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Typographic Portrait Generator Using Image Processing-Project Application

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Abstract: Typography portrait is a portrait made up of words. The face of a person has different shades and distinct features. In order to make a typography portrait the distinct shades and features need to be clearly extracted. Existing systems focus only on the different shades of the face. They fill the face with word clouds without any regard for the distinct features of a face. This project will consider not only the shades of a face but also the features of a person's face. The extraction of facial features will be done first and then text filling will be done accordingly. This project intends to create an application that will create a typography portrait having a much better visual appeal than the present systems.
Keywords: Image Processing, Edge Detection, Image Segmentation, Face Recognition, Text Filling.

I. INTRODUCTION

Typography is the art and technique of arranging text to make written language appealing when displayed. The arrangement of type involves selecting typefaces, point sizes, line lengths, line-spacing, and letter-spacing (tracking), and adjusting the space between pairs of letters. The term typography is also applied to the style, arrangement, and appearance of the letters, numbers, and symbols created by the process. Typography is the work of typographers, graphic designers, art directors, manga artists, comic book artists, graffiti artists, and now anyone who arranges words, letters, numbers, and symbols for publication, display, or distribution. Until the Digital Age, typography was a specialized occupation. Digitization opened up typography to new generations of previously unrelated designers and lay users. A picture is worth a thousand words. But what's a picture of words worth? In the hands of some, far more still. Typographic Portraits combine the specifics of an image with the communicative power of words. They can capture an idea, or express the essence of a person's state of being, in a way that is hard to match in terms of interest and visual appeal. The images in this gallery are sometimes happy, sometimes sad. Colorful, or bleak. But all express themselves in a way unique to typographic portraits.

II. LITERATURE SURVEY

The modified approaches use various exploring techniques, the research papers for implementation of the idea of the project is done. The study related to image processing and text wrapping used in various models and the comprehensive literature review of various researcher's works are stated here.

1) A novel framework for synthesizing the stylization of text-based images. It is composed of several steps without supervision. Initially, the style image is segmented to foreground and background images. Then, the main color of the foreground is accumulated and assigned to the stroke-based binarized geometric shape like text, symbols, and icons to be a content image. The foreground image is considered as the target style and transferred to the content image by image style transfer neural network. Finally, the composition of the stylized geometric shape and the complete background image is accomplished by texture synthesis. The experimental results were (a)Comparison of style transfer method, (b)Improved neural style transfer model, (c)Image inpainting. In the last synthesized image, the style of the font will be more prominent, so that the coordination of the entire image will not be affected. Background subtraction was required for further procedure and also in acquiring accuracy.

2) Background subtraction technique is discussed which will eventually help in separating the person in the image for portrait generation. Selective background subtraction is the major problem associated with the background subtraction technique. For foreground detection, background modeling is used in many different applications to subtract the background and detect foreground objects in the image. There are many challenges in elaborating a good background subtraction algorithm and researchers have been appropriated to develop the new innovation and enhancement techniques to overcome all the limitations. Grayscale and HSV images are used in background subtraction. It does not show robustness at times. Accuracy is sometimes not obtained.

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3) Introduction of a technique of extracting the features from a given texture. Local Binary Pattern(LBP) is a method used to describe the texture characteristics of a surface. By applying LBP, texture pattern probability can be summarised into a histogram. LBP values need to be determined for all of the image pixels. Euclidean distance method is applied to classify the texture pattern obtained from LBP computation. The synthetic images contain only vertical, horizontal, and cross lines. In the image with vertical lines. The textured surface is quite low as a result of the variation. High accuracy can be achieved if the algorithm is implemented on the texture with low variance. The LBP and pattern recognition algorithm might be applied for further implementations, such as texture segmentation and grading on the regularity of texture patterns.

4) Proposal of Image Segmentation technique called Bat Algorithm. The main idea is a low-level operation that can segment an image in non-overlapping regions. Thresholding is an important approach for image segmentation and it is the first step in image processing for many applications. The optimal thresholds are found by maximizing Kapur's entropy-based thresholding function in a grey level image. However, the required CPU time increases exponentially with the number of desired optimal thresholds. Here, a global multilevel thresholding algorithm for image segmentation is proposed based on the Bat inspired algorithm(BA). Cuckoo Search(CS) algorithm was also implemented and compared with Kapur's and BA's algorithms. All algorithms have been tested on four sample images and experimental results show that both metaheuristics find excellent solutions, while computational time is negligible compared to exhaustive search. In this paper, the approach of having an image segmented clearly for further test filling and orientation is given.

