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REDUCTION OF NOISES FROM DEGRADED DOCUMENT USING IMAGE ENHANCEMENT TECHNIQUE

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ABSTRACT

Segmentation of text from badly degraded document images is a very challenging task due to the high inter/intervisitation between the document background and theforeground text of die rent document images. Image processing and pattern recognition algorithms take more time for execution on a single core processor. Graphics Processing Unit (GPU) is more popular now-a-days due to their speed, programmability,low cost and more inbuilt execution cores in it. The main goal of this research work isto make binarization faster for recognition of a large number of degraded documentimages on GPU. In this system we provide new image segmentation algorithm that each pixel in the image has its own threshold proposed. We are doing parallel work on a window of m*n size and extract object pixel of text stroke of that window. The document text is further segmented by a local threshold that is estimated based on the intensities of detected text stroke edge pixels within a local window. In the field of document analysis and restoration, the quality of input documents plays a critical role in subsequent processing tasks. However, many historical and degraded documents suffer from various types of noise, which adversely affect the legibility and interpretability of their content. This paper proposes a novel approach for reducing noise from degraded documents using image enhancement techniques. The proposed method utilizes advanced image processing algorithms to enhance the quality of degraded document images. First, the input document image is preprocessed to remove artifacts such as speckles, scratches, and stains. This step involves adaptive filtering and morphological operations to selectively remove noise while preserving the important text and graphical elements. Next, the enhanced document image undergoes a denoising process to suppress various types of noise, including Gaussian, salt-and-pepper, and random pixel-level noise. This step employs state-of-the-art denoising algorithms such as wavelet-based denoising, bilateral filtering, and non-local means filtering to effectively reduce noise while preserving the structural details and textual content. To further enhance the legibility of the document, contrast and brightness adjustments are applied using histogram equalization and adaptive enhancement techniques. These methods optimize the document's dynamic range, enhancing both dark and light areas, thereby improving the overall visual clarity and readability. Experimental results on a diverse dataset of degraded documents demonstrate the effectiveness of the proposed approach. The quantitative evaluation metrics, including signal-to-noise ratio (SNR) and peak signal-to-noise ratio (PSNR), indicate significant noise reduction and image quality improvement. Additionally, qualitative evaluations reveal the enhanced document's readability and preservation of important content details. The proposed method offers a robust and efficient solution for reducing noise from degraded documents, paving the way for improved document analysis, restoration, and information extraction. The techniques presented in this paper can be valuable for various applications such as historical document preservation, digital archiving, and automatic text recognition systems, ultimately facilitating the accessibility and understanding of valuable historical and degraded documents.

Keywords: GPU, Segmentation, Text, Recognition, Image, Algorithm, Range, Visual.

1. INTRODUCTION

Document Image Binarization is performed in the preprocessing stage fordocument analysis, and it aims to segment the foreground text from the document background. A fast and accurate document image binarization technique is important for the ensuing document image processing tasks. Though document image binarization has been studied for many years, the thresholding of degraded document images is still an unsolved problem due to the high inter/intervisitation between the text stroke and the document backgroundacross dierent document images. Given a degraded document image, the text strokeedges are detected through the combination of the Gray Scale Image and New ImageSegmentation will generate Clear Binarized Image. Generating a clear Binarized document image from degraded document image for that we are using two approaches serial approach and parallel approach. We are using the two approaches just to speed up the execution of the system. For large size document images, we will apply parallelapproach and for small size document image we will be applying serial approach. Because parallel

approach will not be suitable for small size images it will take more time for execution because in parallel approach memory will be allocated for every thread so it will take more time for execution so we will apply serial approach in thatcase and if size of image is more than we will apply parallel approach because serial approach will take more time for execution as size of image is more so we will apply parallel approach .

2. LITERATURE SURVEY

Paper 1: The Proposed System is applied this paper presents an adaptive im-age contrast-based document image binarization technique that is tolerant to different types of document degradation such as uneven illumination and document smear.

Paper 2: In this paper, they presented an application for Image Segmentationalgorithms based on the threshold segmentation with gray scale algorithm.

Paper 3: In the present paper an A few experiments are designed to demonstrate the effectiveness and robustness of our proposed method. Werst analyze theperformance of the proposed technique on public datasets for parameter selection.The proposed technique is then tested and compared with state-of-the-art methodsover on three well-known competition datasets: DIBCO 2009 dataset, H-DIBCO 2010 dataset, and DIBCO 2011 dataset. Finally, the proposed technique is further evaluated over a very challenging Bickley diary dataset.

Paper 4: In this paper, the text is then segmented based on the local threshold that is estimated from the detected text stroke edge pixels. Some post-processing is further applied to improve the document binarization quality.

