Shadow DetectionIn RGB And LAB Color Space

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ABSTRACT: *The total or fractional impediment of light by a misty item shapes a shadow. It is an unfortunate impact, as it corrupts the picture quality as well as limits the data passed on by that picture. In this way for right understanding of the picture, shadow recognition and evacuation turns into an essential advance in picture handling. This paper proposes two distinct strategies to identify darker regions from an RGB picture. In first technique veil regions are distinguished by histogram and morphological tasks. Second technique is chosen on the basis ofaverage estimation of RGB picture in chromaticity planes of LAB Colour space. The picture and veil region evacuation strategy depends on the recognizable proof of the amount of light crashing on a plane. Benefit of proposed techniques is that expelling veil regionsmay not influence the surface and every one of the subtleties in the darker areas.*

Key Words: *Shadow detection , Morphological, Mean, Standard Deviation.*

I.INTRODUCTION

Shadows and shadings prompts bothersome issues on picture investigation. That is the reason much consideration was given to the territory of veil region identification and expulsion on the previous years and secured numerous particular use.

So as to actually characterize what shadow is? A profound investigation of many research works demonstrated that the highlights which help in distinguishing the shadow in a picture are its power, chromaticity, surface and fleeting highlights. While intensity just separates the shadow and non-shadow zones. Generally, chromaticity estimates the shading and isn't subject to power. So techniques depending on the last expect that the region secured under shadow is a lot darker, however with a similar chromaticity measure. A chosen pixel is said to be either under the shadow or the non-shadow territory by relating the surface out of sight reference with that of in the casing. What's more, in the event that the chosen pixel's surface is discovered same, at that point it is delegated under shadow some portion of the picture. The surface of the picture can be protected by either inclination, or shading or higher request of smoothness. There are yet no such strategies which totally depend exclusively on fleeting highlights.

The delicate shadows hold the surface of foundation surface, while the firmareas are excessively dim and have smaller surface. In this manner the discovery of hard shadows is convoluted as they might be mixed up as dim articles as opposed to shadows.

A large portion of the shadow discovery techniques need different pictures for camera adjustment. Be that as it may, the best system must almost certainly extricate shadows from a solitary picture. Likewise it is hard to recognize dull items and veil areas from a solitary picture. This paper presents a basic technique to identify and expel Shadows from a solitary RGB picture. A shadow location strategy is chosen dependent on the averagedegreeof RGB picture in chromaticity planes of LAB colour space. The shadow evacuation is finished by increasing the shadow locale by a fixed quantity. The brightening isn't constant in darker areas. In this manner sifting is done to diminish the blunders in the shadow limit.

II. LITERATURE REVIEW

In [1] uses gamma correction for removing the shadow from the image. The process starts with taking the image then converting it into a grey scale image, at the same time that input color image is binarized by a suitable threshold value. Two morphological operations, erosion and dilation are used to eliminate the discrepancies left in the previous step. After these operations, two images are obtained which are further complemented. Now the regions which are common in both the images are classified as shadows. Then gamma correction value is applied on the shadowed of each complement of the image and then finally removing the shadow completely.

[3] This techniquehelps indiscardingdarker areas. An image is taken as input then converted into a LAB color space. The normal estimations of pixels in Luminance and chromaticity planes were figured. On the off chance that the expansion of

mean of chromaticity planes is under or equal to 256, at that point luminance channel ought to be not as much as subtraction of mean of luminance channel and 1/third of std. deviation of luminance channel.

[4] This paper uses a similar shadow detection technique converting the RBG image to a LAB format and taking further steps. For removing the shadow the red, green and blue average values of shadow region were calculated. Similarly, average values of red, green and blue of non-shadow regions were calculated. Then constant value is calculated which is the proportion of mean in the non-shadow region to the mean of the shadow region, thus, one gets three constants. These constants are then multiplied with the R, G, and B values of each pixel in a shadow image. Thus one ends up with a shadow-free image.

