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A Distinct Technique for Facial Sketch to Image Conversion

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***Abstract*—** A liberal amount of software applications are in market for generating a sketch out of an image, the vice-versa though is unacquainted. Whereas such an implementation will prove to be purposive to the crime investigation departments. Such a youthful approach for generating an image from a sketch is suggested in this paper by following a process of, breaking down the sketch into constituent or component of face, matching or comparing these features with the available database, selecting the best match followed by registering or pasting these image components on a blank face image, performing filtering algorithm in order to perform smoothening of image.

***Index Terms*—** Feature detection, feature extraction, facial components, filtering algorithms, fiducial points, smoothening image.

I. INTRODUCTION

A liberal amount of software's and applications are available to convert a image to a sketch and are well known the vice-versa tough is not yet induced, that is there exists no methodology that would support the conversion of a sketch to an image.

The paper presents a layout for a similar idea, foregoing on which this plan is distributed into four parts Detection and Extraction of features, Matching of features, Registering features to form image, Smoothening and finish to form an image. Using the developed technique for Detection and Extraction of features, using the data obtained from the same performing matching of features. The input will consist of matched features which will be pasted on the face mask so as to obtain the desired output image.

Detecting features is the objective of the first module where facial features are detected and extracted, a database of which is generated for further use. The second module demands a facility of being able to compare two inputs which are a sketch and its feature on a variant platform the approach takes a path of conversion of both the inputs to a similar platform say black and white and then performing feature matching algorithms like PCA Algorithm. The execution of this algorithm is performed on the database and the test image on which conversion is to be performed, automatically without providing separate compatible image to perform matching multiple times with different image inputs. Module three leads to extracting desired features of input sketch and matching them with image equivalents from the database registering all the components together forming an output. Concluding module performs image smoothening algorithm for giving a finishing to the output obtained.

II. LITERATURE SURVEY

A detailed approach on various techniques of merging images is presented. The reference [1] provides various unswerving methods for achieving the objective are introduced along with their result giving capacities. On the basis of which analysis report is also deployed in the given paper. The authors are focusing on a smoothly finished image that is obtained by merging few other images.

The basics of recognizing the similarities between two faces are denoted in reference [2]; the approach used is based on facial expressions that are beneficial to our project from the point that we consider the facial features. The expressions used as a distinguishing point in this paper are the similar aspect we intend to use in our project. Thus the identification of features is taken in consideration and thoroughly observed from this paper.

Pattern recognition and face recognition is the main objective in reference [3] , which not only introduce variant methodology for recognizing a face and producing result in form of acceptance and rejection but also gives a determined percentage of the face match. No limiting is done for displaying the percentage thus every input is considered as a valid input and thus a valid output.

The CMU pose and illumination is a base of the 3D imaging where the expressions are identified and compared using a three dimensional aspect which did not prove to be much of use with respect to our project point of view but the identification methodologies used can be replicate by simply avoiding the three dimensional part. Reference [4] introduces comparison method that produces highly dependable results and thus can be useful.

Feature identification and recognition methodologies with an improvisation that it also presents the identification of these facial expressions or features or faces in first place even in disguise. Reference [5] enlightens any temperament to the original face image can be identified separately and

considered and avoided according to the input and the recognition is done.

In order to imply a combination of nonlinear diffusion and bilateral filtering refining image and edge detection technique is proposed. Citation of two well established methodologies in image processing community is done in order to get a base to the model, which makes understanding and implementing the method very easy. Execution of numerical experiments exhibits that the proposed model can achieve more accurate reconstructions from noisy images, in comparison to other popular nonlinear diffusion models in the literature. Reference [6] briefs a diffusion stopping criterion, established from the second derivative of the correlation between the noisy image and the filtered image which can be introduced as new and simple. Prevention of the diffusion process is done by this indirect measure that depicts a close to the point of maximum correlation between the noise-free image and the reconstructed image, when the former is removed. The stopping criterion is sufficiently general to be applied with most nonlinear diffusion methods normally used for image noise removal.

Literature survey of methodologies of face matching and feature matching is done in this paper. All present techniques for the same are studied and a detailed analysis of the same is presented in reference [7]. Analyzing approach is based on the study of all these techniques under the similar databases and inputs such that the obtained outputs are visually identified to be similar or not and to what extent documents represented as vectors.

