



EXPERIMENTAL APPLICATION OF IMAGE TRANSFORMATION TECHNIQUE USING MATLAB

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ABSTRACT

The paper elaborates the practical need to deal with image transformation, though there are multiple techniques of image transformation our work is focussed on addition of two images. The images taken in this work are of same dimensions, whereas the programming expressed in the paper will also work for images of different sizes. The work also discusses that how the effect of one image intensity can be reduced or increased so as to see the higher or lower effect on two merged images. The transformations are performed using programming code written in MATLAB.

KEYWORDS: Image, transformation, operation

INTRODUCTION

Image is a visual representation of the surrounding around us, this 3D world is expressed in a 2D plane format. Image stores a large amount of information in form of pixels, these pixels are expressed in form of matrix and the complete matrix put together makes a complete image. In case when a single image is not sufficient to provide all the necessary information needed, we require to merge the important details of multiple images into a single image. For example, consider mapping an infrastructure project to be set up. Here to provide the exact location of roads, rivers, and other surrounding details these image topological images can be overlapped to define the location of all regions of interest. This might seem difficult to image, let us try to understand it with a day-to-day application. Today many of the people travel to new markets and work spaces and today they use a very efficient technology called Google Maps. These maps are nothing but layered images all merged to form a single image which caters its users to locate all necessary details on a single image such as roads, office buildings, drainage, parks and other vegetation. Its practical application calls for research in the area of image processing with major focus of edge detection, image segmentation, image refinement and all merged together to form a single image by image addition.

RELATED WORK

Image processing is a field of continuous growth thus many researchers have continued to work in this field. Work of Congbo Luo et al. [1] has been focused on the transformation of digital images and its current scope in digital image processing technology. Gonzalez et al. [2] have worked on various types of image processing operations and expressed on various types of mathematical transformation that are performed in digital image processing, from this matrix addition operation performed on digital images falls within the preview of our work. Diksha et al. [3] have discussed multiple ways about the image segmentation techniques, these techniques have been found very useful in the process of addition of image, because if the images remain segmented in form of multiple edges in the final image, then the final added image will lose its purpose to supply all the necessary information.

Athematic Operation on Image

Image being a 2D representation of an object, it is made by combining pixels in an orderly manner to form a complete image and these pixels are represented by intensity levels. The arithmetic operations are performed on the image pixel by pixel. These are fairly simple operations of image processing but are found to be used in a large number of applications. Since the operation is performed on pixels it becomes important the images should be of same dimensions. In contrast if it is not so, the merged images will provide information common only in the dimensional range of the two images and some information can be lost.



The types of Arithmetic operations are

1. Addition: when two images say P and Q of same dimension are supplied with addition operation, it results to a new images R, the dimensions of whose are same and the resultant pixel intensity is the sum of value of pixel intensity of the original images.

$$R(m, n) = P(m, n) + Q(m, n)$$

Where m, n is number of pixels in horizontal and vertical dimension of an image.

2. Subtraction: when two images say P and Q of same dimension are supplied with subtraction operation, it results to a new images R, the dimensions of whose are same and the resultant pixel intensity is the difference of value of pixel intensity of the original images.

$$R(m, n) = P(m, n) - Q(m, n)$$

3. Multiplication: when two images of say P and Q of same dimension are supplied with multiplication operation, it results to a new images R, the dimensions of whose are same and the resultant pixel intensity is the multiplication of value of pixel intensity of the original images.

$$R(m, n) = P(m, n) * Q(m, n)$$

4. Division: when two images of say P and Q of same dimension are supplied with division operation, it results to a new images R, the dimensions of whose are same and the resultant pixel intensity is the division of value of pixel intensity of the original images.

$$R(m, n) = P(m, n) \div Q(m, n)$$

Mathematical Computation Applied to Image

The discussed mathematical operation, that is the addition operation is performed on two image and the final image is the resultant image of the mathematical operation as shown in Fig 1 and Fig 2. The following addition operation is performed using MATLAB.

