{retrieved\ images\}|}{|\{retrieved\ images\}|}$$

(OR)

$$Precision = \frac{TP}{TP + FP}$$

Recall

Recall is the fraction of the relevant images that are successfully retrieved.

$$Recall = \frac{|\{relevant\ images\} \cap \{retrieved\ images\}|}{|\{relevant\ images\}|}$$

(OR)

$$Recall = \frac{TP}{TP + FN}$$

III. PROPOSED METHODOLOGY

This examination incorporates text features and image features (shape, shading and surface) for picture recovery. The separated highlights group with the guide of Fuzzy C-Means (FCM) in partner with advancement procedures to get ideal centroid esteem. The streamlining systems purpose in anticipating fitting centroid esteems are ECSO, SSO and PSO. Foreseeing ideal centroid esteems for each group by means of FCM partner with improvement procedures absolutely diminishes computational time and intricacy.

In testing, the highlights of given question picture contrast with the centroid esteems with recover most limited separation groups.

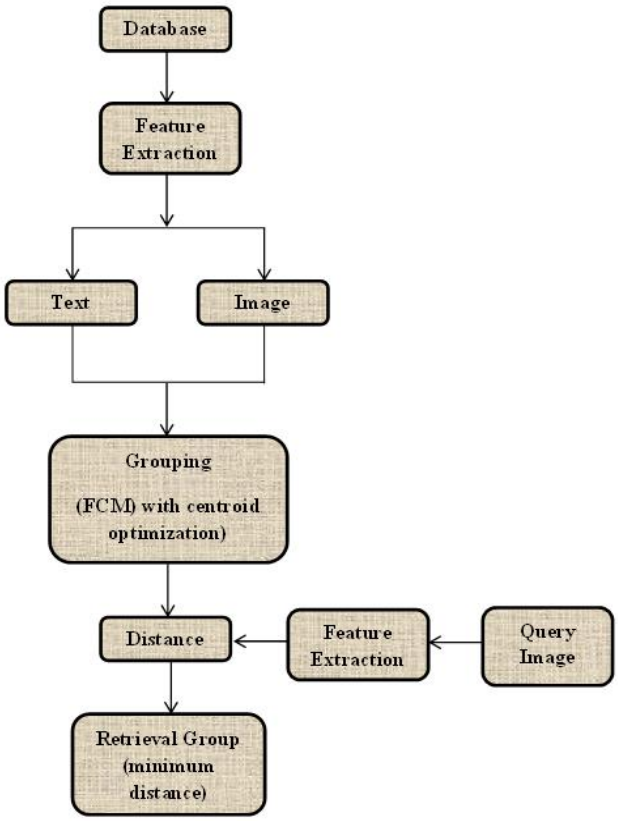


Fig. 3: Proposed Methodology

A. Feature Extraction

Here feature incorporates text highlights like filename and catchphrases, picture highlights like shape, shading and surface to recover pictures for a given database. In text highlights, if the filename is in string or any extraordinary characters it is changed over to ASCII code and numbered stays all things considered. On other hand, watchword marks the envelope name of relating pictures. In picture highlights, if shape is utilized as highlight, edge identification may be the initial step to remove that include. The vigilant edge indicator is utilized to decide the edge of the item in the scene. After the edge has been recognized the significant advance is following the bunch of the article in the scene. The shading histogram can be worked for any sort of shading space, in spite of the fact that the term is all the more regularly utilized for three-dimensional spaces like RGB or HSV. For monochromatic pictures, the term power histogram might be utilized. For multi-ghostly pictures, where every pixel is spoken to by a discretionary number of estimations, the shading histogram is N-dimensional, with N being the quantity of estimations taken. Every estimation has its very own wavelength scope of the light range, some of which might be outside the obvious range. GLCM is the best method for extracting the required features from images.

