

# PHASE BASED ANCIENT DOCUMENT BINARIZATION OF CONTENT RETRIEVAL APPROACH

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## ABSTRACT

*We propose a model for image recovery from ancient documents. To achieve this, we combine three standard steps. They are, preprocessing, main binarization and post processing. In the first two steps, phase derived feature is used. In the post processing step specialized adaptive Gaussian and Median filters are used. One of the outputs of the binarization step shows high performance that can be used in a proposed post processing method. This improves the performance of other binarization methodologies. Finally, we use Mean Shift algorithm to improve the optimization. In the pre-processing and main binarization steps, the features used are mainly phase derived, while in the post processing step, specialized adaptive Gaussian and median filters are considered. One of the outputs of the binarization step, which shows a high recall performance, is used in a proposed post processing method to improve the performance of other binarization methodologies. Finally, we develop a ground truth generation tool, to simplify and speed up the ground truth generation process for ancient document images.*

**Keyword:** -Binarisation, pre processing, post processing.

## 1. INTRODUCTION

Pictures are the most common and convenient means of conveying or transmitting information. A picture is worth a thousand words. Pictures concisely convey information about positions, sizes and inter-relationships between objects. To digitally process an image, it is first necessary to reduce the image to a series of numbers that can be manipulated by the computer. Each number representing the brightness value of the image at a particular location is called a picture element, or pixel.

An image is enhanced when it is modified so that the information it contains is more clearly evident, but enhancement can also include making the image more visually appealing. To smooth a noisy image, median filtering can be applied with a  $3 \times 3$  pixel window. This means that the value of every pixel in the noisy image is recorded, along with the values of its nearest eight neighbours. These nine numbers are then ordered according to size, and the median is selected as the value for the pixel in the new image. As the  $3 \times 3$  window is moved one pixel at a time across the noisy image, the filtered image is formed.

Here a lossy compressed image is taken as an input. Then it is given to the further stages of binarization. A phase based binarization model for ancient document images is proposed as well as a post processing method that can improve any binarization method and a ground truth generation tool. The proposed model consists of three standard steps: 1) pre-processing 2) main binarization 3) post processing.

## 2. RELATED WORK

In this section we review the various concepts and approaches that are dealt in this system to get the clear perspective. We use 2 new techniques namely, the mean shift algorithm and a PRCC to improve the pixel quality of document image.

### 2.1 Region Growing

Region growing segmentation is an approach to examine the neighboring pixels of the initial “seed points” and determine if the pixels are added to the seed point or not.

### 2.2 K-Means Clustering

Somewhere in between these two opposite approaches lies the class of semi-parametric methods - those where we assume "a mixture of distributions," or "a parametric model for each group in the sample" is under this umbrella that k-means clustering falls.

## 3. PROPOSED SYSTEM

### 3.1 PRE-PROCESSING

The pre-processing step includes several stages:

#### Resize

Image resizing refers to the scaling of the digital image. Image resizing is necessary when you need to increase or decrease the total number of pixels. When scaling a vector graphic image the graphic primitives that make up an image can be scaled using geometric transformations, with no loss of image quality. When scaling an ordinary image, a new image with a higher or lower number of pixels must be generated. Image interpolation works in two directions, and tries to achieve a best approximation of a pixel's intensity based on the values at surrounding pixels.

#### RGB to Grey Scale Conversion

Conversion of a color image to a gray scale is not unique; different weighting of the color channels effectively represents the effect of shooting black-and-white films in the given image. To convert a color from a color space based on an RGB color model to a gray scale representation of its luminance, weighted sums must be calculated in a linear RGB space.