III. PROPOSED WORK

A simplified methodology that proposes the conversion of sketch into image with an appropriate approach such that the originality of all the features is retained. The basic approach is to identify the prominent features of a face and then searching for an appropriate or equivalent image equivalent of the same, then by replacing the image equivalent of the feature on the face mask performing proper pasting and smoothening such that the image looks genuine..

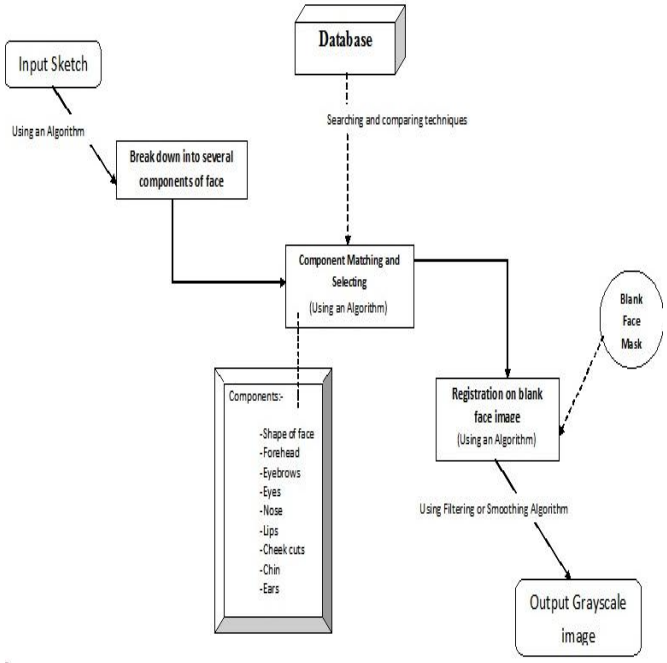

Figure. 1 - Architecture of proposed method

A. Method of Data Collection:

Standard image and its equivalent sketch database are collected from authenticated collection. The database collected consists of more than fifty sketches and its equivalent images. The sketches will be the test inputs, all these sketches need to be of specific dimensions or précised size.

B. Preprocessing:

Database collected from authenticated database collections is processed to obtain a database of components of face or facial features of only the image format, as the processing on sketch is done during execution of the code. Separate collection of these features is stored and retained for use during the code execution. The various feature database consist of the following,

a. Eye database.
b. Nose Database.
c. Mouth Database.
d. Blank Face Database.

C. Methodology:

The entire process is summarized into four modules which are elaborated below the modules namely are as stated,

- Feature Detection and Extraction.
- Feature Matching.
- Registering image equivalents.
- Smoothening and finishing output

D. Feature Detection and Extraction:

When an input is passed to the method the primary task is to use feature detection methodologies and detect the prominent facial features. G In order to generate patterns from time series data for classification purposes several feature extraction methods have been introduced. A statistical measure of the amplitude of the time series is provided by the well known kurtosis method. Another method displays construction of a feature vector using the spectrum, where the power spectral density and the wavelet coefficients are used along with PCA for feature extraction.

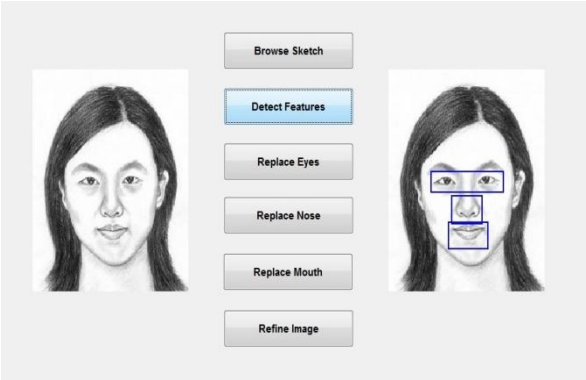

Figure. 2 - Feature detection method

For extracting the phase information Hilbert transform requires conversion of the real-valued signal into complex-valued analytic signal. Time series data is predefined in the SDF-based feature extraction, which is first converted into symbol sequences, and then probabilistic finite-state automata are constructed from these symbol equines for compressing the pertinent information into low-dimensional statistical patterns. DF-based feature extraction from

(wavelet-transformed) time series has been proposed by Jin et al. (2012) for target detection and classification in border regions. The time–frequency localization and demonizing of the underlying sensor time series leads for the use of rationale wavelet- based methods. However, this method requires selection and tuning of several parameters (e.g., wavelet basis function and scales) for signal pre-processing in addition to the size of the symbol alphabet that is needed for SDF. Use of Cascade object detector is done in order to detect and extract the features.

