

RELATIVELY PERMANENT PIGMENTED SKIN MARKS BASED CRIMINAL IDENTIFICATION SYSTEM

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Abstract-

Face Recognition cannot be used to identify the person under certain types of situations because there is not enough of adequate facial image. The very same problems arise in instances of child sexual abuse, in which sexual offenders' images and markings are practically non-existent in corroboration pictures or have been purposefully obscured to avoid identification. The Relatively Permanent Pigmented Vascular Skin Marks can be used an alternative method to identify persons in such cases. An automated identification system consists of skin segmentation is used for matching algorithms in these skin images to recognize offenders. The identification system has been assessed on reference images of different topics, and it was demonstrated that when contrasted with other methods, our detection algorithm generates stable patterns of epidermis marks to identify skin marks. The system identified objects with a high accuracy.

Keywords – Skin marks, Vein Pattern, Relatively Pigmented Mask.

I. INTRODUCTION

In circumstances which including criminal cases, it is occasionally possible to collect founded biometric characteristics for example a child's body or palm prints. In these kind of instances, vasculature pigments as well as epidermis traces can indeed be immensely beneficial. Particularly in instances involving a child, physical molestation, and so forth. A tissue identification system is a software program that includes electronic videos or images to recognise or authenticate an individual from a video sequence. One technique is to compare the individual skin characteristics of something like the body and the face datasets. It is frequently used during surveillance systems and may be especially in comparison to certain other biometric authentication including such fingerprint images or even the iris of the retina. It is also growing extremely prevalent as just a business and marketing identity tool. Some algorithms that recognize faces extricate landmarks to recognise facial characteristics. Many methods regulate a selection of facial images prior to actually processing the facial

characteristics, having saved just the information contained in the image that really is useful for computer vision. The facial expression data is next compared to a test image. One of the very first successful systems is founded on the template matching, which itself is decided to apply to a collection of pertinent facial characteristics to provide a compressed representation of the image. Configuration, that also makes it look at specific attributes, and spectroscopies, which is a statistical technique that summarises an impression in and out of value systems and contrasts the value systems with frameworks to completely remove deviations, is the two principal approaches to processing algorithms.

Relatively Permanent Pigmented or Vascular Skin Marks were recently implemented as a biometric characteristic for proof of identity in instances in which the scientific proof photo shows only the non-facial parts of the body of the criminal activities or survivors, for example in sexual abuse of children and violent protests. Even though manual identification is time intensive and grueling, automated systems can be developed which can use the modern algorithms of computer vision, image processing and machine learning to fasten the process of detection. In this paper, an automated technique is presented which uses back skin images and vein patterns to combine them into a hybrid system.

II. LITERATURE REVIEW

X.Li et al. [1] demonstrated a technique for identifying dorsal palm vein patterns. To enhance the recognition percentage, the vascular structure must have been obtained with minimal modification. The algorithm performs a smooth, one-pixel-width skeletal structure with hardly any deformation after such a number of steps including shape and greyish normalisation, Gaussian lowpass and median filtering, NiBlack content based on visitors edge detection segmenting, region thresholding, morphometric and closing, median filtering, conditional shrinking, prompts weeding. The extracted features are therefore developed by obtaining the vein skeleton's seven rectified moment. Finally, the SVM is fed this same feature representation for training as well as recognition. The algorithm can achieve a 95.5 percent recognition ratio in experiments.

C.Tang et al. [2] summarise also that strategies recommended for attempting to remove obstructing relics are unproductive for with software program. The above work presented an understanding technique for having removed JPEG trying to block relics all the while trying to heal tissue attributes. The association respectively existing and squeezed partitions can always be defined given an instructional database consisting respectively previous and pressurised tissue image data. The earliest components of condensed documentation images are concluded using the same advance knowledge. An archiving methodology is however envisioned to address large data points efficiently. Substantial tests have been conducted on pictures with widely differing character traits and compression ratios. The suggested algorithm outshines other techniques across both graphical and subjective analogies.

