Shadow Detection and Removal in Colour Images using MATLAB

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Abstract
Shadow detection and removal is an important task when dealing with colour structure images. Shadows are generated light fall in the object. Because the shadow region change during the day based on the position of the sun and the sky fall on the structures. Shadows are decrease in the light that reaches a surface area. Shadow area is detected and segmentation based on image analysing process. Some noise Factors will affect the detection result due to the complexity of the condition. Primary colour component image loaded from the shadow and salt and pepper noise is removed from the contra harmonic filter and average colour is computed and the shadow can detected by using binary and morphological function. And hypothesis test to detect shadows from the images and then energy function concept is used to remove the shadow from the image.

Keywords: Shadow Removal, Contra harmonic Filter, Energy Function

1. INTRODUCTION
Satellite and aerial imaging is a common method to obtain information about objects on the Earth’s surface. Object and target detection is of great interest for many applications, including rescue operations and defense applications. Recently, the object detection to man-made structure detection in aerial images has attracted. The ability to detect structures helps in understanding the scene contents of the image and may be used for content-based retrieval in databases and in other applications such as residential development planning, damage condition, and military target detection application. The shadow is detecting the existence of the buildings and other man-made structures in the overall images. Shadow of buildings is isolated and then is employed for detection by integrating and fusing the geometry of the shadow area with the potential geometry of the building or other elevated man-made structures.

In the colour imagery, the primary cue for shadow detection is the colour in addition to the texture feature of the image contents. In the multi spectral imagery, the characteristics of the bands are the main source of the information for shadow detection. The patterns of shadow rely on size of objects and the angles of lighting source. This raising the problem in scene understanding, object extraction, tracking. Because of the effects of shadows on image analysis, much attention is paid to the area of shadow removal over the past decades and covered many specific applications such as traffic surveillance, image segmentation and so on. There are disadvantages like loss of information for the surface under the shadows present difficulties for image interpretation, image filling, detection and other applications. There are a number suggest the presence of shadows in a visual scene and that are exploited for their detection in digital images and image sequence.

Shadow removal from respective image can be used for object detection, such as cancer detection, military object detection etc., as sometimes images are covered by shadows. Then removing these shadows in the image, objects in the images will appear more obviously so that they are recognized correctly.

2. PROPOSED ALGORITHM
In this paper we present a hypothesis test to done by the process of detect shadows from the images and then energy function is supplying the more light to remove the shadow from the image. The general advantages and wide applications of the shadow removal (contra harmonic filter, RGB colour model, hypothesis test, energy function) using detection of man-made structures in satellite image. However, information and prior shape and size information of the shadows are not there in the images. The shadow region change during the day based on the position of the sun and the sky fall on the structures that generate the shadow areas. In the algorithm the added the RGB image loaded from the shadow and salt and pepper noise is removed from the contra harmonic filter and average colour is computed and the shadow can detected by using binary and morphological process. And next process done by energy function is supplying the more light to remove the shadow from the image.

3. APPROACH OF SHADOW REMOVAL
The approach of the algorithm used to remove the shadow is shown in the figure 1. The first step is generating (or) the image with shadow. Then remove noise is applying the contra harmonic filter.

The shadow to remove properly and average frame is computed. The cause of shadow determines the each of the three dimensions colour in the image. So the colour have large values of the average value in the image, image in non-
shadow region have smaller value of the average value in the image. Image is representing by various values primary colour components. Primary colour component background is selected because these colours are absolute and positive integer value of 255. The threshold function used to extract shadow region in binary bitmap where the pixel value is zero this value is called shadow region and value one region is called non-shadow region.

3.1. CONTRA HARMONIC FILTERS

The contra harmonic filter is the nonlinear filter for removing impulse noise; it’s most popular because of good de noising power and efficiency. It is a nonlinear digital filter technique is used to remove noise. The process of the contra harmonic filter is to allowing the signal entry by entry, replacing each entry by means of relative entries. The pattern of relative entry is called the “window”, which signal execute by entry by entry, over the whole signal. For 1D signal, most window signals are producing few entries, whereas for 2 dimensional (2D) (or higher-dimensional) signal (or) image, more difficult window signal are possible (such as "box" or "cross" patterns). The simple definition of centre value after all the entries in the window is numerically.

3.2. RGB COLOUR MODEL

The RGB colour model is an additive colour method in which red, green and blue light colours are added in various ways of combination to reproduce an array of colours [7, 8]. The colour values of primary colour components in image are obtained which are further dark pixels of shadow regions. Then shadows are detected by comparing average primary colour component values with original primary colour component values of image.

3.3. HYPOTHESIS TEST

A hypothesis test is used to process to detect shadows in the image. The shadow is present the data particular pixel is represent values in the RGB primary colour component are reduce. This is low relative signal of shadow represent darker colours in the image shadow region.

The low of the values of each RGB components is dependent on the relationship between each RGB components. The RGB components are not closely equal; the shaded pixels are detected to be middle of the linear path origin from the original pixels. The two pixels value between the RGB values of shaded pixels different size and shape of a rejection surface region. If a pixel value reminds in the region, shadow is replaced with the closely pixel values from the average background Image. The regions are derived the pixel values of each frame to be process and tested. The two minor axes are derived from the RGB component colour values of the pixels. The height of the ellipsoid region is derived from the additive mixing of blue/red or blue/green components. The width size of the test region, process the value of green/red component pixel values. The origin area represents the rejection region of shaded image. The hypothesis test says that the pixel value is a shadow. Another hypothesis process pixel value is not a shadow pixel.

3.4. ENERGY FUNCTION

After the shadow are detected and shadow are removed by using the process of energy function method. The energy function produces the lights in the shadow region in two methods. In the first method to determine constant light is required and needs of multiple of light in the region and next method constant light is required and no needs of multiple of light in the shadow region. This two methods are determine the new method (i.e. the brightness is closing of line) inside the shadow regions and we got a final shadow enhanced image.

Fig. 1. Shadow Removal Algorithm.

Finally, convert the noise less binary original image to extract the shadow from the non-shadow image region. And applying binary function to testing the effects of shadow on the particular pixel located in the background, it also derived for combination pixel value.

And shadow detection and removal are performed by energy function. The function determines the lights in the shadow region in two different methods. In the first method determine the constant light is required and needs of multiple of light in the region and next method constant light is required and no needs of multiple of light in the shadow region. This two methods are determine the new method (i.e. the brightness is closing of line) inside the shadow regions and we got a final shadow enhanced image.
4. RESULT

The result of the shadow removal, the corresponding colour shadow pixels and removed. In first process we done by pre-processing and segmentation in the image by using contra harmonic filter the pepper noise is removed in the image. In the binary technique convert the normal image to salt and pepper image. Next process of the average colour pixel value of RGB primary colours component in the image are consider by dark pixel of shadow region.

Then hypothesis test is used to detect the shadow in the image and the detected shadows are comparing average values of primary colour component with original values of primary colour in the image. And then shadow removal done by using energy function. The shadow removal algorithm applied to various colour images given below in figures (a),(b),(c).

![Original image](image1)

![Shadow in image](image2)

![Shadow enhanced image](image3)

5. CONCLUSION

In the papers we produce the methods of remove shadow for coloured backgrounds. This algorithm removes the large amount of shaded colours pixels and added same colour background pixels without losing the present data’s
using the MatLab software. This final image (Shadow enhanced image) used for target application and various applications.

6. REFERENCES


