

Partial Colorization Image and Dominant Colour Extraction Using Ant Colony Algorithm

Muna Jaffer AL-Shamdeen¹, Farah Saad Al-Mukhtar²

¹Computer Science Department, College of Computer and Mathematics Science, University of Mosul, Mosul/Iraq

²Computer Science Department, College of Science, Al-Nahrain University, Baghdad/Iraq

ABSTRACT

This paper present a method to colouring part of the image, the object only, or everything else except the object , then finding the dominant colour of the original image and partial colouring image using ant colony algorithm.

Keyword: Partial Colouring, Ant Colony Algorithm, Dominant Colour.

1. INTRODUCTION

Facilitate and fulfill human needs can be done by color. It can identify and describe important things (animal, vegetable or mineral)stimulate with all the senses. Express imaginary and wish- achievement; generate fantasies and environment; confirmor disguiseobjects or figures; boost self-image and personal respect; generate a beautiful reaction. More important, the utilization and arranging of color enable us to generate beauty,agreement and express our palates, supply us with a sense of achievement[1].

The coloring part ofthe image or video in grey-scale, called a partial coloring methods when the major object is in color, and the remain of the image in black and white, much assurance to the object can give amazing flair, also we enable to use small quantities of color to high-light invisible part ofimages, in the other word you wouldn't if all in color or wholly black and while. Partial colorization used on film shot to develop commercials and television programming to expedite the director's artistic vision[2]

2. COLOUR IMAGES

Colour images are referred to as three –band monochrome image data, where each band of data corresponds to a different colour .The actual information stored in the digital image data is the grey–level information in each band[3]

Typical colour images are denoted as red,green,andblue (RGB image) Using the 8-bit monochrome standard as a model, the corresponding colour image would have 24-bits/pixel (8-bits for each of the three colour bands (red, green and blue) [3].

3. GREYSCALE IMAGE

Monochrome image is a grey scale image. It has no color information but grey level information. Number of differentgrey levels were determined by number ofbits used for each pixel. Normal grey scale image has 8bits / pixel data, which permit use 256 different color [3]

4. THE METHOD OF PARTIAL COLORIZATION

The outline of the colorization process:

- 1- Split the input colour image into (red, green, blue) components, read it then store each component in separate array (Red component in matrix Red, Green component in matrix Green and Blue component in matrix Blue).
- 2- Divert the input colour image to grey image ,then generate a new matrices Red 1, Green 1 and Blue 1 with the same size of old matrices , then renew them with the value of the grey image matrix
- 3- Produce a mask with the same size of grey image and renew the pixel positions as one if the pixel position should be RGB else zero or vice versa.
- 4- From the mask find the index of the masked position

- 5- Produce partial colour and grey scale by obtain the red component (Red) for the corresponding index of the mask and renew it in the Red1 matrix. Similarly do in Green1 and Blu1 matrices, finally produce a three dimensional matrix of the same size of colour Image and updatate the three dimensional matrix with Red1, Green1 and Blue1 components.

5. DOMINANT COLOUR EXTRACTION

In this paper an algorithm for extraction the predominated color was explained using Ant Colony algorithm, that suggest an active and fast method to feature extract from the compressed bit streams[4].

Ant Colony

Ant colony clustering algorithm used in several area since 1990, Researchers in their studies noticed that the ant corpses can be collected into several piles, Deneubourg proposed a model explained the action of ant in piling corpses called Basic Model to characterize clustering activity of ant. The main idea is when an unloaded and facing a corpse, it will pick the corpse up with probability that increases with the degree of isolation of the corpse; while the ant carrying the corpse, it will fall the corpse with a probability that increases with the number of corpses in the vicinity. The picking and dropping operation are biased by the similarity and density of data items within the ants' local neighborhood [5]. The step of predominated Color Extraction based on Ant colony clustering is as following, first an input image is converted into Lab color space. We obtain the training series consisting of N Source vectors : $Z=\{k_1, k_2, \dots, k_n\}$. The source vector that is three -dimensional consists of L,a,bvalue in Lab color space. Then we utilize the ant colony clustering algorithm to extract the predominated colors from the training series Z. The first step is to randomly project training sequence Z on to plant, and a few virtual ants are generated. Randomly placed on the plane, then the density measure of each ant is computed [5].

Each ant act correspond to its current state and corresponding probability. Finally several clustering centers are visually formed through the ants' collective actions. The algorithm is ended with a few clustering dominant color set denoted as $S=\{s_1, s_2, \dots, s_j\}$, $d=\{d_1, d_2, \dots, d_j\}$, where each dominant color $s_1=\{L_1, a_1, b_1\}$ is a three- dimensional Lab color value, and d_1 is the corresponding size percentage [6].

