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Typographic Portrait Generator using Image Processing

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Abstract: ***Typography portrait is a 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 Orientation, Text Elongation.

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. LITERATURESURVEY

The modified approaches using various exploring techniques, the research papers for implementation of idea of 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.

A. 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 foreground is accumulated and assigned to the stroke-based binarized geometric shape like text, symbols and icons to be 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.

B. 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 background subtraction technique. For foreground detection, background modeling is used in many different applications to subtract the background and detect foreground object in the image. There are many challenges in elaborating a good background subtraction algorithm and researcher have been appropriated to developing 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.

C. Introduction of a technique of extracting the features from a given texture. Local Binary Pattern(LBP) is a method used to describe 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. Texture surface is quite low as a result of 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 regularity of texture patterns.

D. 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 the 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 meta heuristics 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.

E. They have discussed an approach of extracting the facial segments and features. This paper describes a method for segmenting 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 on a large database. This process optimizes the algorithm and increases the processing efficiency. The approach is to partition an image based on abrupt changes in intensity, such as edges in an image and partitioning 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.

1) Present Work: Typography portrait is indeed a very aesthetic form of art. Customers are willing to pay to have a typography portrait made for themselves. No doubt there are people who are exploiting this opportunity Currently there are a few service providers that are offering this as a service. The noteworthy competitors are Seanings, PictureToPeople and WordArt.

Fig. 1 Seanings

Seanings is an individual who creates typography portraits of celebrities using photoshop. The drawback of this approach is that it is very time consuming and requires a lot of human effort. Refer Fig 2

Fig. 2 PictureToPeople

PictureToPeople uses a simple approach. It superimposes the words on top of the image. The final result is not very sharp or clean. Refer Fig:2 WordArt makes use of word clouds. It detects the contrast in the image and creates contrast segments. The words are then arranged in a random size and orientation inside the segments. Refer Fig:3

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III. PROPOSEDSYSTEM

As we observe, the existing systems that provide typographical portrait of input image are incapable of providing a visually appealing portrait in reasonable cost and amount of time. The proposed methodology will allow one to generate the typographic portrait by overcoming the disadvantages of existing systems while involving the minimum efforts. As no such typographic portrait generator application exists, only research papers related to the proposed methodology are studied.

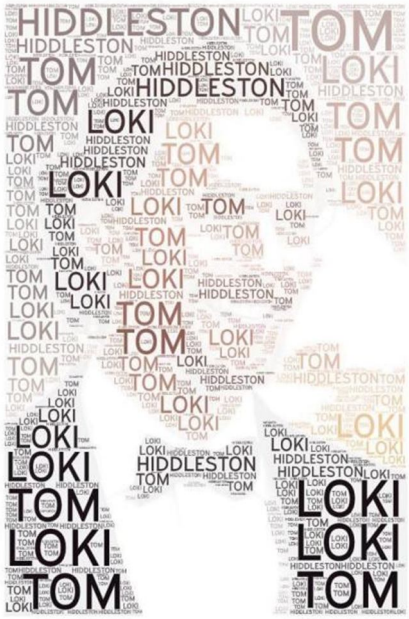

Fig. 3 WordArt

The system will make use of a dataset of images. The dataset will be divided into training data and testing data. The training data will be used to train the model and the testing data will be used to test the model.
The system model will contain a few key components like background subtraction, image segmentation and text filling.
In background subtraction, the background and the actor or subject will be separated. The background will be discarded and only the portion of the image containing the actor will be preserved.
Image segmentation is the division of the image into segments. In this phase the features of the actor will be found out and segmented. The different features will be represented by the multiple segments.