3. OBJECTIVES

1. To segment the foreground text from the handwritten text within the degraded documents.
2. To identify current advances in document image binarization for both machine-printed and handwritten document images

4. EXISTING SYSTEM

Many thresholding techniques have been reported for document image binarization. As many degraded documents do not have a clear bimodal pattern, global thresholding is usually not a suitable approach for the degraded document binarization. Adaptive thresholding, which estimates a local threshold for each document image pixel, is often a better approach to deal with dierent variations within de- graded document images .The local image contrast and the local image gradient are very useful features for segmenting the text from the document background because the document text usually has certain image contrast to the neighboring document background .They are very elective and have been used in many document image binarization techniques. The Old system mainly uses serial approach for processing images. Due to this the processing time of image is high means to generate the outputit takes more time. Image processing, a sub-domain of computer vision, is an eld that deals with the conversion of an image into digital form and perform some operationson it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually, image processing system includes treating images as two-dimensional signalswhile applying already set signal processing methods to them.

The purpose of image processing can be basically divided into 5 groups, namely:

1. Visualization: Observe the objects that are not visible.
2. Image sharpening and restoration: to create a better image.
3. Image retrieval: seek for the image of interest.
4. Measurement of pattern: measures various objects in an image.
5. Image recognition: distinguish the objects in an image.

Digital image processing has become an applied research area that goes fromprofessional photography to several dierent elds such as astronomy, meteorology, computer vision, medical imaging, among others. The aim of digital image processing is to improve the pictorial information in order to perform subsequently other tasks such as image-based classification, feature extraction or pattern recognition. Image processing is usually an expensive and time-consuming task. The use of a GPU to parallelize tasks started several years ago, in 2004 proposed a new architecture usingmultiple GPUs for image processing and computer vision; they obtained Significant speed up over a CPU implementation. Fast algorithms are important for ancient imageprocessing systems for handling large set of calculations. To speed up the processing, parallel implementation of an algorithm can be done using Graphics Processing Unit (GPU). GPU is general purpose computation hardware; programmability and low cost make it productive. Binarization is widely used technique in the image analysis and recognition applications. In this paper, we investigate the accuracy and performance characteristics of GPUs on well-known global binarization.

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5. METHODOLOGY

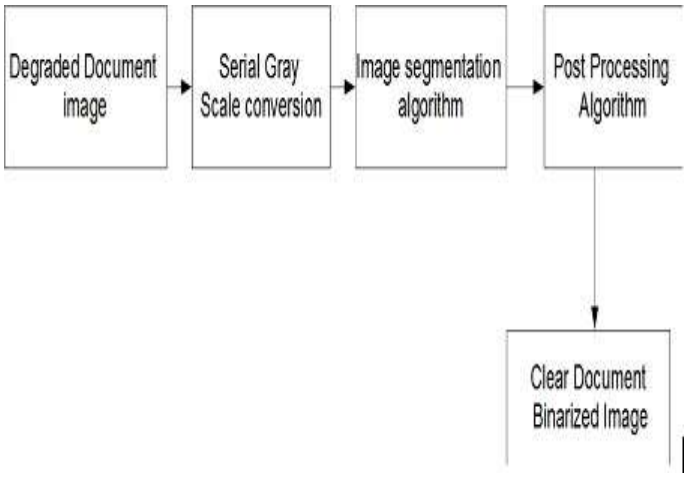

Figure 1: Architecture System.

6. FUTURE SCOPE

The system can be implemented on java platform so that the android application can be develop for the user and the system can be made more user friendly and can be made easy to use for the user. Also, we can directly pass the input by taking picturefrom the mobile camera and passing the image directly to the system to get clear binarized output. We can also pass the input to the system by our laptop's camera simply taking the document Infront of the camera and passing it to the system to get clear binarized output. Only getting the output in the binarized form we can alsotake the output in color form as the background color of the image is we can simplyhave that color and remove the degraded part from the image.

7. APPLICATIONS

- Application of system is image Binarization. Current research aims at developingconstrained systems for limited domain applications such as postal address reading, check sorting, tax reading, and once automation for text entry. Since we can makeuse of the entire word at once, it is possible to exploit correlations between adjacent characters.
- One way to do this is through contextual knowledge of syntax which has been shown to be successful for reading image Binarization address information of post- marked mail.
- Another potential application of systems is in historical document image Binarization. Systems also and applications in newly emerging areas, such as development of electronic libraries, multimedia database, and systems which require Character dataentry.
- For government in official files/documents which are degraded can be Recovered Important data by image Binarization.

8. CONCLUSION

The system provides document image Binarization technique that is tolerant to dierent types of document degradation. The proposed technique is simple and robust, only few parameters are involved. We have presented an approach for document im-age processing using parallel computing using C .Net.

Thus, we propose Parallel Approach for Document Image Binarization Using Im-age Segmentation Algorithm for generating clear document image from giving de- graded document image.

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