Color Transformation of Images for the Color Blind Viewers using Bacteria Foraging Optimization Technique

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Abstract- Color Transformation of image is modify the color of image in the another one. Till yet many researchers did work in this field to enhance images for the people suffering from color blindness and to enhance image contrast. Many methods are used to transfer the color of image and color blind viewers are enhancing the image contrast and differentiate those colors. These methods Linear Color Transformation PSO, daltonization are used and make a optimize color table that are taking more time .Here we are going to propose the BFO technique and optimize color table with BFO for the given number of generations. Using BFO makes color transform table more accurately rather than the normal morphological and mathematical based approaches and reduce the processing time.

Keywords- BFO, Color Transformation CVD, Daltonization.

I. INTRODUCTION

In Today's techniques are trending data is increasing very fastly in the form of images and many other forms. An image is a two dimensional functions f(x, y) where x and y are the plan coordinates and amplitude of f at any pair of coordinates (x, y) is called the intensity of the image .Color transformation implies to processing of components of a color image with in single color model (converting image from one color model to another one) Transformation as [1]

$$g(x, y)=T[f(x, y)] \qquad (1)$$

g (x, y)----- process output color image

f (x, y)-----input color image

It is a very big problem to store the images in a very meaningful matrix form. When the image store in matrix form they can implement different methods of factorization [2].The total population, 95% of the people with Color Vision Deficiency either has a protanopia (L cone cell sdisfunction) that is an inability to see the red color or a deuteranopia (M cone cell disfunction) that is an inability to see the green color. This problem is mostly occurring in the males as compare to the females. The remaining 5% of people with CVD has a tritanopia (S cone cell dysfunctions). Tritanopia is much rarer to the other two. This could be described as blue yellow color blindness [4].

This suggests do the solutions to aid the majority population with protanopia and deuteranopia. Color blindness simulation algorithm uses to make at the confusion line that is fact these lines are being aware to identical color for color blind viewers. With the help of Confusion line Color blind viewers can identify the single color between more colors [3]

With the help of one bright component and two chromatic components were proposed for testing the color perception of people suffering from CVD [11].

Bacteria Foraging Optimization Algorithm (BFOA), is a new comer to the family of nature-inspired optimization algorithms. BFOA is solved many engineering problems like transmission, optimal control. For over the last five decades, optimization algorithms like Genetic Algorithms (GA), Evolutionary Programming (EP), Evolutionary Strategies (ES), which draw their inspiration from evolution and natural genetics, have been dominating the realm of optimization algorithms. Recently natural swarm inspired algorithms like Particle Swarm Optimization (PSO) have found their way into this domain and proved their effectiveness.

II. REVIEW OF RELATED WORK

A. Factorization Method

In the digital image processing we perform the image in digital way we use the factorization method for fast processing We use the LU decomposition method that is work only on the square matrix.

$$A=LU \qquad (2)$$

Lower triangular matrix (L)

Upper triangular matrix (U)

This technique is not used for large data sets [2].Factorization method is developed by the linear algebra.

B. Principal Component Analysis

PCA technique that takes a collection of data and transfer in that manner the new data has a given statistical properties. In this technique we eliminate the less important data using compression method [5].In some time eliminate related to the important data.

Separating confusion line method in color space is using color segmentation for protanopia and deuteranopia. In the huge part of the image is used .CVD making a confusion line map ,512 virtual boxes in RGB color space .After that classify the confusion line .We did check the region place that is belong to confusion line or not that is calculate by the seed points and the histogram.

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It performs the color transformation in CIE Lab Color Spaces. We apply this algorithm in smart phone [6].

C. Image Enhancement using PSOs

Image enhancement is most important in the image processing that is used for transferring one image to another image improve the perception for the human viewers. Image enhancement is an optimization problem that is solved by the particle swarm optimization (PSO).

In this enhanced sometimes leads to the problem of gamut for the very less pixels. PSO is an optimization tool provides a population based search procedure in which separately called particles, that has change the position with in time .In the PSO a single solution is calculated that is called particle. The swarm is initialized with a group of the particles in anyone and it searches for optima by updating through iterations .Each particle update has two values:- Best position, Best position Tracked by particle In this technique is using then problem occur the contrast enhancement of the color images [9].

