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Supervised Method for Face Photo Sketch Synthesis and Recognition

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Abstract: *Facial Sketches are most widely used in law enforcement agencies for identification and apprehension of suspects, which may involve in several criminal activities. In this paper we plan to implement an efficient system to recognize a forensic sketch images to a gallery of mug shot images which will help law enforcement agencies. In this paper SIFT algorithm explained for feature extraction. This SIFT feature will possess strong robustness to the accessory, expression, pose, illumination variations.*

Keywords *- Face sketch recognition, image matching, feature, SIFT*

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I. Introduction

Face Photo Sketch Recognition & Synthesis is important technique used to overcome the difficulty of matching photos & sketches in two different modalities. . It is also developed mainly for security purposes thus used in law enforcement. As the necessity for higher levels of security rises, technology is bound to swell to fulfill these needs. Any new creation, enterprise, or development should be uncomplicated and acceptable for end users in order to spread worldwide. To improve discrimination and to provide similar information to face recognition systems, it appears of importance to derive a sketch from a photo when this information is available. This process is called "Face photo-sketch synthesis".

Face sketch synthesis and recognition is a technology of using computer to analyze the face images and extract the features for recognizing the identity of the target. Due to illumination variations and occlusion, the appearances of a face complicate many problems in face recognition. With the rapidly growing number of digital cameras capturing data in public areas, having a robust and accurate face sketch recognition method is critical to apprehend suspects and prevent crimes. Image matching is a research focus in the field of image processing. Usually image in the imaging process will be affected by shooting time , angle ,the natural environment and other factors, not only the image captured by the interference noise and there are serious distortions and abbreviations.

The feature based sketch matching algorithm, scale invariant feature transform (SIFT) we present simpler and faster design and utilizes localized sketch information in the matching process. For such useful technique face recognition there are many more algorithms or methods research and develop for the ease of user. Mainly these methods are best favorable on their accuracy. SIFT feature posses strong robustness to the accessory, expression, pose, illumination variations. SIFT used for extracting local features. The face sketch recognition using SIFT can robustly identify face among clutter and occlusion.

The Proposed system will accurately matches forensic sketches with their corresponding photo images using feature-based approach. User will feed forensic sketch to the system to find a suitable match for the respective image found in the database. The feature descriptors of both the sketch and photo images are computed and matched for equality, once a match is found the user is alerted and the corresponding suspect's information is extracted from the database and displayed to the user.

II. Literature Survey

[1] David G. Lowe (2004) present a method for extracting distinctive invariant features from images that can be used to perform reliable matching between different views of an object or scene. The features are invariant to image scale and rotation, and are shown to provide robust matching across a substantial range of affine distortion, change in 3D viewpoint, addition of noise, and change in illumination.

[2] Andrea Vedaldi (2007) describes an implementation of the Scale-Invariant Feature Transform (SIFT) detector and descriptor. The implementation, which is compatible with D. Lowe's implementation1, is

distributed along with the source code. Designed for the MATLAB environment, the code is broken into several M and MEX files that enable running selected portions of the algorithm. The SIFT detector and descriptor are discussed in depth in. Here we only describe the interface to our implementation and, in the Appendix, we discuss some technical details

[3]Poonam A. Katre (2014) states that faces are highly deformable objects which may easily change their appearance over time. Not all faces areas are subject to the same variability. The SIFT approach in the context of face authentication. Several pattern recognition and classification techniques have been applied to the biometrics domain. The SIFT (scale invariant feature transform) is used for extracting local features.

[4] YU MENG and Dr. Bernard Tiddeman (supervisor) states that The SIFT algorithm takes an image and transforms it into a collection of local feature vectors. Each of these feature vectors is supposed to be distinctive and invariant to any scaling, rotation or translation of the image. In the original implementation, these features can be used to find distinctive objects in different images and the transform can be extended to match faces in images. This report describes our own implementation of the SIFT algorithm and highlights potential direction for future research.

