ISSN(Online) : 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

A Survey on Optimisation Techniques for Content Based Kannada Image Retrieval

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ABSTRACT: Content Kannada Based Image Retrieval (CKBIR) is a mode of dealing with storing and retrieval image sets having Kannada text. This is being done in few steps like pre processing, feature extraction, classification and few optimisation techniques. This paper is a way in comparison of the three optimisation techniques like PSO(Particle Swarm Optimisation), GA(Genetic Algorithm) and HS(Harmonic search). We compare the techniques with respect to their performance measured in terms of their speed in retrieving the pages of search result which has the content as in the source data image. Various kinds of data sets are dealt here to get the output comparisions in finding out which algorithm is speedier.

KEYWORDS: Content Based Kannada Image Retrieval, Particle Swarm Optimization, Genetic Algorithm, Harmonic Search.

I. INTRODUCTION

The whole world runs behind data today. Creating database and managing it as it grows big is challenging. What is still tougher is retrieving the interested data among the database. When it comes with respect to images with data in it, it has additional challenges associated with it. Here the match is tried either at word level or pixel level. Word level match is a better approach in practise. These CBIR systems are a way to keep our olden works for further generations to come. We do not lose out any of our documents by this approach.

Dealing with text of English is easy but Indian language is hurdle to this. This is due to the availability of many data types and words in them. Especially south Indian languages have more problems respect to this. Here in the discussion we have considered Kannada language in the CBIR systems.

There are loads of activities in the field of CBIR happening today. Here in this paper we have tried to compare three optimisation techniques and find out which is the best among them. This will better our legacy system of CBIR in its own way.

The Pre Processing will involve making given image to grayscale image. Next contrast is enhanced by contrast limited histogram equalization (CLHE). The noises are removed by Wiener filter. Gaber features and shape features are extracted in the feature extraction phase. Any of the known optimisation techniques are applied and finally we apply SVM classifiers.[12]

II. RELATED WORK

Many previous works done by different researchers in this field have been studied. In recent years, a number of different approaches have been proposed for efficient search and retrieval of document images from large database such as font and size independent, correlation based, characterization of the images, segmentation and binarization based. Some of the works regarding this field is given below.

Nithya. E. et al (2013) proposed font and size independent content based image retrieval of Kannada document [1]. Primarily they have pre-processed an image to remove the noise present in the input image followed by segmentation. To

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match the feature of the query image they have extracted the Gabor and shape based features from the training images. Here, they have showed that the segmentation algorithm is robust to the noise image. In this paper [2] Ashour proposed a new content based image retrieval method using color and texture features in order to avoid the problems of computational complexity and the retrieval accuracy. Here they have calculated the color moment and texture moment to extract the color and texture features.

In paper [3] C.Ramesh babu durai, V.Duraisamy, C.Vinothkumar has proposed an approach for content based retrieval of image using neural network in medical image classification. They collected the images from scan centre and they also designed roulette wheel such that a sector of the wheel is occupied by the population using the fitness value. Jomy John, Pramod K. V and Kannan Balakrishnan studied on Handwritten Recognition System of South Indian Languages. In this paper [4] they have reviewed multiple papers and algorithms used by each of papers and their results.

In this paper [5] Thanuja C and Shreedevi G R proposed Content Based Image Retrieval System for Kannada Query Image from Multilingual Document Image Collection; here they presented visual clues based approach to identify the Kannada text in other languages such as Hindi, English and Maleyalam documents. M.C. Padma and P.A.Vijaya extracted Texture based features for automatic script identification [6].

III. GENETIC ALGORITHM

In the design of programmed pattern classifiers, feature selection and extraction are significant in optimizing performance, and will have an impact on the associated classifier design. The confusion amongst the feature selection and extraction and also the classifier design cannot be considered independently. So, as a practice most researchers will make the simplifying assumption about the feature selection and the classification stages are independent. However the goal is proper classification and the midway step of feature extraction and dimensionality reduction is submissive to that goal. It is better to combine feature extraction with effective classification strategies. Then this will imply some sort of mechanism of classification selection feedback in order to switch the feature extractor [12].