A. Nurhudatiana et al.[3] characterised the "Relatively Permanent Pigmentation or Vascular Skin Signs" as RPPVSM based on the biological characteristics. A general surgery highly qualified manual process classified RPPVSMs from Caucasian, Asian, and Latino males'

ribcage pictures. In accordance with the exploratory results, Caucasians emerge to have significantly more RPPVSMs than Asians and Latinos, and RPPVSM different versions are transmitted totally separate and homogeneously throughout the 80 percent of the population. Criminals in cases of child trafficking and sexual assault customarily cover up or conceal their own individuality and scar tissue, attempting to make recognition untenable. Similar views of their neck, chest, and buttocks thought and behavior skin texture marks. Manual RPPVSM identification could be challenging and time-consuming.

C.Tang et al. [4] proposed a technique for classifying persons by unravelling vein frameworks from surface divulged in images. The researchers prototype this same opposite stage of evolution of skin tone creation in a picture utilising theories from optics and skin bioengineering, as well as deduce distribution patterns of ecological factors from color images in which blood vessel structures can be sensed. The scientific tests' findings are extremely enticing. The clarification of vein forms in the final images is equal to or better compared to nearly infra - red portrayals.

A.Nurhudatiana et al [5] established three learning-based algorithms for automatically detecting RPPVSMs in color pictures. 216 back torso samples of 118 people were used to test those same algorithms. The results show that the new RPPVSM detection method has a huge upside for crime assessments along with good recognition accurateness.

Relatively Permanent Pigmented or Vascular Skin Marks are skin marks recommended by A.Nurhudatiana et al [6]. Individuality was investigated in order to sustain the scholarly groundwork for those who use RPPVSM patterns like an innovative biometric characteristic. RPPVSM has been checked on 269 men individuals' back sides. Authors unearthed that within centre to low population density structures, RPPVSM manages to create a separate and homogeneous distribution, even though in highly dense patterns, RPPVSM tends to form clusters. Authors display an individual personality prototype for individually and distributed uniformly RPPVSM styles. When especially in comparison to the regression coefficients, one such model is correct the parameter estimates well enough. Eventually, the validation and proof of identity accuracies are expected.

X.Hu et al. [7] postulated a simple and fast face detection method. Initially, certain locations of interest which also mark complexion areas were also tried to search using only chrominance Cr information, as opposed to both chrominance Cr and Cb data. Rather than, a customary and so well AdaBoost algorithm was applied to evaluate how many of the acknowledged points of interest seemed to have a face. Since converting 400 face patches into in the YCbCr vacuum, this one was unearthed that 400 face patches coincide with the Cr histogram, which itself is non-skin, and then was diminished to 137. A further 215 face pictures as from LFW repository were picked at random from a hot tub of 108 attendees to put the proposed approach towards the test.

Although large coverage points and red marks are also used, they were also counterproductive sometimes in criminal trials since this skin exposure in corroboration photos has had no identifying marks or complexion marks for identifier. But since vein inscriptions have not been

recognisable in coloured photographs, they seem to have been previously tricky to use in forensic testing. This paper explains a technique for identifying personal information styles in photographs taken of body. Even though blood vessel spots were not noticeable in coloured photos, they have been traditionally challenging to employ in forensic testing.

H.Alsufyani et al.[8] proposed a novel approach for probing the economic viability of just using compositional relevant data from skin and hair areas for ordinary person person authentication. This data is helpful because when complete face photograph is indeed not readily accessible for helping to identify, such as criminal examination. 4 facial areas were probed because they were highly probable to really be recognisable sometimes in illumination variations face image and are comparatively straightforward to recognize. The harvesting among those facial areas of particular interest is aided by the detection and recognition of feature point. A pattern matching technique is employed to identify areas that have high skin material. That after something which, each epidermis region is separately digested using feature extraction methods on Local Binary pattern and Wavelet transform filters.

