Image Binarization Technique For Degraded Document Images

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ABSTRACT:

Segmentation of text from badly degraded document images is a very challenging task due to the high inter/intra-variation between the document background and the foreground text of different document images. In this paper, we propose a novel document image binarization technique that addresses these issues by using adaptive image contrast. The adaptive image contrast is a combination of the local image contrast and the local image gradient that is tolerant to text and background variation caused by different types of document degradations. In the proposed technique, an adaptive contrast map is first constructed for an input degraded document image. The contrast map is then binarized and combined with Canny's edge map to identify the text stroke edge pixels. 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. The proposed method is simple, robust, and involves minimum parameter tuning. It has been tested on three public datasets that are used in the recent document image binarization contest (DIBCO) 2009 & 2011 and handwritten-DIBCO 2010 and achieves accuracies of 93.5%, 87.8%, and 92.03%, respectively that are significantly higher than or close to that of the best performing methods reported in the three contests. Experiments on the Bickley diary dataset that consists of several challenging bad quality document images also show the superior performance of our proposed method, compared with other techniques.

1.1 INTRODUCTION:

DIP is electronic information dealing out on a 2-D collection of figures. The collection is a numeric demonstration of an picture. A genuine picture is shaped on a sensor while an force emission strikes the sensor by means of enough strength to make a sensor production. An picture might be distinct as a 2-dimensional purpose, f(x, y), anywhere x along with y are spatia coordinates,

plus the amplitude of f at any couple of coordinates (x, y) is called the strength or gray height of the picture at that point. while x, y, as well as the amplitude principles of f are every one finite, separate quantities, we call the picture a digital picture. The field of digital image processing refers to processing digital images by means of a digital computer. A digital image is composed of a finite number of elements, each of which has a particular location and value. These elements are referred to as picture elements, image elements, pels, and pixels. Pixel is most widely used to denote the elements of a digital image.Images play the single most important role in human perception. Humans are limited to the visual band of the electromagnetic (EM) spectrum, imaging machines cover almost the entire EM spectrum, ranging from gamma to radio waves. They can operate on images generated by sources that humans are not accustomed to associating with images. These include ultrasound, electron microscopy, and computer-generated images. Thus, digital image processing encompasses a wide and varied field of applications.It is the employ of computer methods to carry out picture processing on digital pictures . this has the similar reward in excess of analog picture processing as digital signal processing has in excess of analog signal dispensation it allows a much wider range of algorithms to be functional to the input information, in addition to can keep away from troubles such as the build-up of sound in addition to signal distortion throughout handing out. picture dealing out is a subclass of signal dealing out concerned particularly with pictures. get better picture quality for human insight and/or computer explanation.

1.2 Fundamental Steps in Digital Image Processing:
1.2.1 Image Acquisition:

An picture is captured through a sensor as well as digitized. but the production of the camera or sensor is not already in digital form, an analog-to-digital translater digitizes it. usually, the picture acquisition phase involves presenting , that as scaling.

1.2.2 Image enhancement :

picture improvement is in the middle of the simplest plus most attractive areas of digital picture handing out. essentially, the thought at the back improvement techniques is to bring out detail that is obscured, or simply to highlight certain features of interest in an image. A familiar instance of improvement is at what time we add to the difference of an picture since "it looks improved." To bring out detail is hidden, or simply to highlight sure features of attention in an picture.

1.2.3 Image restoration:

picture return is an region that too deals with improving the appearance of an image. picture restoration is object, in the brains that return techniques tend to be depended on arithmetical otherwise probabilistic models of picture poverty. improvement, on the additional hand, is based on human subjective preferences regarding what constitutes a "good" enhancement result. civilizing the look of an image be inclined to be based on arithmetical or probabilistic models of picture poverty.

1.2.4 Image Compression:

Image Compression deals with techniques for reducing the storage required saving an image, or the bandwidth required transmitting it. Although storage technology has improved significantly over the past decade, the same cannot be said for transmission capacity. This is true particularly in uses of the Internet, which are characterized by significant pictorial content. Image compression is familiar to most users of computers in the form of image file extensions, such as the jpg file extension used in the JPEG (Joint Photographic Experts Group) image compression standard.

DOCUMENT IMAGE BINARIZATION TECHNIQUES:

essay picture Binarization is performed in the preprocessing stage for essay study and it aims to part the center content from the essay set. A quick and exact essay picture binarization method is central for the resulting essay picture handing out household tasks such as optical character recognition (OCR).