MATLAB Program

```
Clc
clear all
close all
I = imread('1.jpg');
    figure;
imshow(I);
    title ('First Image');
g=size(I);

J = imread ('Capture.JPG');
J =imresize (J, [g (1), g (2)]);
    figure; imshow (J);
title ('Second Image');
    for i = 1: g (1)
        for j = 1: g (2)
            for k=1:3
output (i, j, k) = (I (i, j, k) +J (i, j, k));
```



```
end
    end
end
figure;
imshow(output);
title ('Added Image');
```

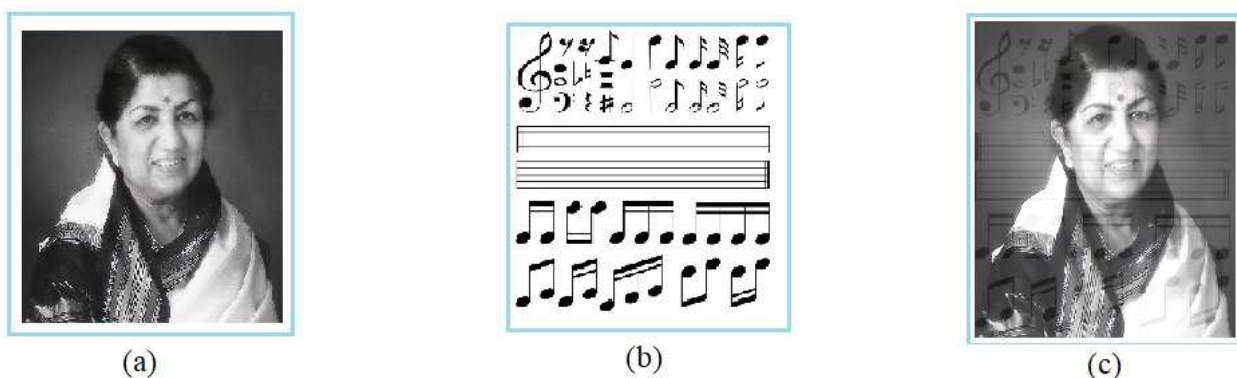


Fig 1. (a) First input image [4]. (b) Second input image [5]. (c) Resultant addition image.

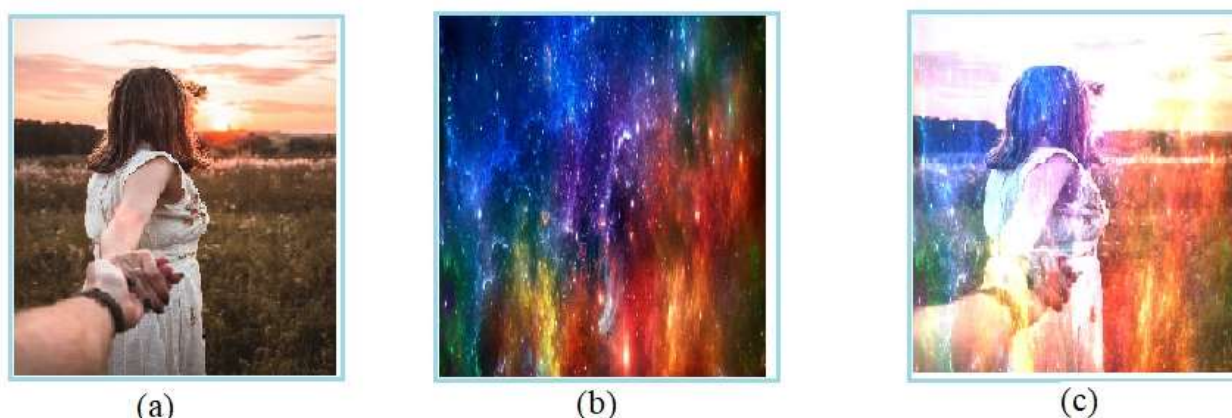


Fig 2. (a) First input image [6]. (b) Second input image [7]. (c) Resultant addition image.

CONCLUSION

The resultant image as shown in Fig 1(c) and Fig 2 (c) are the results of addition of pixel of two input images to get this final image. This application of image processing can also be used to add more than two images as required for the purpose. The MATLAB program is written with an image resize option, so even if the dimensions of two input images are not same, the computation will be performed. This brings us with the future scope of research that when the image of different dimensions is resized to merge to a final image, the resized image loses its resolution hence producing blurry effect as shown in Fig 2(c).

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