Identifying suspects as well as abusers from photographs of epidermis from different parts of the body, so according Y.Peng et al.[9], is a novel and challenging task. In this sort of situation, variety of assessments is unattainable so even though skin images do not reveal visible characteristics, particularly in some forensic situations, and neither faces nor body marks can be identified. Countless techniques have been proposed to deal with this problem based on the appearance of skin signs and veins, however these methodologies overlook the reality that image is not constantly comprehensive, and skin points and vasculature are almost always imprecise. Androgenic hair variants are effective with low settlement, but integration has never been factored into the equation, and indeed the match is not steady for modifications in the perspective.

III. PROPOSED METHODOLOGY

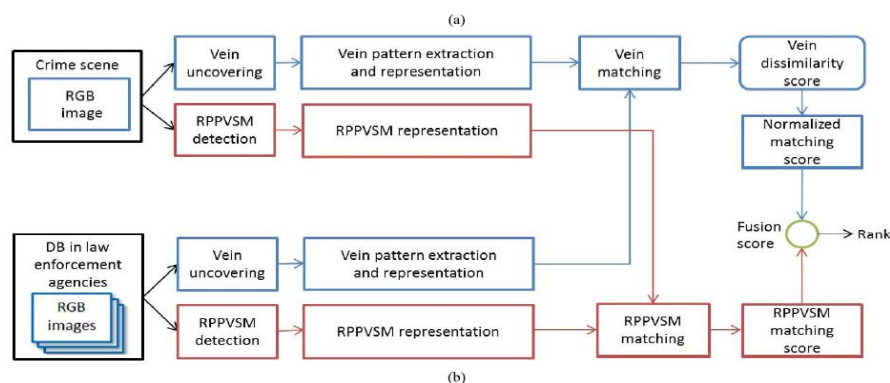


Figure 1: Proposed Methodology

As can be seen in the figure 1 above, the system consists of mainly two sections. In the first section, the raw input images are processed using both the relatively permanent pigmented vascular marks method as well as vein matching underneath the skin. The data base of different

criminals can be recorded and can be assembled with the local police department repository. In the second part, any new image can then be processed again to obtain the features and match with the existing database.

IV. RESULTS & DISCUSSIONS

MATLAB was used to implement the proposed algorithm. Images obtained from the internet include back images of people.

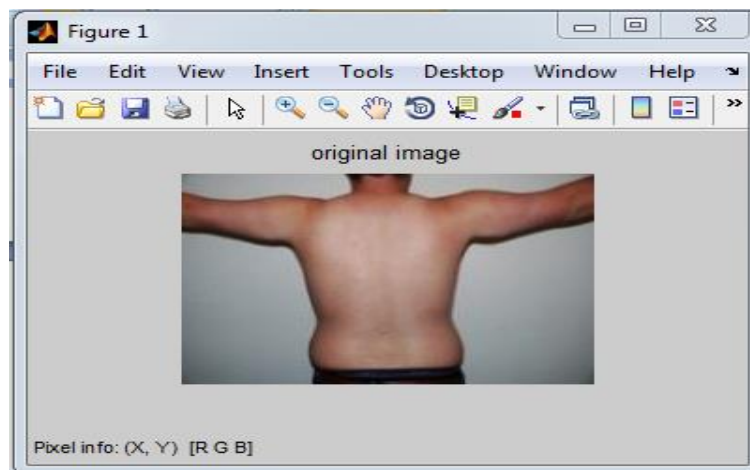


Figure 3: Image of Back Region

Figure 3 depicts the dataset's initial back image. It goes through several stages of processing.

