Analysis of Different Image Processing Strategies

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ABSTRACT- Image processing technology is a popular practical technology in the field of computer science. It has important research in analysing, recognizing, identifying, and predicting the images using a variety of platform with algorithms.This is aimed at the analysis of algorithms of image processing in the cloud platform.Several algorithms are very high to use image processing and computing technique. Here a selection of state-of-art is applied to test image processing execution and timing factor using different strategies and platforms. Among them, the dataset structure and performance of the system can choose a verification algorithm to achieve the final operation. Based on the structure of a real-time image processing system based on SOPC technology is built and the corresponding functional receiving unit is designed for real-time image storage, editing, viewing, and analysing. Studies have shown that the image processing system based on cloud computing has increased the speed of image data processing by 12.7%. Compared with another platformespecially in the case of segmentation and enhancement of the image. This analysis has advantages in image compression and image restoration on a cloud platform.

Keywords- Analysis, Image, MSR, PSNR, Time, Cloud.

I. INTRODUCTION

The term "Digital Image Processing" refers to the process of manipulating digital images using a digital computer. A digital image is made up of a finite number of elements referred to collectively as picture elements, image elements, panels, or pixels. Pixel is the most frequently used term to refer to the fundamental elements of a digital image [1]. However, in contrast to humans, who can only capture images in the visible band of the electromagnetic spectrum, imaging devices can capture images across the entire electromagnetic spectrum. Thus, digital image processing has a broad range of applications in fields such as medicine, remote sensing, traffic monitoring, document analysis and retrieval, and so on [2].
Image processing strategy is an important part of image processing to visualize the performance and outcome of the goal. Image processing is a discipline in which the process's input and output are both images. It is a process that entails elementary operations such as noise reduction, contrast enhancement, and image sharpening [2] [3]. Image analysis is a process that takes images as inputs but produces attributes extracted from those images as outputs (e.g., edges, contours, and the identity of individual objects). Finally, the result can be defined as the process of "making sense" of a collection of recognised objects, as in image analysis, and performing the cognitive functions associated with algorithms [5]. The objective of this paper is to compare the image processing algorithms using correlational values within the cloud platform.

II. STRATEGY OF IMAGE PROCESSING

A. IMAGE ENHANCEMENT

The term "image enhancement" refers to the processes used to alter images, regardless of whether they are traditional photochemical photographs, digital photographs, or illustrations. Conventional analogue image enhancement is referred to as photo retouching; it involves the use of tools such as an airbrush to alter photographs or the editing of designs using any traditional art medium. The primary tools with which a user can influence, enhance, and transform images are graphic software programmes, which can be broadly classified as raster graphics editors, three-dimensional modellers, and vector graphics editors. Additionally, several image editing programmes are used to render or create original computer art. [3].

C. IMAGE RESTORATION:

Image restoration is the process of converting a noisy/corrupted image to a clean, creative image. The altered form can take on a variety of forms, including motion blur, noise, and camera out-of-focus [8]. The term "image restoration" is distinct from "image enhancement." The latter is intended to emphasise aspects of the image that make it more agreeable to the viewer, rather than to construct practical data in a scientific sense.

D. IMAGE SEGMENTATION

Segmentation is a critical issue in image processing. Segmentation is the process by which an image is subdivided into its constituent parts or objects and images are accomplished using image thresholding techniques.

The threshold can be defined as the conversion of the greyscale to the binary set 0 to 1.

$$S(x, y) = \begin{cases} 0, & if \quad g(x, y) < T(x, y) \\ 1, & if \quad g(x, y) \geq T(x, y) \end{cases}$$

Where, S(x, y) is the segmented image's value, g(x, y) is the pixel's grey level, and T(x, y) is the threshold value at the coordinates (x, y). T(x, y) is a coordinate-independent constant that is constant for the entire image in the simplest case. In this case, selecting a single thresholding value for the entire image is impossible, and a local binarization technique must be used.