5) They have discussed an approach of extracting the facial segments and features. This paper describes a method for segmenting the frontal head and other facial parts of persons from grey level images. The segmentation is done by oriented template correlation. This matching method only depends on edge information, especially the orientation of the edges. In the matching stage, we calculate the possibility for a face at the current image position using this model. The detection capabilities of the presented algorithm are evaluated in a large database. This process optimizes the algorithm and increases processing efficiency. The approach is to partition an image based on abrupt changes in intensity, such as edges in an image and partition the image into regions that are similar according to a set of predefined criteria. Segmenting and extracting facial details is a tricky task and requires higher accuracy.

6) In computer vision and image processing, Otsu's method, named after Nobuyuki Otsu, is used to perform automatic image thresholding. In the simplest form, the algorithm returns a single intensity threshold that separates pixels into two classes, foreground, and background. The paper thoroughly discusses the Otsu method and extends it to the 2-dimensional histogram. The 2-dimensional Otsu method utilizes the gray-level information of each pixel and its spatial correlation information within the neighborhood. This method compared with the 1-dimensional Otsu method. It was found that the proposed method performs much better when the images are corrupted by noise.

III. PROPOSED SYSTEM

The proposed system eases the process of generating Typographic Portraits. The process gives a visually appealing portrait of the person expressed by the phrase given by the user. The system has to take the input of the user image and the text filled in the portrait. The system consists of two main steps: Image Processing and Text Processing. The results of the two steps are involved to give the typographic portrait. The methods we observed in the survey are required to build the system. As we observe, the existing systems that provide typographical portraits of input images are incapable of providing a visually appealing portrait at a reasonable cost and amount of time.

The system developed works in two main phases:

A. Image Processing

This phase takes the image as input, converts it to grayscale, performs threshold on the image and then fills the threshold image with text. In step 1, related details filtered out. In step 2, filtered data are the association of different key value pairs and each pair is different numbers of samples, which results in forming a data block. In Next steps , these blocks are forwarded to be processed by the Data Processing Unit.

Firstly, the input image is converted to a grayscale image which helps to apply thresholding distinctly. Then the gray scale image undergoes the process of image thresholding. This process is applied with some defined algorithms. It creates a bitonal (aka binary) image based on setting a threshold value on the pixel intensity of the original image.

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1) Algorithms Used

a) Local Binary Pattern (LBP): Local binary patterns (LBP) is a type of visual descriptor used for classification in com- puter vision. LBP is the particular case of the Texture Spectrum model proposed in 1990. LBP was first described in 1994.It has since been found to be a powerful feature for texture classification; it has further been determined that when LBP is combined with the Histogram of oriented gradients (HOG) descriptor, it improves the detection performance considerably on some datasets. A comparison of several improvements of the original LBP in the field of background subtraction was made in 2015 by Silva et al. A. How Local binary pattern works : The LBP feature vector, in its simplest form, is created in the following manner: Divide the examined window into cells (e.g. 16x16 pixels for each cell). For each pixel in a cell, compare the pixel to each of its 8 neighbors (on its left-top, left middle, left-bottom, right-top, etc.). Follow the pixels along a circle, i.e. clockwise or counter-clockwise. Where the center pixel's value is greater than the neighbor's value, write ". Otherwise, write ". This gives an 8-digit binary number (which is usually converted to decimal for convenience). Compute the histogram, over the cell, of the frequency of each 0 occurring (i.e., each 29 combination of which pixels are smaller and which are greater than the center). This histogram can be seen as a 256-dimensional feature vector.Optionally normalize the histogram. Concatenate (normalized) histograms of all cells. This gives a feature vector for the entire window. The feature vector can now be processed using the Support vector machine, extreme learning machines, or some other machine learning algorithm to classify images. Such classifiers can be used for face recognition or texture analysis.

b) Automatic thresholding using Otsu Method: The Otsu method utilizes the gray-level information of each pixel and its spatial correlation information within the neighborhood. The Otsu method, as proposed, is a non-parametric and unsupervised method of automatic threshold selection for picture segmentation. An optimal threshold is selected by the discriminant criterion. Namely, soas to maximize the separability of the resultant classes in gray levels. The procedure is very simple, utilizing only the zeroth and first order cumulative moments is a good thresholding method. However, this method does not take into consideration the spatial correlation between the pixels in an image. Thus, the performance might degrade rapidly as the spatial interaction between pixels become more dominant than the gray-level values. In this case it becomes difficult to isolate the objects from the background. The gray-level value of each pixel as well as the average value of its immediate neighbour is studied. Thus, the threshold is a vector and has two entities:the gray level of the pixel and the average gray-level of its neighbour. This method performs much better when the images are corrupted by noise.

B. Text Processing

Text processing simply works on the text that is to be put in the typographic portrait. User text is first taken into a text file and then the text is multiplied a very good number of times. The text is then stored there itself. The file is taken into consideration while filling the text into the thresholded image. Word cloud generation technique is used for text filling.