III. PROPOSED SYSTEM

METHOD I -----

1. Input Image: We can take any image containing shadow as the input image. It may be a high or low resolution image. It can even be a gray scale image.
2. Gray Scale: The input colour image is converted into a gray scale image if not originally in gray scale. It is easier to perform the process on gray scale.
3. Histogram: The histogram of gray scale image is plotted in order to get a clear understanding of the pixel values. This histogram helps in deciding the threshold value.
4. Binarization: The gray scale image is then binarized using a suitable threshold. By taking the binarization we get a rough idea about the shadow and non-shadow areas. The value below the threshold gives the black region, that is, shadow region while the values above threshold will give white region, that is, non-shadow region.
5. Morphological Operation: By this method the inconsistencies left by the previous steps are eliminated. Morphological means processing on shapes and hence we need the structuring element for the same. The two morphological operations are erosion and dilation in which the pixels are deleted and added at the boundary of the image respectively.
6. Complement: The complement of both operations (erosion and dilation) is taken. These will be considered as x and y.
7. Soft Non Shadow Mask: This is used for correcting the glitches and it is created by the erosion and dilation process. After this only the shadow regions that are common to x and y are considered as shadows.
   if (x_erod (i,j) &&y_dila (i,j)) ==1
   m_shadow (i,j) == 1

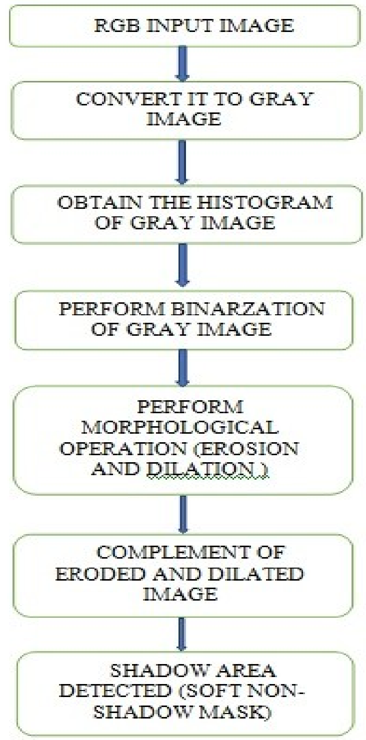


FIGURE 1 : This flowchart depicts the shadow detection method using RGB color space.

METHOD II -----

1. Input Image: We can consider any RGB image as the input image no matter how low or high the resolution is.
2. LAB Color Space: Thecolor image is converted to an LAB image in which L is the luminance channel while A and B are chromaticity channels.
3. Mean Values: The mean values of the LAB colour space is computed separately. Now a very specific condition is considered ---
4. If mean A + mean B < 256; then the pixel with a value in
   L ≤(mean (L) – standard deviation (L)/3)
   can be classified as shadow pixels and other as non-shadow pixels.
5. If the above process is not satisfied, that is, if the difference of the mean of chromas is more than 256, then no shadow is obtained.

If(avg(A) + avg(B)< 256)
thenL < (avg(L) – std. deviation(L)/3)

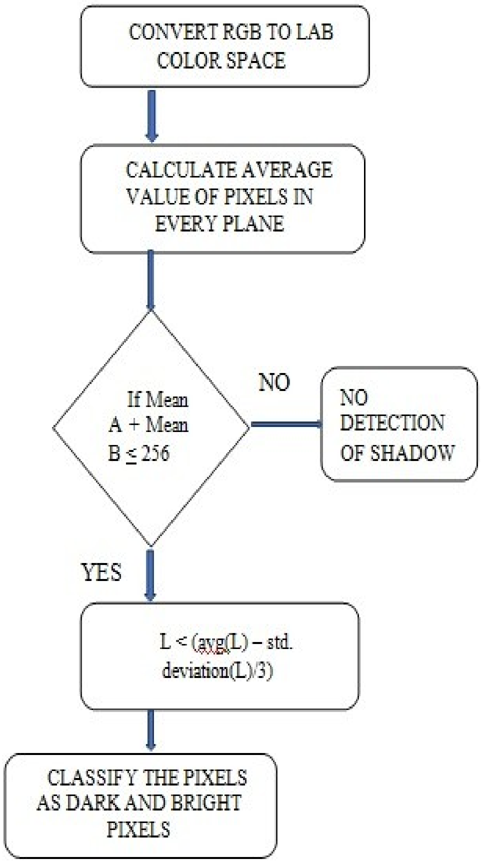


FIGURE 2: This flowchart depicts the shadow detection method using LABcolor space.