2.1 DOCUMENT IMAGES:

degradations tend to induce the document thresholding error and make degraded document image binarization a big challenge to most state-of-the-art techniques. Though text picture binarization has been studied for many years, the thresholding of degraded essay images is still an unsolved problem due to the high lay to rest/intravariation between the text stroke and the text backdrop across different essay imagery. As illustrated in Fig2.1, the handwritten text within the tainted documents often shows a certain amount of variation in terms of the stroke width, stroke brightness, stroke link, and document background. In addition, past documents are often tainted by the bleed through as illustrated in Fig.2.1 (a) and (c) where the ink of the other side seeps through to the front. In addition, historical documents are often degraded by different types of imaging artifacts as illustrated in Fig.2.1 (e). These different types of documentThe new essay Image Binarization match (DIBCO) [1], [2] held under the support of the International Conference on Document study and thanks (ICDAR) 2009 , 2011 as well as the Handwritten text Image Binarization Contest (H-DIBCO) [3] held beneath the structure of the International Conference on Frontiers in Handwritten gratitude demonstrate new pains on this issue.

We participated in the DIBCO 2009 plus our backdrop opinion technique [4] perform the most excellent in the middle of entries of 43 methods submitted from 35 global research groups. We too participated in the H-DIBCO 2010 in addition to our local maximum-minimum method was single of the peak two winners among 17 submitted algorithms. In the most new DIBCO 2011, our proposed method achieved second best results among 18 submitted algorithms.This paper presents a essay binarization method that extends our previous local maximum-minimum method [5] and the method used in the latest DIBCO 2011. The proposed method is simple, hearty and capable of conduct different types of tainted essay images with minimum limit tuning. It makes use of the adaptive image contrast that combines the local image contrast and the local image gradient adaptively and therefore is liberal to the text and background variation caused by different types of document degradations. In particular, the proposed method addresses the over-normalization problem of the local maximum minimum algorithm [5]. At the same time, the parameters used in the algorithm can be adaptively likely.

2.2 Document Image Binarization Techniques:

essay picture binarization tries to extract only the text stroke pixels from the gray-scale essay imagery, and is usually performed in the essay preprocessing step. It is an active examine area and has been studied for decades because it is important for the resultant essay image handing out tasks such as optical character thanks and essay layout study. Many essay binarization methods have been reported in the writing that can be roughly categorized into two groups: one is global thresholding methods, which assign a single sill for the whole document image; the other is local thresholding methods, which give a threshold for each pixel or a small region of the essay images. The global thresholding methods are widely used in many essay image study applications for their ease and competence. However, these methods are usually not suitable for degraded essay imagery, because they do not have a clear bimodal pattern that separates center text and setting. So the local thresholding methods are better approaches for pure essay imagery with non-uniform background and foreground sharing. The local threshold can be calculated using different information of the document images, such as the mean and standard divergence of pixel values within a local windows, water flow model, background working out, light model and local image difference.

One drawback of these thresholding approaches is that the thresholding performance depends on the window size and hence the character stroke width. For a given essay symbol, different binarization methods may create different parallel dual picture. Some binarization methods perform greater on certain kinds of document image, while others create better results for other kinds of essay imagery. By combine different binarization technique, better act can be achieve with carefully analysis. Those pixels that are labeled the same by different methods are usually correctly top secret, and those pixels which are top secret as text by some methods and labeled as background by other methods have senior option to be misclassified than others. Based on such watching, we divide all the image pixels into three sets: foreground set, where those pixels are classified into center by all the examining binarization methods; background set, where those pixels are classified into background by all the examining binarization methods. the binarization results of a given Instead of design a new essay thresholding method, we present a learning frame in this paper that combines

different existing essay thresholding methods for the reason of a better thresholding result. [?] Use a simple voting plan to combine different binarization methods, which just re labels the pixels with most frequency label assigned by given methods. The combined image can be used as a beginning binarization result for further analysis make use of neural network to learn from the binarization results produced by different technique, this method can work for documents with complex background and images, but it maybe time strong and planned a self teaching knowledge essay binarization framework to process document binarization method. However, it depends on the historical binarization records of the examining essay binarization technique. plus it applies the next neighbor classification methods to the all the text image pixels, which may not be suitable for the high difference individuality of tainted document imagery. So we suggest a method to combine existing binarization methods to obtain improved binarization presentation.

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