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Image Extraction using Convolution Kernal

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Abstract

This paper discusses about the noise reduction of images using the convolution matrix. The convolution kernel matrix filters generate new features of the input images with good quality. The noise reduction methods based on convolution kernel is achieved by deep learning theory along with the difference equations. The random variation of the colour and brightness are taken as authenticated coefficients of the images. Convolution techniques along withrecurrent neural network are applied into theinput image. This input image is divided into the matrix of pixel values. The optimal enhanced image is arrived through convolution kernel using computational learning of autonomous difference equations.

Key words: Noise reduction, image processing, convolution filter, difference equation recurrent neural network.

AMS Subject Classification: 94A08

1. Introduction

Many researchers have proposed various research concepts using filters for noise reduction in both signal and image processing [7]. Different noise reduction methods were planned and implemented for different types of noise [1, 10]. The fast growth of deep learning theory helps in noise reduction techinques based on convolution kernel achieved good results that effects in many fields such as probability, statistics, computer vision, image processing, signal processing and electrical engineering [4].

In general the kernel is in the form of matrix that slides over the image and increases the optimal quality of output in a desired way along with the input [9]. However, filter is a concatenation of many kernels, each of which is allocated to a specific input channel [2]. Convolution kernels are one of the most advantageous way to remove unnecessary data from the image and have been the subject of various noise reduction research, image recognition segmentation, edge detection, deep learning,

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etc. The convolutions allow the whole image to be easily scanned its neighboring pixels [3]. The robustness to heavy deformation is another fascinating aspect and is something that regular kernels cannot do well due to their size [5]. Actually, a small kernel is often more influenced by a local distortion, so a regular kernel is almost everywhere convex and concave regions [6, 8]. In comparison, strong shifts in the contour are too greatly influenced by traditional contour approximation methods such as polygonal approximations. The paper is ordered in the following way. Section II demonstrated the extraction of image kernal with various dimensions. Section III dealt with the simulation result of image extraction using convolution kernel. Finally section IV concludes the paper.

2. Extraction of Feature Image

Convolution is a method of flipping the rows and columns of the kernel and multiplying locally similar entries and adding the values. Convolution neural network filter have been proposed for different types of noises. Convolution kernel is a powerful tool for image processing. Two-dimensional convolution kernel can be used to filter an image or for edge deduction. Convolution multiplies the numbers of two matrices, which is of distinct sizes, but of the similar dimensionally, make a third matrix of the similar dimensionality. It is applied in image processing to put into operation where output pixel values arre linear combinations of input pixel values.

Convolution operation is demonstrated through figure 1. We use the filter of dimension 3×3 matrix with element $[[0,1,2],[2,2,0],[0,1,2]]$. The filter is decendiing through the input values. All sliding situation ends with a single number. The ending output is of a dimension 3×3 matrix.

Consider the following 5×5 matrix with pixel values as

Now use the following convolution kernel filter to extract the feature of the image (in matrix form)

The convolution starts at the uppeer left corner of the secondary-matrix and explained as

The value 12 in figure 1.3 is calculated like

$(3 \times 0)+(3 \times 1)+(2 \times 2)+(0 \times 2)+(0 \times 2)+(3 \times 0)+(1 \times 0)+(1 \times 1)+(2 \times 1) = 12$

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3	3	2	1	0
0	0	1	3	1
3	1	2	2	3
2	0	0	2	2
2	0	0	0	1

Figure 1: **Five cross five input image**

0	1	2
2	2	0
0	1	2

Figure 2: **Convolution filter kernel**

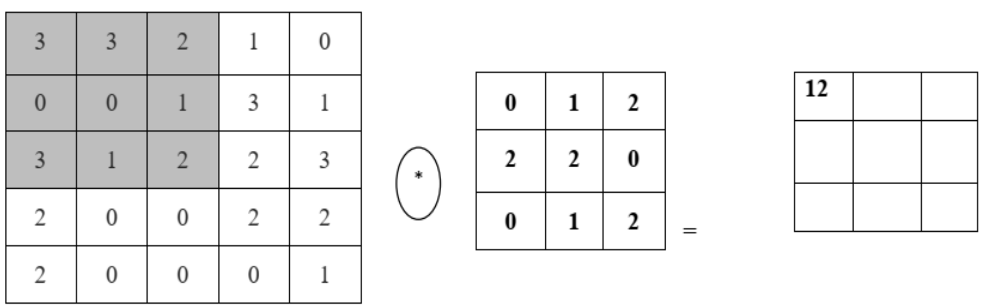

Figure 3: **The Convolution operation begins at the upper left corner**

We repeat the same step by moving the filter kernel one column towards right and so we get the second output, and preceding like this we get,

By applying the convolution operation for third sub matrix and we get

Next onvolution operation is by moving the filter kernel one row downwards and so we get the fourth output. Proceeding like this we get