A.1. *IMAGE BINARIZATION*

Binarization primary goal of determining a single threshold value or set of threshold values for converting a greyscale image to a binary image. The primary contribution of binarization is the recovery or extraction of information from degraded document images [9-11].

A.2 *IMAGE BINARIZATION in MACHINE LEARNING*

[7] Presents a nonparametric and unsupervised method for automatic threshold selection that utilises a grey level histogram and maximises the ratio of intra-class variance to the total variance. [4] binarization method calculates the maximum and minimum local intensities for each pixel in its neighbourhood.

E. PROGRAMMING FRAMEWORKS

Different programming frameworks such as Hadoop, FastFlow, OpenMP, pthreads, OpenCL, DirectCompute, OpenGL, MapReduce, and Spark have been developed for efficient data processing in a heterogeneous environment. Hadoop is becoming very popular because it can efficiently process structured, semi-structured, and unstructured data. Different image processing applications such as face and motion detection, face tracking, extracting text from video frames in an online lecture video, video processing for surveillance, and content-based image retrieval (CBIR) [5]have demonstrated that Hadoop can be efficiently used for image-based applications. Here authors are implementing cloud-based testing and analysing the datasets of images other than Hadoop.

E. ALGORITHMS

Algorithms are important tools to execute any operation on any platform. Execution of algorithms on the platform of cloud computing isa matter of test and need of time. Types of conventional image processing algorithms are mentioned below:

1) Color Enhancement algorithm: The algorithm for colour enhancement improve the image contrast and changes in contrast on a local scale. It helps for labelling connected components concerned with identifying and labelling disjoint regions.

$$S_{i\,j} = 1/M \sum_{(n,m)\,\in s} fij$$

2) Gaussian Blur algorithm: It is a search algorithm that is used to solve problems involving general constraint satisfaction. The algorithmclassifies the colour separately for a blurred image.

3) Feature detection algorithm: Feature detection algorithms consists of the Marr–Hildreth algorithm, canny edge detection algorithm, SIFT algorithm, and SURF algorithm [4] to detect local features of the images [6] whose perfection is yet delivered 96% for the established image.

$$R_{\mathrm{MSR}i} = \sum_{n=1}^{N} \omega_n \{\log I_i(x,y) - \log[F_n(x,y) * I_i(x,y)]\}$$

$$f_i\,(x,y) = G\,(x,y)\,R_i\,(x,y)\,I_i$$

Where G(x, y) is the geometrical factor and R is the reflection of the object.

4) Segmentation algorithm: This particular algorithm parts a digital image into two or more regions that include the GrowCut algorithm, and the Walker algorithm for growing regions.

II. RELATED RESEARCH

As the result of recent technological advancements, the algorithms of image processing in various fields [10] have been expanded. Today, with the advancement of imaging systems and image processing algorithms, a new branch of quality control and instrumentation has emerged, and recent advances in this field are presented [11]. [12] Used a SIFT for rice grain grading to increase the added value in the rice farming process.

Dynamic power management (DPM) is used to check the efficiency of power while the algorithm executes in any platform. It achieves energy-efficient computation by selectively turning off a few components when they are idle [14].

[15] Described that image processing operations are geometric adjustments such as resizing, rotating, and colour adjustment. Additionally, there are additional processing techniques such as combining images with different levels of brightness, sharpness, or colour space and merging two or more images that compress images, such as decreasing image size and improving file quality, such as decreasing noise and increasing contrast.

The impact of the meltdown hole on various processors and operating systems is to improve security by preventing attackers from capturing data on computers [12].

[16] Proposed a fast watershed transform for detecting objects of interest in an image. This transformation was fundamentally different from conventional watershed transformations in that it was not based on mathematical morphology. The chain code algorithm was used to implement this method. Additionally, it outperformed all other watershed algorithms in terms of speed. When this fast watershed is combined with energy-based segmentation, a new segmentation method called fast water snakes is created [13].