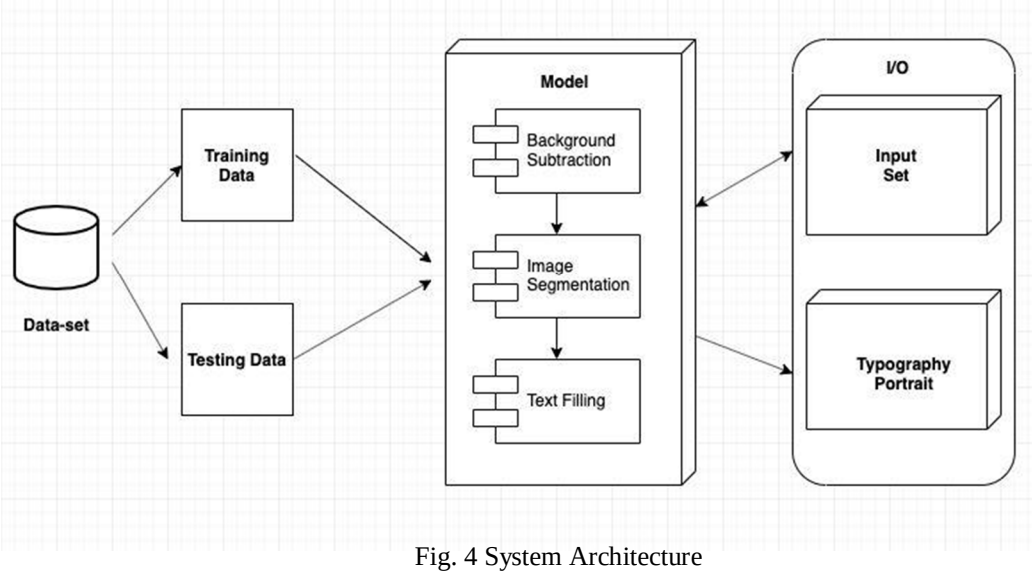

Fig. 4 System Architecture

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Text filling is probably the most tricky part of the system. In this phase, words or text is filled inside the various segments created in the previous phase.
The system will take image (with actor present) as input and produce an output image with typography portrait of the actor.

A. Background Subtraction

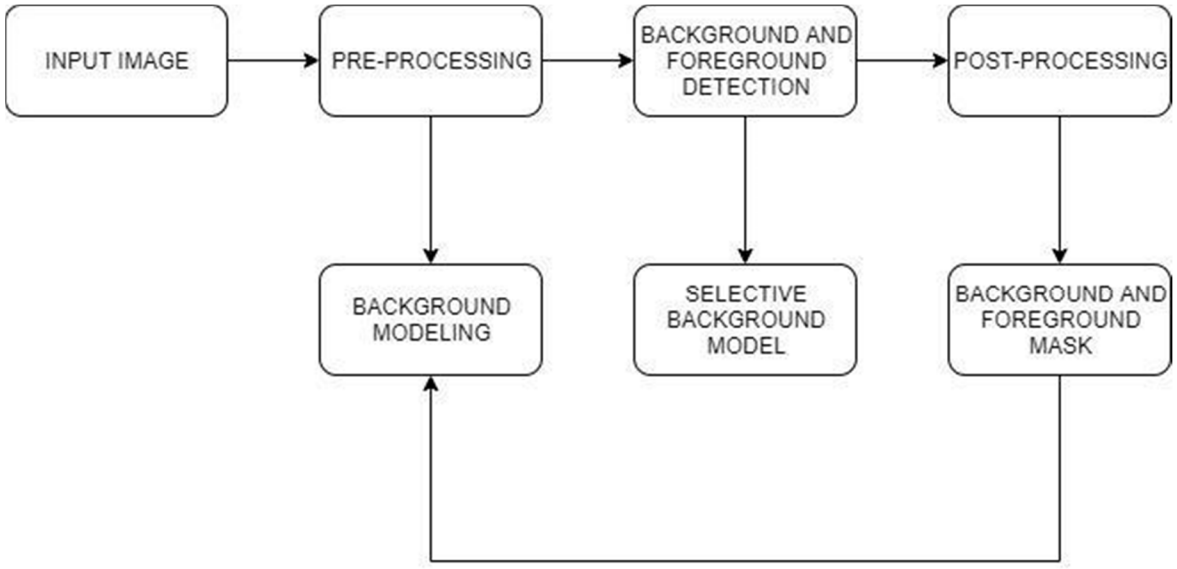

Fig. 5 Flow diagram of background subtraction.

This is the initial step of the main working of our software. Here we need to accentuate the primary target by removing the unwanted things present in the background. So in background subtraction, the basic operation needed is the separation of the moving objects called “foreground” from the static information called the “background” , but we do not need to use this as we are not performing background subtraction on a video. We need to use selective background subtraction.
Background subtraction process considers four major steps which are pre-processing, selective background modeling, , background and foreground detection and finally data validation.