#### Basic Filtering

This process includes two filtering steps in it. They are:

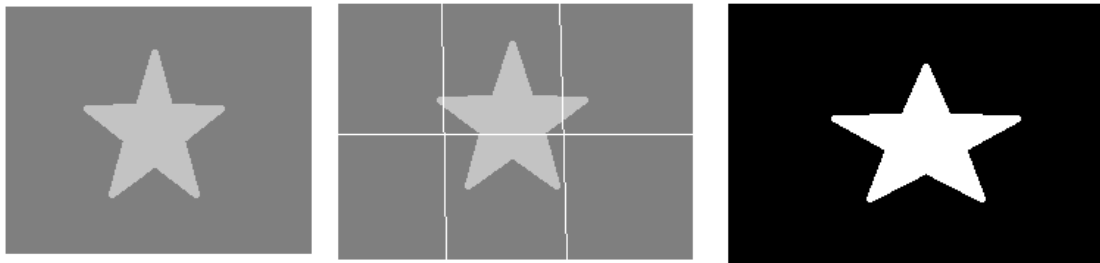
- Median filtering
- Gaussian filtering

### 3.2 IMAGE SEGMENTATION

Segmentation was used to identify the object of image that we are interested. We have three approaches to do it. The first is Edge detection. The second is to use threshold. The third is the region-based segmentation. It does not mean that these three of that method can solve all of the problems that we met, but these approaches are the basic methods in segmentation. Segmentation algorithms for the images are generally based on one of the following two basic categories. The first one is Edge-based segmentation. The second one is Region-based segmentation.

#### Image partitioning

One of the simplest approaches to variable threshold is to subdivide an image into non-overlapping rectangles. The fig-1 shows the image that is obtained after using OTSU algorithm. The fig-1(b) is the sub-dividing of image into images. Then giving 0 for black and 1 for grey shown in fig-1(c).



**Fig-1 (a)** Noisy, shaded image. **(b)** Image subdivide into six sub-images. **(c)** Result of applying Otsu's method to each sub-image individually.

### 3.3 MAIN BINARIZATION

The PRCC is the scheme used here which performs pixels degree rotation in both horizontal and vertical direction to select the better pixel angle to improve the pixel quality. Where PRCC refers to Phase Rotation Congruency Covariance which means rotation of the degree of the image pixel's in both the horizontal and in the vertical directions. After the rotation, the better angle is fixed in which the image is seen with an improved manner.

### 3.4 POST PROCESSING

#### 3.4.1 Adaptive Weighted Trimmed Median Filter

A noise detection process to distinguish between the noisy pixels and noise-free pixels, before applying nonlinear filtering operation, is essential. To full fill the objective adaptive median filter (AMF) was attempted. AMF algorithm was capable of identifying noisy and noise free pixels. An Adaptive Weighted Median (AWM) Filter is proposed for improving the performance of median based filters. The adaptive technique is used to determine whether the pixel is corrupted or uncorrupted pixel.

#### 3.4.2 Median Filter

Median filtering is a non-linear filtering operation. Median rejects salt and pepper noises in presence of edges. It preserves edges while removing noise. we use the median to remove the noise. After binarizing the input image using an adaptive median, bw median, a simple procedure is used to remove noises.

#### 3.4.3 Mean Shift

Mean shift is a non-parametric feature-space analysis technique for locating the maxima of a density function, a so-called mode-seeking algorithm. Application domains include cluster analysis in computer vision and image processing.

### 3.5 OUTPUT IMAGE

Finally the binarised output image has been obtained which is free from many types of degradation especially global bleed through and better binarization has been achieved. The output error rate is verified using the measure of PSNR and MSE.

## 4. EXPERIMENTAL EVALUATION

The evaluation is purely based on the software of MATLAB analysis. The first step in MATLAB image processing is to understand that a digital image is composed of a two or three dimensional matrix of pixels. Individual pixels contain a number or numbers representing what color value is assigned to it. Then `rgb2gray` can be used to change a color image into a grayscale image. In order to create a histogram from an image, use the "imhist" function. Contrast enhancement can be performed by the "histeq" function, while thresholding can be performed by using the

“graythresh” function and the “im2bw” function. Segmentation is the process of fractioning an image into its component objects. method is to use a combination of dilation and erosion to segment objects. The MATLAB function “bwperim” performs this operation on binary images.

## 5. CONCLUSION

Ancient Document binarization is the vital role of image processing domain, in our implementation we focused this binarization on phase rotated congruency component and density capacity reconstruction methodology process and attain the result in adaptive weighted trimmed median filter post processing the improvisation compared to input via mse and psnr values. To extend the progress further in historical documents on well trained machine learning tool like neural network , fuzzy classification with more datasets to attain best results.

## 6. REFERENCES

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