IV RESULT

A shadow is a dull (genuine picture) zone where light is hindered by a dark article. It possesses the majority of the three-dimensional volume behind an article with light before it. The area of a veil is a 2-D outline, or a turn-around projection of the item hindering the light.

We were able to detect the shadow from the image by using the morphological operation in method I. But the problem with the first method is that we are not able to detect the shadow perfectly. There are still some discrepancies left and we can see those discrepancies in the images (b). This method of using the morphological method is thus not Satisfactory.The final image of detection from method I is shown in image (c).

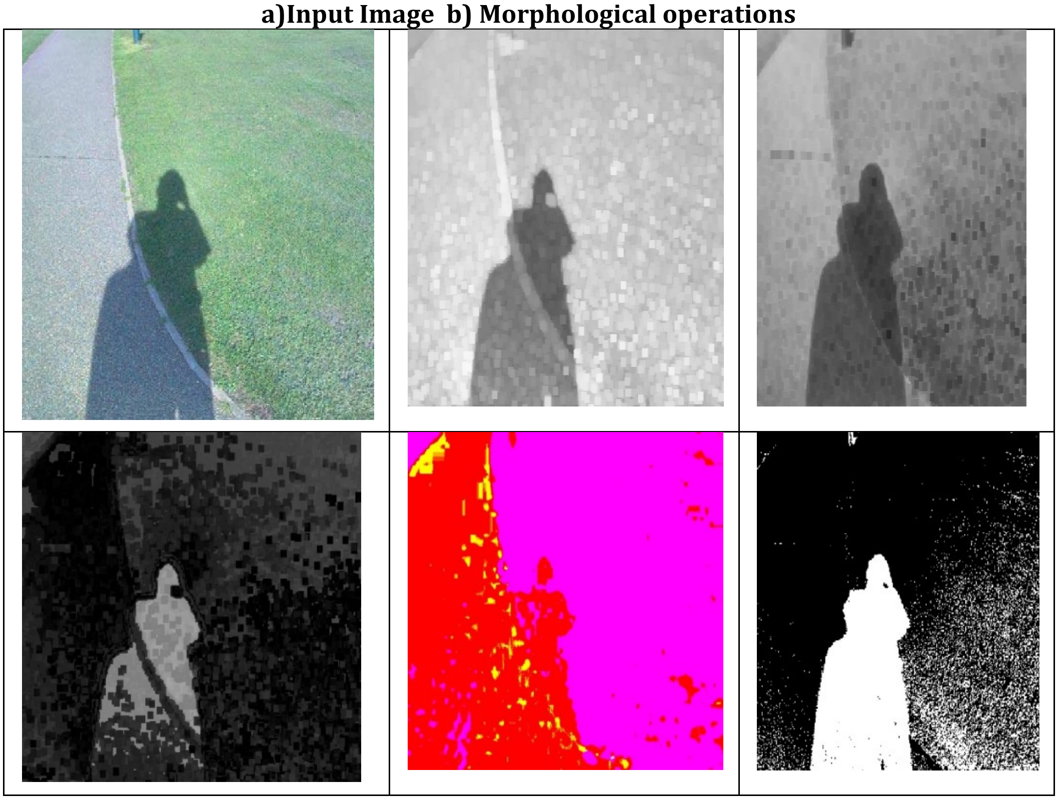
Thus we chose the second method, that is, shadow detection using LAB color space. In this method the RGB color space is converted to LAB image.

The result of the conversion can be seen in image (d). The average of L and chromaticity channels are calculated.

We used two mathematical operations, that is, mean function and standard deviation function. This method gave a clearer detected shadow. This detected shadow can be seen in image (e).

We implemented these two methods using the MATLAB 2018a software .

a)Input Image b) Morphological operations



c) Shadow detection method Id) RGB to LAB e) Shadow detection method II

V CONCLUSION

So the shadow is detected using two methods viz. morphological operation and LAB colour space method. We observe that shadow is detected more precisely in the LAB colour space method.

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