6. RESULT

We present here two interesting strategy using partialcolouringmethod colorized the main subject or everything except the main subject



Original Image



Dominant Color in Original image

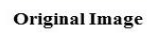


Partial Colorized image



Dominant Color in Partial Colorized image

(a)



{ , , , , , }

Dominant Color in Original image



□, ■, ■, □, ■, ■

Dominant Color in Partial Colorized image

Original Image

Dominant Color in Original image



Dominant Color in Partial Colorized image

Original Image

Figure 1. Color calibration chart.

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , , , ,  }

Dominant Color in Partial Colorized image

(d)



Original Image

{ , , , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , , , }

Dominant Color in Partial Colorized image

(e)



Original Image

{ , , , , , , , , , , }

Dominant Color in Original image



Colorized image

{ , , , , , , , , , , }

Dominant Color in Partial Colorized image

(f)



Original Image

{ , , , , , , , , , , }

Dominant Color in Original image



Colorized image

{ , , , , , , , , , , }

Dominant Color in Partial Colorized image

(g)



Original Image

{ , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , }

Dominant Color in Partial Colorized image

(h)



Original Image

{ , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , }

Dominant Color in Partial Colorized image

(i)



Original Image

{ , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , }

Dominant Color in Partial Colorized image

(j)



Original Image

{ , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , }

Dominant Color in Partial Colorized image

(k)



Original Image

{ , , , , , , , , }

Dominant Color in Original image



Partial Colorized image

{ , , , , , , , , }

Dominant Color in Partial Colorized image

(l)



Original Image

{ , , , , , , , , }

Dominant Color in Original image

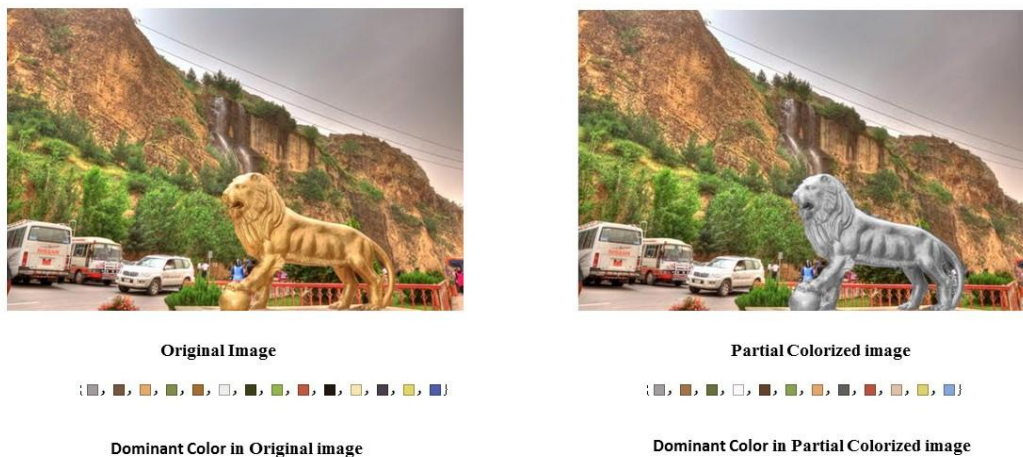


Partial Colorized image

{ , , , , , , , , }

Dominant Color in Partial Colorized image

(m)



(n)

Figure: Examples of the input colour image and output the partial Colorization, and dominant colour for input and output image.

CONCLUSION

In this paper, we present a method to partial colouring depending on the mask of the image and find the dominant colour using antcolony optimization, the interesting results we got, added to the image an aesthetic touch that making the image more attractive, and the ant colony optimization give us the exact dominant colour of the input image and the image that we applied the partial colouring on it.

REFERENCES

- [1]. K.N .Plataniotis and A.N. Venetsanopoulos, " Color Image Processing and Applications ", Springer-Verlag, February 18, 2000.
- [2]. RastislavLukac,Konstantinos N. Plataniotis, "Color Image Processing ", CRCPress,2006.
- [3]. Gonzalez Rafael C. and Woods Richard E., "*Digital ImageProcessing*", Prentice Hall, Inc., 3rd edition, (2008).
- [4]. YOO, J.-D., PARK, M.-K., CHO, J.-H., AND LEE, K. H., " Local color transfer between images using dominant colors" , J. Electron. Imaging 22, 3 (July), 2013.
- [5]. Simranjeet Kaur, Prateek Agarwal and Rajbir Singh Rana , "Ant Colony Optimization : A Technique used for Image Processing " ,www.ijcst.com, IJCSt Vol. 2, Issue 2, June 2011
- [6]. Jing Tian, Weiyu Yu, ShengliXie," An Ant Colony Optimization Algorithm For Image Edge Detection", IEEE Congress on Evolutionary Computation (CEC 2008).