In a similar way, the final convolution matrix will be,

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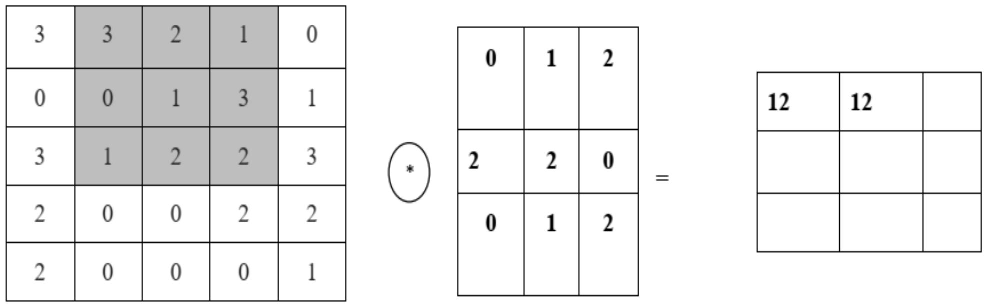

Figure 4: **The Second Convolution**

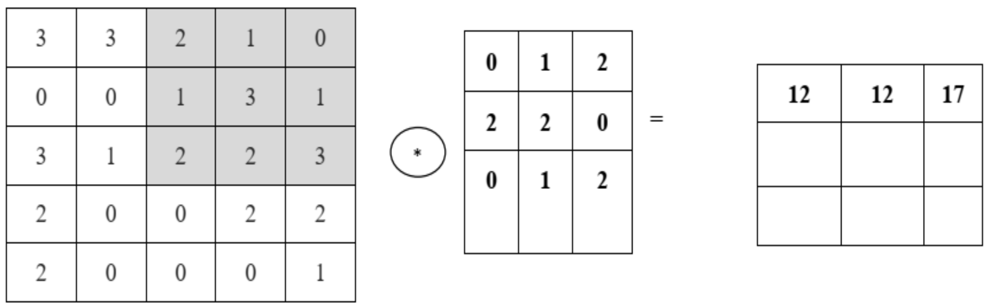

Figure 5: **The Third steps convolution**

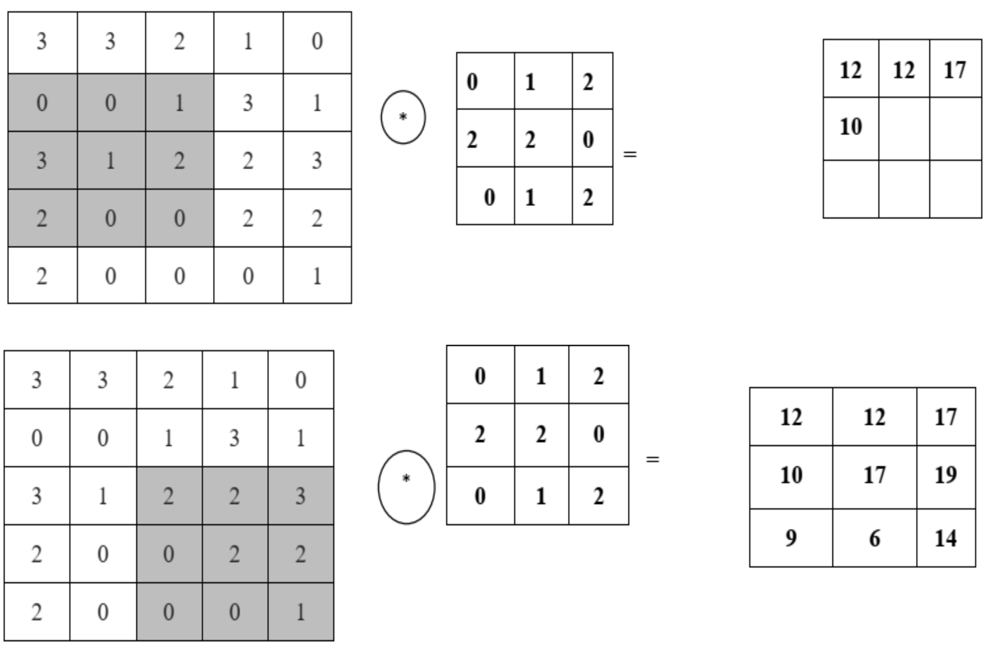

Figure 6: **Final convolution**

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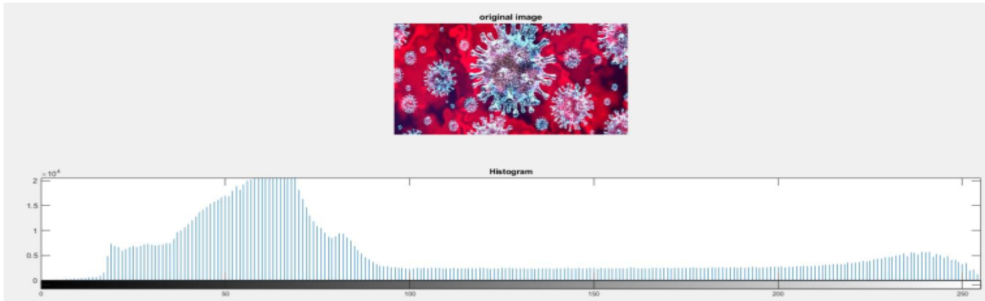