D. Daltonziation method

Daltonziation method is used of color adaption in an image to improve the color perception for mainly color blind viewers. In this algorithm for protanopes who cannot differentiate the color between red and green color .In this algorithm the protanope-unperceptible (Pu) colors are identified in the image then transfer into the new protanope - perceptible (pp) by a fast daltonization method .That is utilizes the color clustering to rapidly measure the color similarities [7].

In this technique we are using RGB to LMS transfer matrix. When the Recoloring process is doing for color transformation by using simple matrix method which delivers different type of colors iteratively until the modified colors are not confusing with the (pu) and (pp). This process does not decide whether the iterative Recoloring process is more needed or not [7].

III. PROBLEM FORMULATION

In today's world, as the demand of the technology has increased for a greater extent and has provided many opportunities for the physically challenged people to comfort their life. Due to some problems related to any disease. But due to degradation of images, color blind viewers to face the problem to visualize the color clearly. There are many leading techniques to process these images but they take more considerable processing time. This paper proposed a technique which focus on reduce the processing time to the greater extent compared to the leading techniques.

IV. PROPOSED METHODOLOGY

A. Theory of BFO

BFO is a global optimization algorithm for distributed optimization and control. Bacteria Foraging Optimization Technique is inspired by the foraging behavior of Escherichia coli. These algorithms give attention to the researchers because the BFO is used for the real world optimization problems in several application areas. The method is behind this foraging strategy of E. coli is emulated in very good manner [10].

Researchers are trying to hybridize BFOA with different other algorithms in order to explore its local and global search properties separately. It has already been applied to many real world problems and proved its effectiveness over many variants of GA and PSO. Mathematical modeling, adaptation, and modification of the algorithm might be a major part of the research on BFOA in future.

B. Proposed Algorithm

The Bacteria Foraging Optimization system consists of mainly four principals that are follows:-[8]

1. Chemo taxis: - For E.coli this process was simulated in two different ways:-run and tumble. The Bacteria has performing two types of operations. In this research each bacteria unit step of size one in the same directions to find the same nutrients [13]. If the pixel find the similar color for the unit step then fulfill the fitness function otherwise they move to the next pixel position.
2. Swim
3. Reproduction:-This step has defined the health status of all the colors in the image [13].
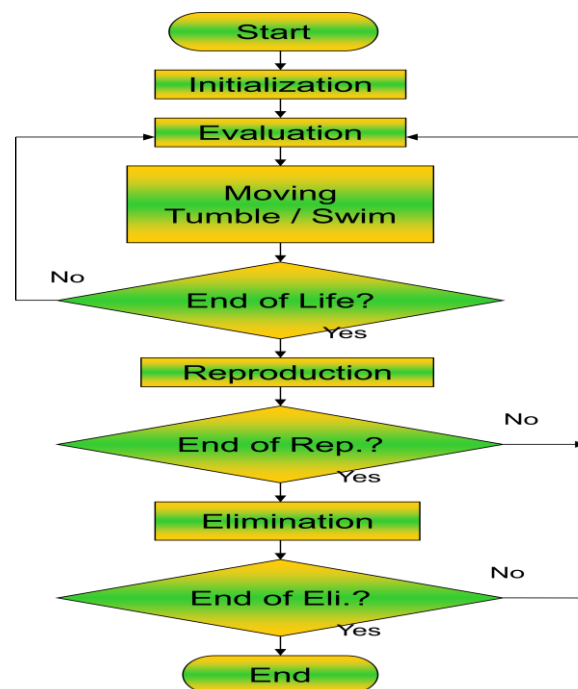4. Elimination:-Elimination has mainly two steps primary and secondary step.

Fig 1:-Bacteria Foraging Optimization [12]

V. CONCLUSION

In the daltonization technique is used when the Recoloring process is doing for color transformation by using simple matrix method which delivers different type of colors iteratively until the modified colors are not confusing with the protanope-unperceptible (Pu) and protanope-perceptible (pp). This process does not decide whether the iterative Recoloring process is more needed or not. Using BFO we are overcome the problem of iteratively process.

V. FUTURE WORK

In this paper we have proposed a BFO based on color transformation of images. Using in this technique we produce better results as compare to the existing technique creating color table for the color blind viewers they can easily differentiate the colors . We are decreasing the processing time as compare to the other techniques.

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