1) Word Cloud Generation

a) Input: Text and image as array

b) Output: Image filled with input text.

c) Steps

- For each event data, relevant Historical Data is extracted.
- Normalize this for all the live feed.
- Persist the data into the data store and forward it.

2) System Architecture

a) Input

- Input Image
- Text for typography

b) Output: Typography Portrait

Steps

- Take input image
- Convert image to grayscale
- Apply threshold algorithm on image
- Display Threshold image

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- Accept input text
- Duplicate text and write to a text file
- Fill text in threshold image
- Display the final typography png image

IV. RESULTS

A. Input



Fig. 1 Input Image



Fig. 2 B/W Intermediate Image



Fig. 3 Output Image

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V. CONCLUSIONS

The proposed system will demonstrate the use of image processing techniques such as edge detection, thresholding, text filling in the form of word cloud etc. The system produces a more visually appealing typography portrait as compared to the existing systems.

VI. ACKNOWLEDGMENT

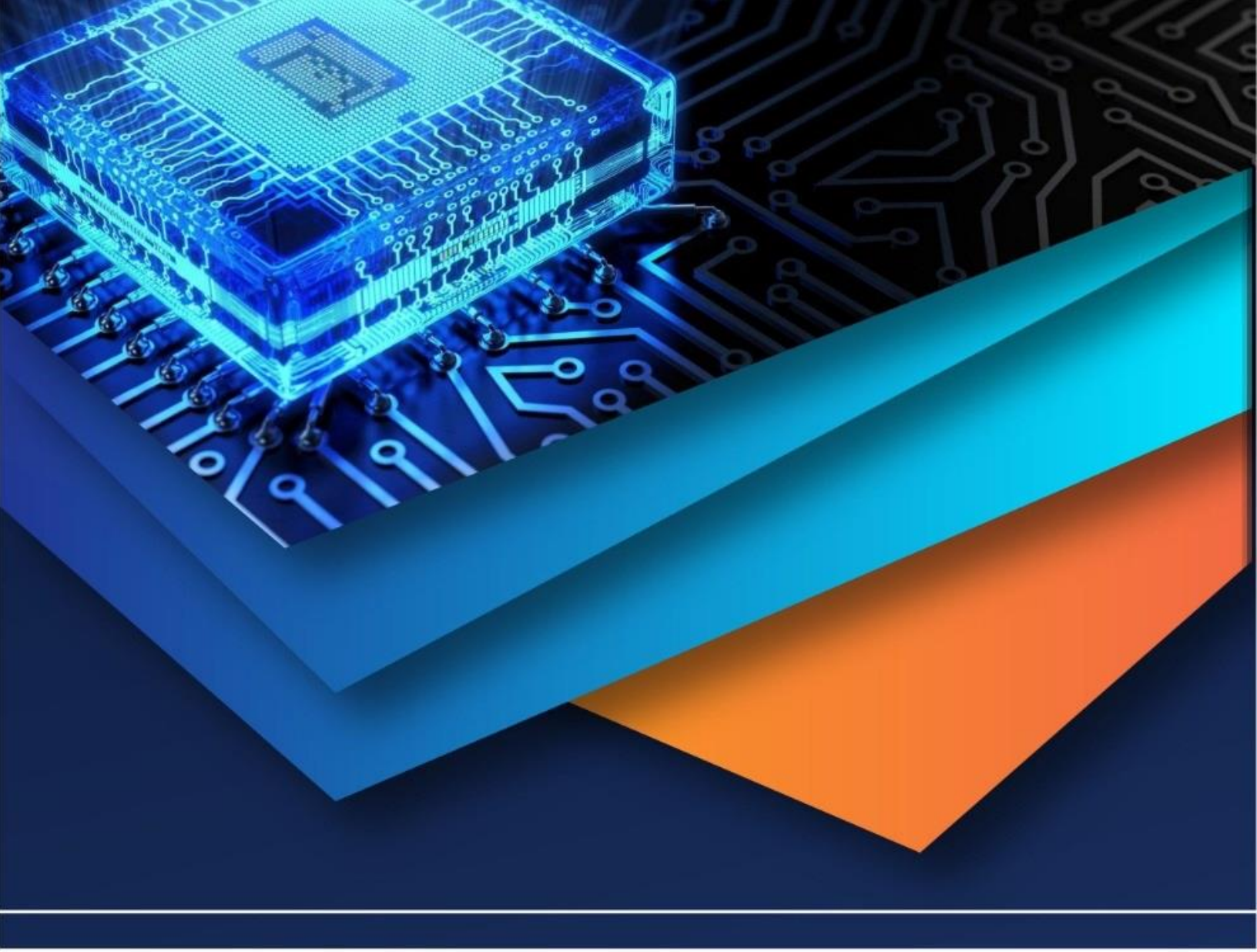
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