It follows few of the crucial steps. Initially we set the features as the parameters and then begin the generation of new offsprings. For every new population, fitness value is to be found out. Then the rearrangement of the population is done on the basis of the fitness value calculated. Then we need to take away unwanted features which are not likely to be used in the process. Then on we need to verify the features that are repeated. Finally reduction of the features happens to give the right match from the data pool. It good way to use this algorithm as it uses easier probabilistic transition rules than the deterministic ones. The process will go on with the population with potential solution.

IV. PARTICLE SWARM OPTIMISATION

Particle Swarm Optimization (PSO) is taken for feature selection process. PSO is a computational methodology which optimizes a problem by iteratively putting an effort to improvise a candidate solution in correspondence to a given measure of quality. The feature vectors are saved in the database with a pointer to the model image to which they are belonging. In the retrieval process, a query image is presented to the system and the features of the image are extracted as described above. Each individual feature vector from the query image is compared using the Euclidean distance measure with all the other features vectors stored in the database of the model images. When improved positions are being discovered these will then come to guide the movements of the swarm. The process is repeated and by doing so it is hoped, but not guaranteed, that a satisfactory solution will eventually be discovered. The images are retrieved from database which is relevant to the given input image.[13]

V. HARMONIC SEARCH

The usage of harmony memory is important, as it is similar to the choice of the best-fit individuals in genetic algorithms. This will make sure of the best harmonies to be carried over to the New created Harmony memory. It is typically assigned as a parameter $r_{accept} \in [0,1]$, called harmony memory accepting or considering rate. This is done to

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ISSN (Print) : 2320-9798

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use the memory effectively. If this rate is too low in number, only few best harmonies are selected and then it may converge too slowly. If this rate is extremely high (almost 1), almost all the harmonies are to be used in the harmony memory, while other harmonies are not to be explored, this can lead to wrong solutions.[14]

Here we need to select the value from the harmony search memory. Or select it from adjoining value or at random. This will do the initialization of the harmony search. Then in the next step enhance new solution making use of harmony candidates. Then the harmony memory considering rate has to be updated by evaluation of the previous step. Repeat the previous steps until the given condition. This search is already in use in optimizing benchmarks, power systems, industry, signal and image processing and other such areas. The idea of harmonic search is robed from musical mean of finding an ideal harmony state. Whenever a harmony is composed all the varied combinations of the song is stacked on to the memory.

VI. EXPERIMENTAL OBSERVATIONS

This section explains the results of the CBKIR systems.