GLCM (Gray Level Co-occurrence Matrix)

GLCM is a factual procedure of exploring surface that thinks about spatial relationship among pixels in pictures. GLCM basically utilized in example acknowledgment and decides the variety in power at the pixel of interest [11]. GLCM surface thinks about the association between two pixels at some random minute, called the reference and the neighbor pixel. GLCM set of features can be used to reflect the general typical for level of association between arrangements of pixels in different edges similar to homogeneity, consistency, etc. One of the guideline factors that impacts the isolation capacities of GLCM is the division evacuate between pixels. When you take the detachment 1, it prompts reflect the degree of connection between abutting pixels (i.e., short range neighborhood arrange). While, growing the partition regard prompts mirror the level of connection between removed pixels. The GLCM feature set includes contrast, correlation, energy, Entropy and Homogeneity.

$$Contrast = \sum_{v}\sum_{u}(u-v)^2 * p(u,v)$$

$$Correlation = \sum_{v}\sum_{u}\frac{(u-m_u)(v-m_v) * p(u,v)}{\delta_u \delta_v}$$

Here m is mean and δ is Standard deviation.

$$Energy = \sum_{v}\sum_{u}(u-v)^2$$

$$Entropy = -\sum_{u,v} p(u,v) * \log(p(u,v))$$

$$Homogeneity = \sum_{v}\sum_{u}\frac{p(u,v)}{1+|u-v|}$$

B. FCM (Fuzzy C-means Clustering)

FCM is an information bunching procedure which is based on unsupervised clustering procedure that gathers the informational index into n groups in which information point those untruths near focal point of a group will have an abnormal state of having a place and the other way around. It relies upon the minimization of the goal work.

$$FCM = \sum_{i=1}^{n}\sum_{j=1}^{c}(\mu_{ij})^m \left\|x_i - v_j\right\|^2$$

Here $1 \le m \le \infty$ and μ_{ij} is the membership of x_i in the cluster j and $\left\|x_i - v_j\right\|$ is the Euclidean distance.

C. Crow Optimization

Recent optimizations are mainly based on nature inspired methodologies and some of them are Genetic Algorithms, Particle Swarm Optimization, Social Spider Optimization, Harmony Search, Bat algorithm and so on. In our proposed methodology, we use Crow Search Algorithm for optimization while retrieving the images based on content.

Crows are broadly conveyed class of winged creatures which are presently considered to be among the world's most savvy creatures [12]. As a gathering, crows show amazing instances of insight and regularly score all around very on knowledge tests. They can retain faces, use instruments, convey in complex ways and cover-up and recover nourishment crosswise over seasons.

In a crow group, there is a conduct which has numerous likenesses with a streamlining procedure. As indicated by this conduct, crows conceal their overabundance nourishment in specific positions (concealing spots) of nature and recover the put away sustenance when it is required. Crows are avaricious flying creatures since they pursue each other to acquire better nourishment sources. Discovering sustenance source covered up by a crow isn't a simple work since if a crow finds another is tailing it, the crow attempts to trick that crow by setting off to another situation of the earth. From advancement perspective, the crows are searchers, the earth is search space, each situation of nature is relating to an attainable arrangement, the nature of sustenance source is objective (wellness) work and the best nourishment wellspring of the earth is the worldwide arrangement of the issue. In light of these likenesses, CSO endeavors to recreate the wise conduct of the crows to discover the arrangement of advancement issues.

The Principles of CSO are listed as:

- Crows live as group.
- Crows retain the situation of their concealing spots.
- Crows pursue each other to do burglary.
- Crows shield their stores from being stolen by likelihood.

Assume that crow A wants to visit its hiding place for food and at some point of time crow B wants to follow crow A to find that hiding place. In this case, two cases may exist.

Case 1: Crow A does not know that crow B is following. As a result, crow B will approach to the hiding place of crow A.

Case 2: Crow A knows that crow B is following it. As a result, in order to protect its cache from being pilfered, crow A will fool crow B by going to another position of the search space.