[14] Proposed a very useful image segmentation method for segmenting fingerprints based on the friction ridges of the human finger and also included an effective storage capacity for the segmented images. Watershed algorithms [13] rely on ridges to perform proper segmentation, a requirement that is frequently met in contour detection, where the objects' boundaries are expressed as ridges. Segmentation was accomplished using the watershed algorithm concept.

[18] Proposed a method for combining the results of morphological watershed analysis and enhanced edge detection. As a post-processing step, the colour histogram algorithm was applied to each of the segmented regions obtained, which improved the overall performance of the watershed algorithm.

[15] Described a method for counting the various blood cells found during a blood smear test. The presented approach relied on segmentation via morphological watershed transformation. Masks were created using morphological operations, and cells were segmented using a marker-based watershed transform.

III. RESEARCH METHODOLOGY

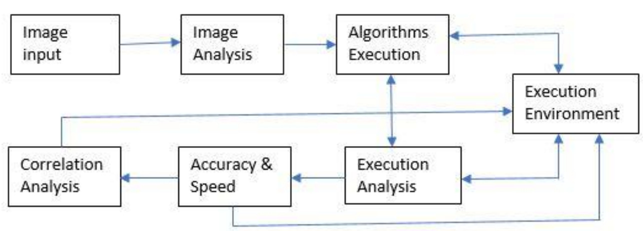


Fig.1 Used model for experiment

The model of the study used in this paper is derived in fig.1.

A. DATA COLLECTION

Datasets were collected online from the free domain of kaggle.com. Images belong to the traffic light of 250 out of 2056 files. 120 images were selected randomly to process after pre-processing of the images. OpenCV was used in python for cloud platform related algorithms and tested for enhancement, blurring, illumination, and segmentation.

B. DATA ANALYSIS

$$r_2 = \frac{\sum_i (x_i - r_{1Xm})(y_i - r_{1Ym})}{\sqrt{\sum_i (x_i - r_{1Xm})^2}\sqrt{\sum_i (y_i - r_{1Ym})^2}} = \begin{cases} -1 \\ or \\ +1 \end{cases}$$

(1)

[20][21] Applied to correlate the algorithm within the execution. Here, the cloud platform is being tested to see the related difference.

C. EXPERIMENT

OpenCV in python was used to imply the author's model toward experiment using the sample datasets. In the transformation of the original image, the correlations are sorted, and then 120 large coefficients are retained while zeroing out the remaining correlation. Correlations for the observation matrix were observed to marginalize the images and results were transmitted to the cloud platform. As a result, the correlations are used to observe the original image rather than the original image itself. The correlations are equal to the original image in this experiment.

D. CLASSIFICATION

Classification of the algorithm was tested by testing phases of colour enhancement, smoothing, feature detection, and segmentation in the different platforms. Different ratings were noted with 1 (worst) 5 (best) to and shown in TABLE I.

	RedHat	Ubuntu	Windows	W_Cloud	Class
Enhancement	4	3.3	2	4	Fair
Smoothing	3	3.4	4.5	3.5	Good
Feature	3.5	4.5	1.5	4	Fair
segmentation	4	3.3	3	5	Excellent

TABLE I Algorithm Ratings for classification

Simulating a portion of the operation or the entire design during the introduction process is possible. The layout and operation of a device using a delay model after the design has been implemented and the timing relationship has been analysed. Equipment testing is the process of using test tools to verify the equipment's final function and performance indicators following an experiment or programming.

D.a IMAGE PROCESSING PROGRAMMABLE SYSTEM

1) **Design realisation**: refers to the process of converting input files to bitstream files. The training software compiles and optimises the design files automatically and performs mapping, placement, and routing of selected devices, as well as creating the associated bitstream data files.

2) **Device configuration**: There are two types of FPGA device configuration modes: active configuration and passive configuration[19]. Active configuration mode is a configuration operation programme that is guided by GAL devices that control the process of external storage and preparation. Passive configuration is a process of controlled synthesis.