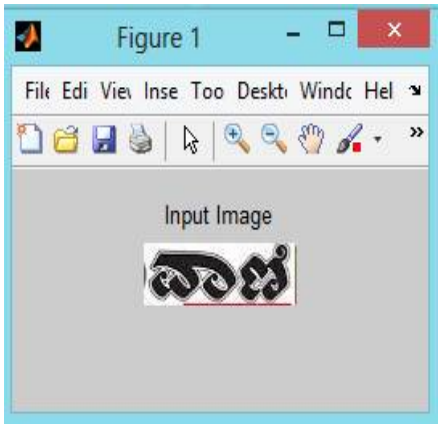

Figure 1: Input image

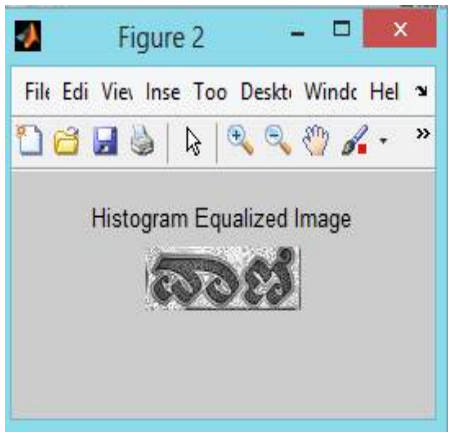

Figure 2: Histogram Equalization of input image

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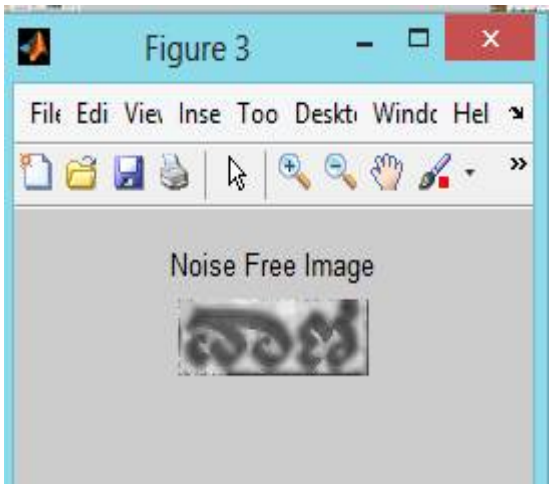

Figure 3: Noise removal of the image

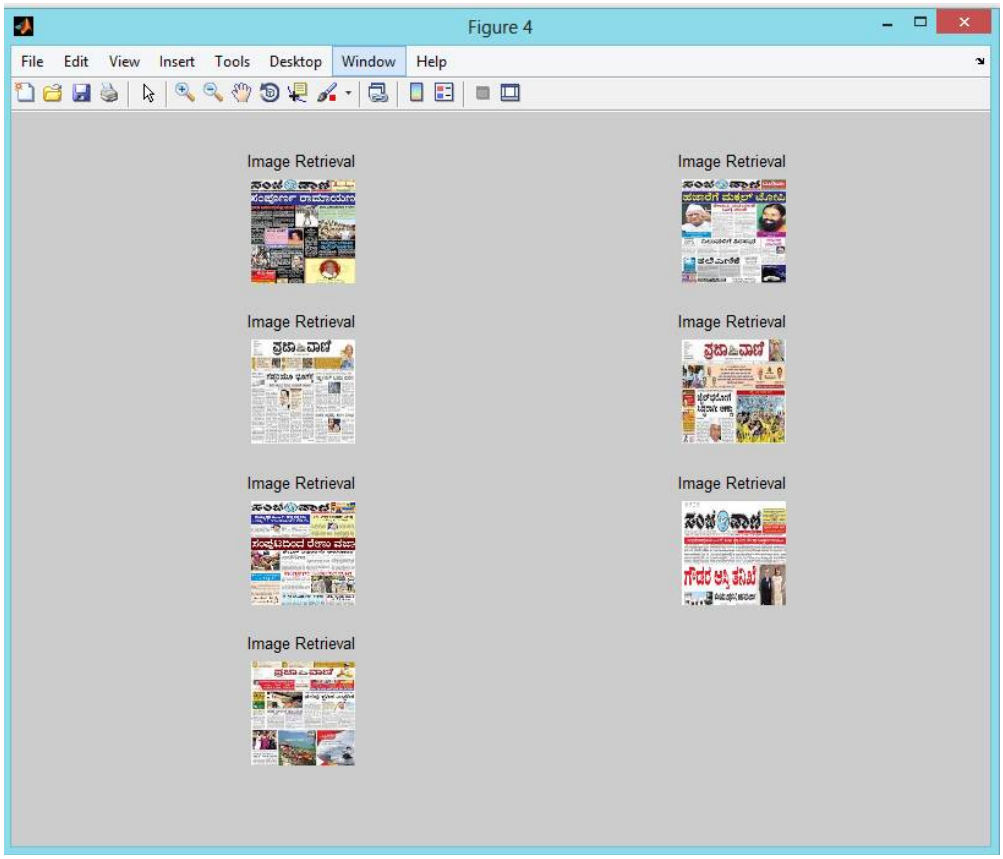

Figure 4: Image retrieved.

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VII. CONCLUSION

This approach retrieves the document images with having content match with the source image. The database used is 550KB. The complexity of Histogram production is O(n4). For PSO calculation of the Euclidian distance is more important step. While in genetic algorithm generation of new off springs plays important role. Similarly calculation done on the harmony memory is crucial. From the PSO the computational speed is increased by 8%, by the GA the computational speed was found to be increased by 10% and from the HS the computational speed increased by 12%. It is evident that HS is the best optimal technique to be adopted.

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BIOGRAPHY

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