1) *Pre-Processing:* Pre-processing is the process of reading input image into a data format that can be used for the selective background modeling.
2) *Selective Background Modelling:* Background modelling is the heart of any background subtraction algorithm. In background modelling, we used selective background subtraction method to select the unnecessary background in the image and apply the binary mask for this selection. This binary mask is output for the next phase of foreground detection.
3) *Background and Foreground Detection:* The foreground and necessary background are separated from the selective background model after the step of selective background modelling. The method will classify the selective background and necessary background and foreground object by identifying it pixels from the input image.
4) *Data Validation:* Data validation stages examine the binary mask of background and foreground object with the input image and then remove the selective background and detect foreground object with a corrected background in the image.

B. Performance evaluation of selective background subtraction:

1) *Robustness to Noise:* Determining how efficiently the region of interest is detected by the algorithm by adapting to noise automatically, as regions of interest are selected from noisy pixel values.
2) *Computational Cost:* It isbased on the time and the resources required by the algorithm respectively. For determining the accuracy, as the number of methods in the algorithm increases, the computational load also increases.

C. Image Segmentation

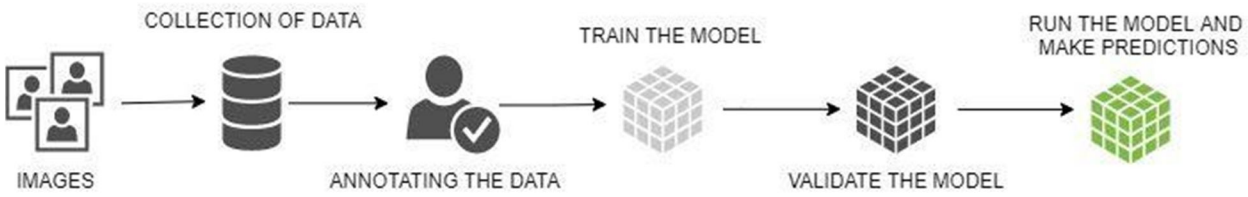

Fig. 6 Image Segmentation.

Image segmentation is the process of taking a digital image and segmenting it into multiple segments of pixels. The goal of image segmentation is to simplify and/or change the representation of an image into something more meaningful and easier to understand.

Semantic Segmentation is the process of assigning a label to every pixel in the image. This is in stark contrast to classification, where a single label is assigned to the entire picture. Semantic segmentation treats multiple objects of the same class as a single entity. On the other hand, instance segmentation treats multiple objects of the same class as distinct individual objects (or instances). Typically, instance segmentation is harder than semantic segmentation.

Image Segmentation process typically consists of five essential steps which are collecting data, annotating the data, training a model, validating the model and finally run the model of images and make predictions

1) *Collecting Data:* Collecting data refers to the creation of dataset of images. The collection of images will be stored and used for further processing.
2) *Annotating the Data:* The user needs to annotate the images and identify the region of damage. This can be done with the help of an annotation tool.
3) *Training a Model:* In this step we train the model that we have created using the annotated images.
4) *Validating the Model:* Validation of the trained model is carried out in this step.
5) *Run the Model of Images and Make Predictions:* Run model on images from test/val set and see model predictions.

D. Text Filling

In text filling, writing of the given text into the various shapes (segments) of the image is carried out. The text is meant to be wrapped inside the segments of the image. The result from the step 2 is the image divided into the different segments of the same pixel value. Following steps may be performed in text filling ,

1) *Extracting segments:* The text cannot be written in the irregularly shaped segments, that's why the extraction of the normal shapes from the segments is to be done. The knowledge of the pixel value of every segment in the image is required for identifying the shapes for text wrapping. The four extreme coordinates are considered within the segment of the equal pixel values. Given, the quadrilateral formed is wholly contained within the segment, the segment is considered for text filling. The segment extracted does not have a pixel with different value than pixel value of the segment..
2) *Division of segment:* The quadrilateral is divided in small rectangular shapes. The segment is made the grid of rectangular shapes of various sizes. The start coordinates of every rectangular box are required for the text writing.
3) *Text writing:* The boxes are considered for writing the text from the given word. According to the size and orientation, the alphabets are written into the boxes. The part of the word to be written is chosen wisely to accomplish the text wrapping of the entire word into the segment. The size of the text is decided with respect to the size of the box.