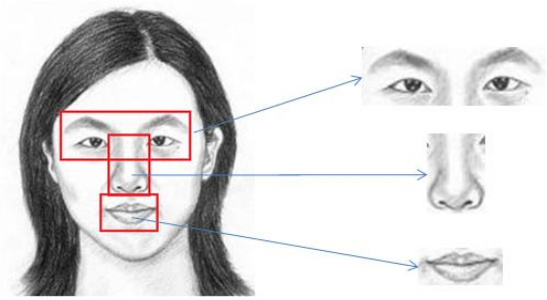

Figure. 3 - Feature extraction method.

E. Feature matching:

Application of principal component analysis is done on each image by the Eigen Object Recognizer class, the results of which will be an array of Eigen values which can be recognized by a Neural Network which is trained. PCA is a frequently used method of object recognition as its results, can be fairly accurate and resilient to noise.

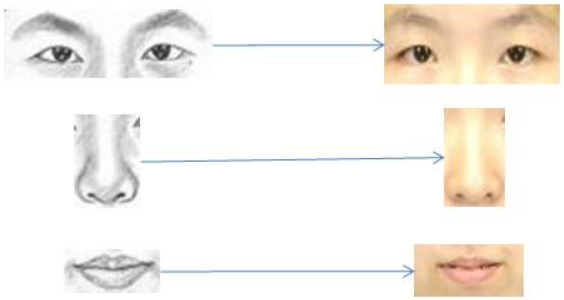

Figure.4 - Feature matching method

The method of which PCA is applied can vary at different stages so what will be demonstrated is a clear method for PCA application that can be followed. It is up for individuals to experiment in finding the best method for producing accurate results from PCA. To perform PCA several steps are undertaken:

a. Set extracted feature as test image.
b. Consider train database of particular feature.
c. Perform PCA detect output.
d. Display output.

F. Registering Features and Smoothening Image:

The previous mode of feature matching provides several image outputs viz. Eyes, nose, mouth, blank face. The objective now switches to registering all these components together in proper dimensions at proper location. In order to detect exact location of every feature their original landmarks are revised from the input sketch, this simplifies the task of dimensional repositioning of the features. Facial points are detected to register the location of every component specifically at its precise dimensions.

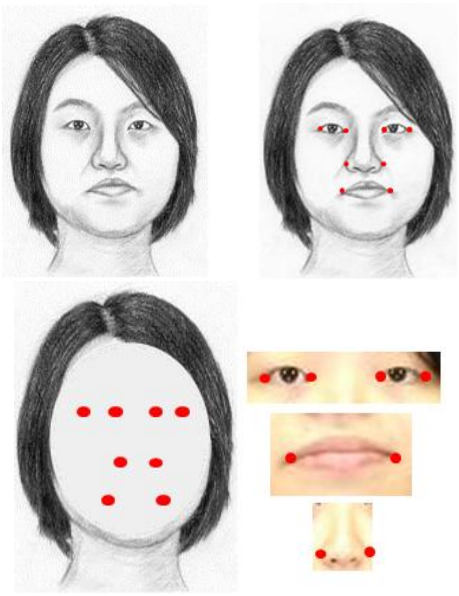

Figure. 5 – Approach for detecting location of components.

The outcome of all will be a patched form of image which will have all the image components in their appropriate locations but the facial appearance of the image may not be as pleasant as expected. Resizing the components and realigning them is thus a necessity, for which application of certain filtering and smoothening algorithms is conducted.

Figure. 6 – Approach for registering of features

The output is finalized by performing gradient smoothening on the image and image blending algorithms are executed for obtaining a perfect outcome, the output is a visually pleasant image form as shown below,

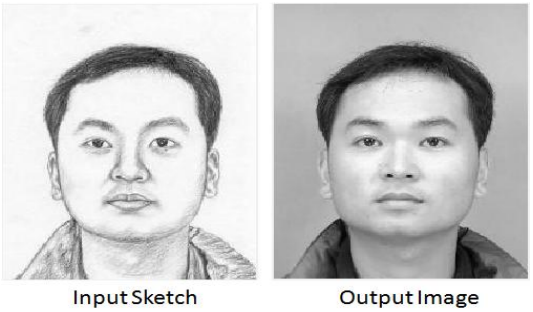

Figure. 7 Final outcome of image formation.

IV. ACKNOWLEDGMENT

This paper proposes a distinct technique for creating an image output from a sketch input. It is presented successfully in the paper, an approach that is used to improvise a unique method for developing a novel technique and presenting a satisfying output.

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