[5]Tayyaba Hashmi (2016) states that, The problem of matching a sketch to a gallery of mug shot images is addressed. Previous research in sketch matching only offered solutions to matching highly accurate sketches that were drawn while looking at the subject (viewed sketches). To identify sketches much efficient algorithm is presented here. Both sketches and photos are considered for extracting feature descriptors using SIFT (Scale Invariant Feature Transform). Proposed method can be used to match a few sketches against a mug shot gallery containing several images.. The proposed project will lead to state-of-the-art accuracy when matching viewed sketches. The proposed project represent both sketches and photos using SIFT feature descriptors and multiscale local binary patterns (MLBP).

III. Proposed Methodology

In 2004 Lowe, invents SIFT descriptor which is invariant to scale, rotation, affine transformation, noise, occlusions and is highly distinctive. SIFT features consist of four major stages in detection and representation; they are (1) finding scale-space extrema; (2) key point localization and filtering; (3) orientation assignment; (4) key point descriptor. The first stage is to construct the key points of images by using Difference-of-Gaussian (DoG) function. The second stage, candidate key points are restricted to sub-pixel accuracy and removed if found to be unreliable. The third stage represents the dominant orientations for each essential point of the images. The final stage constructs a descriptor for each key point location depends upon the image gradients in its local neighborhood. Then the SIFT descriptor is accepting the 128- dimensional vector which used to identify the neighborhood around a pixel. The SIFT extracts the key points (locations and descriptors) for all the database images. Then given an altered image SIFT extracts the key point for that image and compares that point to the dataset.

IV. Flow diagram of SIFT algorithm

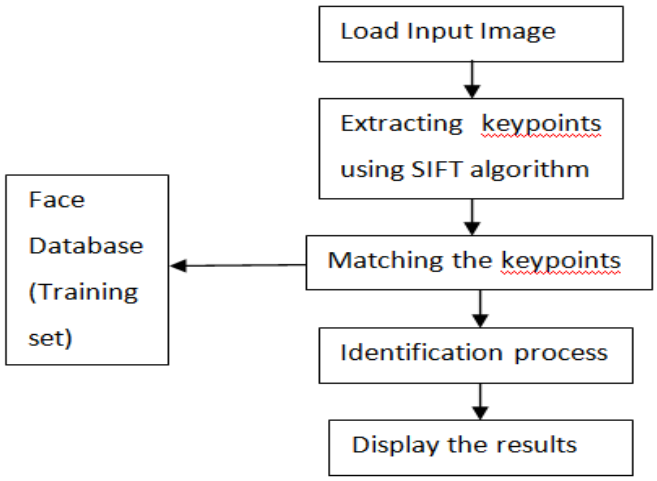

Fig1: The flow diagram of proposed SIFT algorithm

Face detection and tracking is the method to find out determining whether face is present or not in an image. Face detection gives information about presence or absence of required face only which is contrary to the

face recognition technique. The group of feature based face recognition techniques is the Scale Invariant Feature Transform (SIFT) proposed by Lowe. The SIFT technique and its corresponding features has many properties that make them suitable for matching different images of an object or a scene. The SIFT is a method that detects the local key points that are notable and stable for images in different resolutions and uses scale and rotation invariant descriptors to represent the key-points .Face recognition is done by using SIFT algorithm. The input query image first extracted the key points. If the search input image key points are close to train database than the input query image is matches with the database.

V. Conclusion

Face sketch recognition is a challenging as well as important recognition technique. There is a need for continual research on forensic sketch matching. This can help assist the law enforcement agencies to apprehend criminals quickly, before they commit another crime. In this paper SIFT algorithm utilizes feature extraction and keypoint matching process for the selection of best image by matching highest number of keypoints. Feature matching method by researchers alike for its performance and stability, matching speed. The SIFT algorithm have a good effect for solving image distortion caused by viewpoint change, rotation and scaling and partial occlusion. The advantage of SIFT algorithm posses strong robustness to the accessory, expression, pose, illumination variation.

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