Figure 7: **Original image and histogram analyzer of the original image**

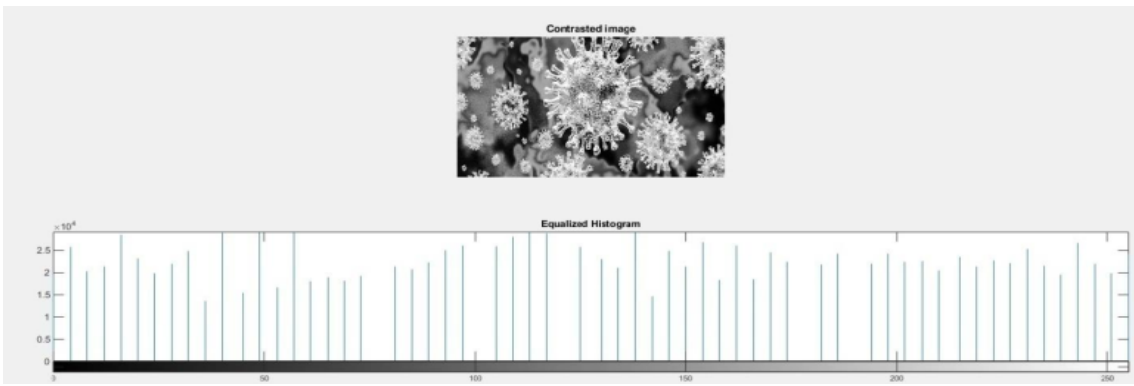

Figure 8: **Contrasted Image and equalized histogram analyzer of the image**

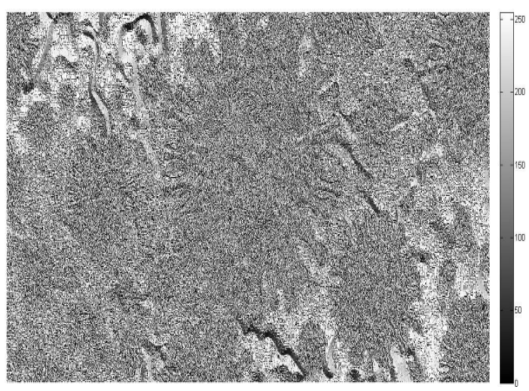

Figure 9: **Convolution array dimension of original image**

3. Convolution Simulation

Simulations are carried out for enhancement of various basic image processing techniques in frequency domain as well as the spatial domain. Digital image processing allows the changes of image value, filter kernel values when we use the

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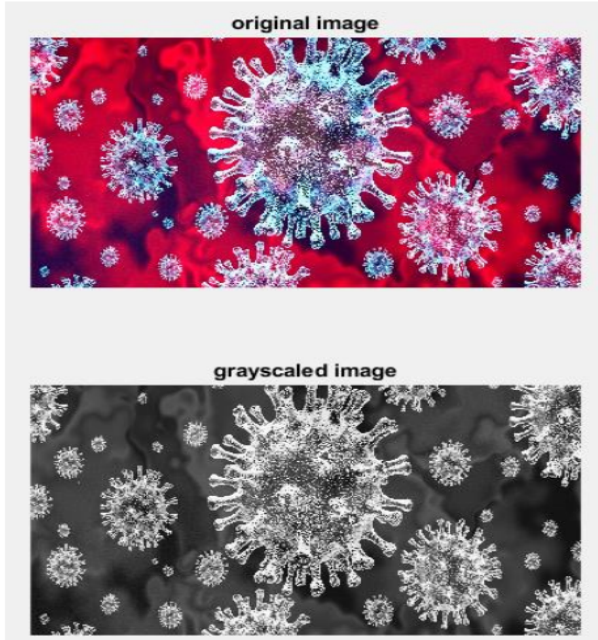

Figure 10: **Original and gray scaled image**

convolution. The above process essentially walks through to enhance the image and to understand and quantify the image quality through various dimensions. Weights contribution, spatial relation of pixels, computer vision tasks and translation invariant are advantages of convolution. This allows convolution to perform hierarchical feature learning; which is how our brains are thought to identify objects. Figure 7 shows the Original image and histogram analyzer of the original image. Figure 8 classifies the Contrasted Image and equalized histogram analyzer of the image. Figure 9 reveals the Convolution array dimension of original image. Finally figure 10 classifies the Original and gray scaled image.

4. Conclusion

The proposed a filtration of pixel value of image using convolution filter kernel to extract feature matrix. We Performed convolution on the image matrix and extracted feature matrix. The value of the output images is calculated in similar way to extract the feature matrix. Further the convolution kernels can be used for computer vision, and to show how efficient in image analysis. This approach has proved to be resilient for noise and heavy deformation and is invariant in scale, resolution and concentration. This is a special method of using convolution kernels that are resilient to heavy deformations, permit contact between high distance strokes and evaluate local or global stroke characteristics.

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