The flowchart for ECSO (Enhanced Crow Search Optimization) is as follows:

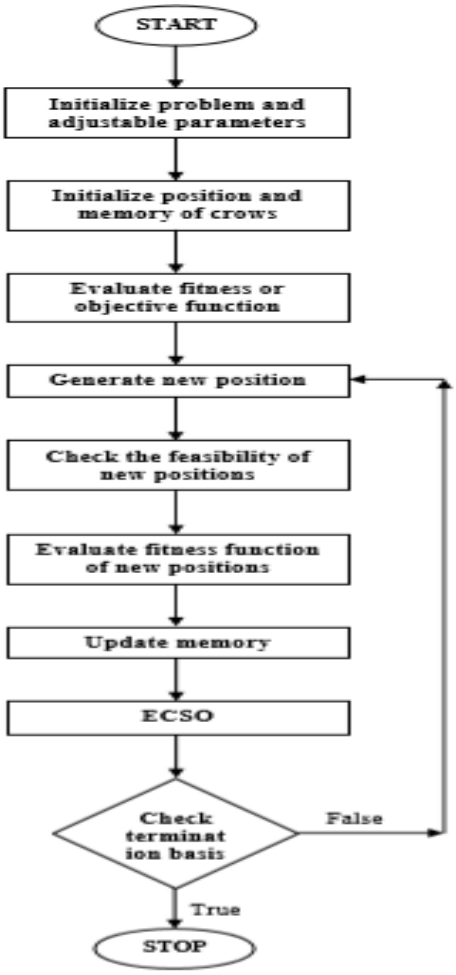
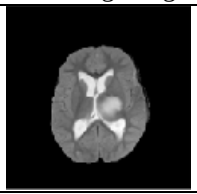


Fig. 4: ECSO methodology

IV. RESULTS AND DISCUSSION

The goal of recovering pictures for a given question picture assess with following examinations. The examination incorporates a lot of inquiry pictures each having five unique pictures for approval appeared in table-1, the exhibition of each question picture assesses with three standard estimates accuracy (P) review (R) and F-measures (Fm) for ECSO, SSO and PSO spoke to in table-2. Along these lines, the examinations incorporates normal execution consequences of each inquiry pictures in the set for various streamlining strategies partner with FCM in foreseeing ideal centroid and in the end with assembly chart displays the exhibition of actualized enhancement procedures in anticipating ideal centroid.

Table-1: Query Images

S. No	Brain &Lung Images
B1	

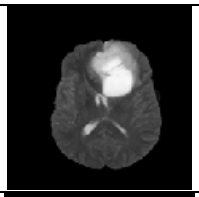
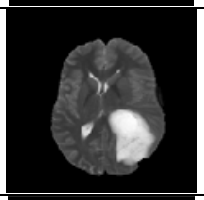
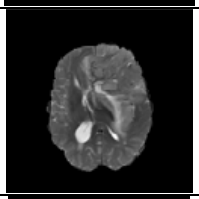
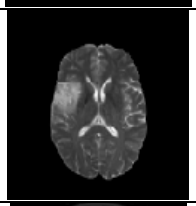
B2	
B3	
B4	
B5	
L1	
L2	
L3	
L4	
L5	

Table-2: Performance Evaluation

Output	ECSO			SSO			PSO		
	P	R	Fm	P	R	Fm	P	R	Fm
L1	91	90	90	89	84	86	86	86	86
L2	91	90	90	89	84	86	86	86	86
L3	91	90	90	89	84	86	86	86	86
L4	91	90	90	89	84	86	86	86	86
L5	91	90	90	89	84	86	86	86	86
B1	95	94	94	89	87	88	90	88	89
B2	95	94	94	89	87	88	90	88	89
B3	95	94	94	89	87	88	90	88	89
B4	95	94	94	89	87	88	90	88	89
B5	95	94	94	89	87	88	90	88	89

V. CONCLUSION

It is shown from the above results that Enhanced Crow Search Optimization is giving better results than existing SSO and PSO methodologies. Here we have considered Brain and Lung images as input Query images and applied our proposed algorithm on these images, we have evaluated Precision, Recall and F-measures with existing mythologies and hence provided the results. From Results, we can clearly say that our proposed method is giving better results. The same methods can be tested with Color images.