This is consistent with the design verification process, which includes functional simulation, timing simulation, and equipment testing. The logic of the design was validated through functional simulation including other factors.

E. RESULT OF DIFFERENT STRATEGY EXECUTION ANALYSIS

Images of a different light were selected with 1, 2, and all the lights. Qualitative and quantitative performances of the algorithms are compared using a different strategy. The algorithm has better performance in a cloud platform than another platform of different categories of images. Mean and frequency like statistics was calculated. Compared with other algorithms, the computing speed of the platform and performance were observed.

1) Compression Performance Test with correlation

To evaluate the algorithm's performance, collected datasets were tested. The resolution of the image is expressed in pixels. Table II illustrates the correlation of the dataset files of images effect frame using various quantization factors in a compression encoder. Human vision can intuitively compare the difference in image quality following compression. The test compares the correlation, file size ratio, the peak entry-to-noise ratio, and compression time ratio,including other factors.

TABLE II. PARAMETER WITH CORRELATION **COMPRESSION DIFFERENT**

Corelation	Image File(KB)	Entry-to-noise ratio	Compression time(Seconds)
65	1.8	32.4	0.7
55	1.9	33.1	0.65
45	2.2	37.4	0.8
35	2.5	37.9	0.89
25	2.9	38.1	0.91
15	3.2	41.3	0.9
5	3.5	44.6	1.1

As shown in Table II, different system parameter settings have a greater effect on the image compression effect. The larger the correlation, the less compressed image data there, the higher the image compression ratio, and the lower the image's peak entry-to-noise ratio. Simultaneously, the algorithm's compression time is reduced, and the visual effect of the image is visible in obvious blocking effects. Thus, it is possible to maintain the compression ratio while obtaining a higher image quality.It seems feature detection and segmentation algorithm performance is higher than others.

The experimental data indicate that the system correlation is set to 15, and the compressed image's visual effect is obvious. At this point, there is no discernible distortion in the image, and the difference is visible.

2) Hanging Risk Assessment (HRA)

By exploiting the temporal coherence between consecutive executions, this section test algorithm that estimates the HRA in dynamic and unknown environments[18][19]. A lower value of correlation is achieved when it is closer to the processor in the queue. That is, when the derivative approaches its maximum point, there is the error detection which presents an Empirical Risk-of-Hanging, $R_c = 1 - 6.0$. Taking into account Rc, the HRE is estimated

$$HRA = R_c/(1-r_i) \qquad (2)$$

Where, 1 (one) represents the reference frame and i,obtained from (1) and $R_c = 1 - 6.0$. Error detection is known fromthe Interactive Thresholding Algorithmthat reclassifies the background and foreground pixels based on the thresholding method [17].

Taking as base an image resolution equal to image 96x72, the input process will be performed N-times until the result is invariably, or until the hanging points which is less than 100.

Finally, Hanging Risk Estimation Table III presents the HRE from the platform for the different algorithms. The Pearson's correlation was obtained in (1).

Algorithm	(1-ri)	Variation Range	Hanging Risk	HRA in Seconds
Enhancement	1-0.968	0.032	(Rc /0.032)	12.43 Sec
Feature	1-0.907	0.093	(Rc /0.093)	4.31 Sec
Segmentation	1-0.800	0.200	(Rc /0.800)	2.00 Sec

TABLE III HANGING RISK ESTIMATION

The earliest less risk of hanging is shown in table III for segmentation which is 2.00 seconds of execution after hurdles during the processing period.

3)Reconstruction of image for Algorithm

Reconstruction of the Cholesky matrix decomposition. The following is a summary of the SOPC experimental results. The analysis's findings are summarised in Table IV.