The machine or model has to be made apt to learn the ability to select the text segments according to the orientation of the segment of the image. The high level Convolutional Neural Network is required to train the machine for fulfilling the goal.

IV. CONCLUSIONS

The proposed system will demonstrate the use of image processing techniques such as edge detection, instance segmentation, segment masks, text filling in irregular shapes, etc. The system will produce a more visually appealing typography portrait as compared to the existing systems.

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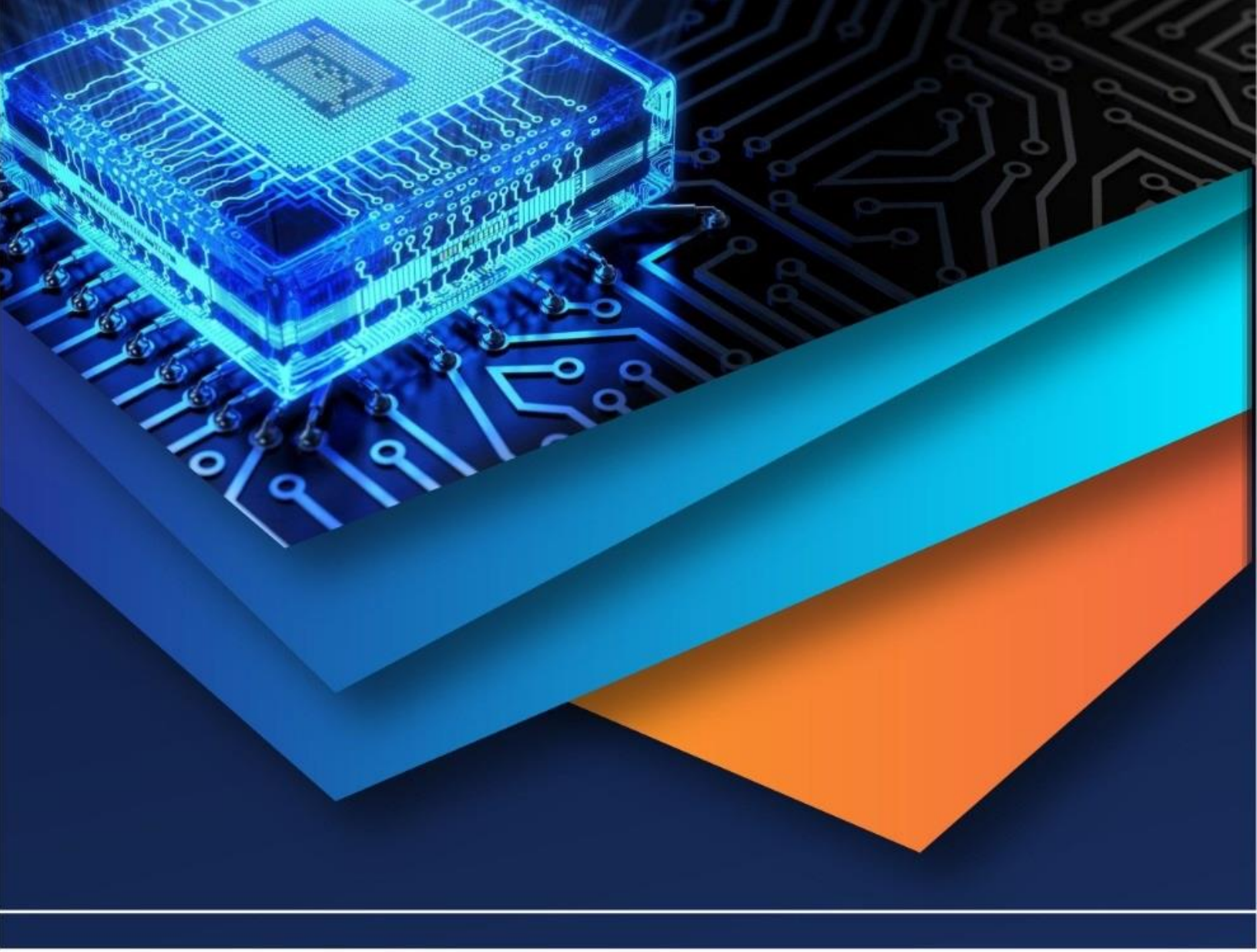

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