ACKNOWLEDGMENT

The authors wish to express gratitude toward Wikipedia and web sources who gave part of data about picture division. This empowered us to investigate new calculation for better division strategy over existing ones.

REFERENCES

1. VijayaBhaskar Reddy and Rama Mohan Reddy,"Content based image indexing and retrieval using directional local extrema and magnitude patterns", Electronics and Communications, pp.1-7, 2014.
2. Esther de Ves, Guillermo Ayala, XaroBenavent, Juan Domingo and Esther Dura, "Modelling user preferences in content-based image retrieval: a novel attempt to bridge the semantic gap",Neurocomputing, pp.1-36, 2015.H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.
3. Guang-Hai Liu, Jing-Yu Yang and ZuoYong Li," Content-based image retrieval using computational visual attention model", Pattern Recognition, pp.1-42, 2013.
4. Subrahmanyam Murala and Jonathan Wu, "Local ternary co-occurrence patterns: A new feature descriptor for MRI and CT image retrieval",Neuro computing, pp.1-14, 2013.
5. Ferreira, Santos, Torres, Goncalves, Rezende and Weiguo Fan, "Relevance feedback based on genetic programming for image retrieval",Pattern Recognition Letters, Vol.32, No.1, pp.27–37, 2011.
6. Sang Min Yoon, Holger Graf and ArjanKuijper,"Hierarchical image representation using 3D camera geometry for content-based image retrieval",Engineering Applications of Artificial Intelligence, Vol.30, pp.235-241, 2014.
7. Daekeun You , Sameer Antani, Dina Demner-Fushman, Md Mahmudur Rahman, VenuGovindaraju , George R. Thoma," Biomedical Article Retrieval Using Multimodal Features and Image Annotations in Region-based CBIR",Proceedings of the SPIE, Vol.7534, pp.1-12, 2010.
8. StefanosVrochidis, Symeon Papadopoulos, Anastasia Moumtzidou, Panagiotis Sidiropoulos, EmanuellePianta and IoannisKompatsiaris, "Towards content-based patent image retrieval: A framework perspective", World Patent Information, Vol.32, No.2, pp.94-106, 2010.
9. Ahmed M.Anter, AboulEllaHassenian and Diego Oliva,"An improved fast fuzzy c-means using crow search optimization algorithm for crop identification in agricultural",Expert Systems with Applications, Vol.118, pp.340-354, 2019.
10. Huang Min, Shu Huazhong, Ma Yaqiong and Gong Qiuping,"Content-based image retrieval technology using multi-feature fusion",Optik - International Journal for Light and Electron Optics, Vol.126, No.19, pp.2144-2148, 2015.
11. A.Srinivasa Reddy, P.Chenna Reddy, "Prediction of Brain Tumor Image Segmentation using MRG and GLCM Algorithms", International Journal of Engineering and Advanced Technology, Volume-8 Issue-4, pages:1159-1165, April 2019.
12. Alireza Askarzadeh, "A novel metaheuristic method for solving constrained engineering optimization problems: Crow search algorithm", Computers and Structures - Elsevier, 169 (2016) 1–12.

AUTHORS PROFILE

T.Y.Srinivasa Rao currently working towards his Ph.D (CSE) from Jawaharlal Nehru Technological University, Kakinada, A.P, India. His research significance includes Digital Image Processing and Advanced Data Structures. He is a member of CSI and ISTE.

Dr. P. Chenna Reddy is working as Professor in CSE Department at JNTU, Ananthapur, Andhra Pradesh, India. He has 23 years of Teaching experience and 11 years of Research experience. His research significances are Image Processing, Computer Networks and Bio-inspired networking.