Image	Img_1	Img_2	Img_3	Img_4	Img_5
PSNR	26.8	26.2	30.4	27.5	27.4

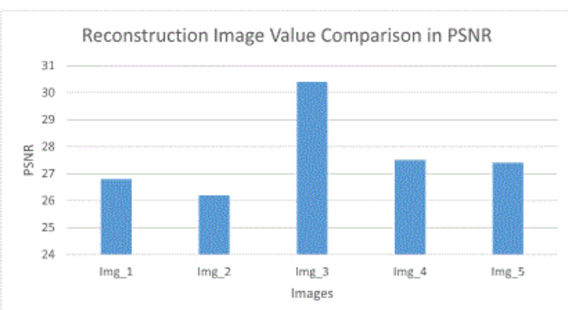
TABLE IV RECONSTRUCTION OF IMAGE WITH PSNR

As can be seen from the comparison of the data in the table, the PSNR of the SOPC reconstructed image is not very high. Three factors affect the PSNR, according to the analysis:

3. a Because all data in the SOPC system is represented as fixed-point numbers, the algorithm's accuracy is compromised somewhat, resulting in a low PNSR for the reconstructed image.

3. bA random observation matrix is generated using LFSR. Because the random number generated by LFSR is not completely random, it has a small effect on the incoherence of the observation matrix. Affected is the PSNR that has been reconstructed.

3.c Before observing a correlation, are reset to zero, which results in the loss of some small details, affecting the PNSR.



The

Image	Platform	Algorithm	Time(Sec)
Img_1	Ubuntu		31.72
	Windows	MSR	32.66
	W_Cloud		24.54
Img_2	Ubuntu		28.67
	Windows	MSR	29.34
	W_Cloud		25.76
Img_3	Ubuntu		27.68
	Windows	MSR	28.89
	W_Cloud		25.13

observation of high and low points can be seen inthe graph clearly in Figure 2.

Fig. 2 PSNR Value Comparison after SOPC Image Reconstruction

According to the data analysis in the figure, img_3 has the highest PSNR among the five. The analysis demonstrates that the image is relatively regular, the correlation obtained after the transform is sparse, and reset to the image's minimum value, resulting in the maximum PSNR after reconstruction.

4) Analysis of Time Execution

This analyses the execution time of the restored image, as well as the average ratio (r) defined as the objective measurements of enhancement effect. At last, Σ percentage of pixels which become completely black or completely white after enhancement is computed [19][20]. To quantitatively assess and rate this state-of-the-art algorithm in different platforms, we compute three indicators r,s, and Σ compare by the greylevel images: input image and restored image.

Qualitative and quantitative performances in the cloud platform of the algorithm are compared, and the results are presented in Table V. Results of the three indicators show that the platform has better performance than others.

TABLE V EXECUTION TIME IN CLOUD OF MSR

Table V shows the result of computational time for frequencyof MSR, to generate the statistics. Our results show that cloud platform requires less computational time in comparison with others after loading the image file into the system.

V. CONCLUSION

The authorstested different strategies of image processing schemes and state of art on the cloud platform and other comparative using strategic algorithms.By comparing the implementation of the image processing system on a personal computer (PC) to the implementation of algorithms, the structure of the cloud computing system is constructed, and the various components of image enhancement, storage, feature, segmentation and real-time display for each component of image processing are carried out, as well as the overall structure design. The design of the structure has been enhanced. Different image processing parameters like noise, smoothing, the timing of enhancement and segmentationhave a greater effect on the compression effect of the image including correlational value within the dataset of the image. The larger the correlation, the less compressed image data is there, the faster the image compression rate, and the lower the image's peak entry-to-noise ratio. Simultaneously, the algorithm's compression time and enhancementare reduced, and the visual effect of the image is visible ina short time effect.The result of tested parameters like correlational value, execution timing, hanging risk, reconstruction of images,and related functionality within itself using algorithms shows the average hike of 12.7% in the strategic cloud platform.
It'snot possible to tell which image or file is fasterduring executionbecause image data contains a large amount of information, implementing image processing algorithms places additional demands on hardware devices. The advancement of cloud computingtechnology has resulted in an increase in the functionality of processors with extra advantages of speed. Embeddinghardware and related platform for image processing will also result in the development of a complex system.

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BIOGRAPHY

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