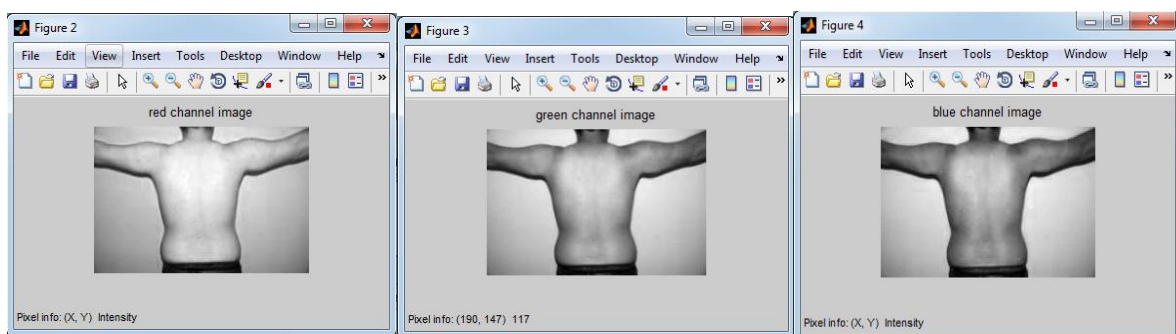


Figure 4: R,G & B image

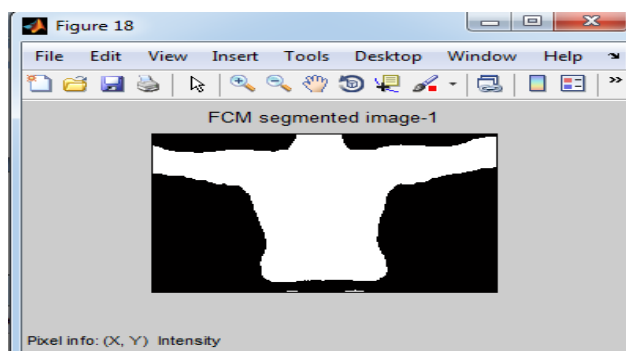


Figure 5: Fuzzy clustered Mean

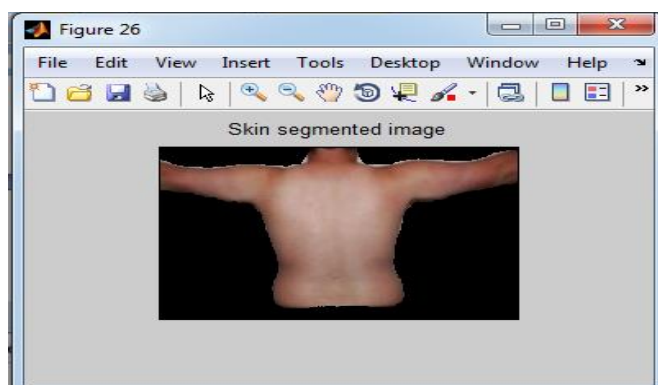


Figure 6: Background removed Image

Figure 4 depicts the results obtained by separating Red, green and blue channels respectively. Mask image is shown in figure 5 which would be used further for segmentation. The skin area is segmented within this image and the background areas are completely removed as can be seen in figure 6. Finally vein uncovering method is applied on this image to reveal the underlying vein network image.

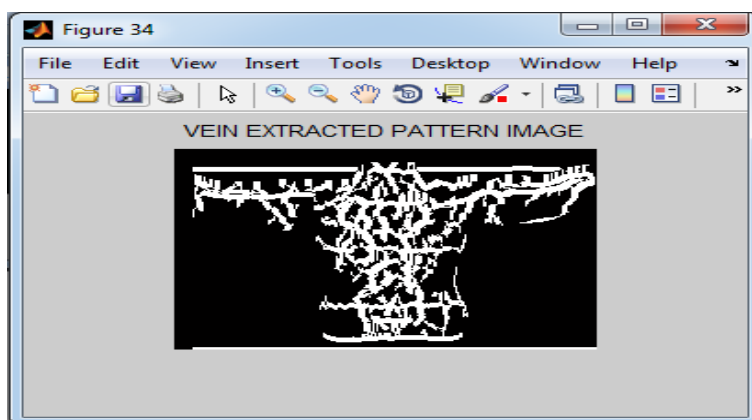


Figure 6: Extracted Vein Pattern

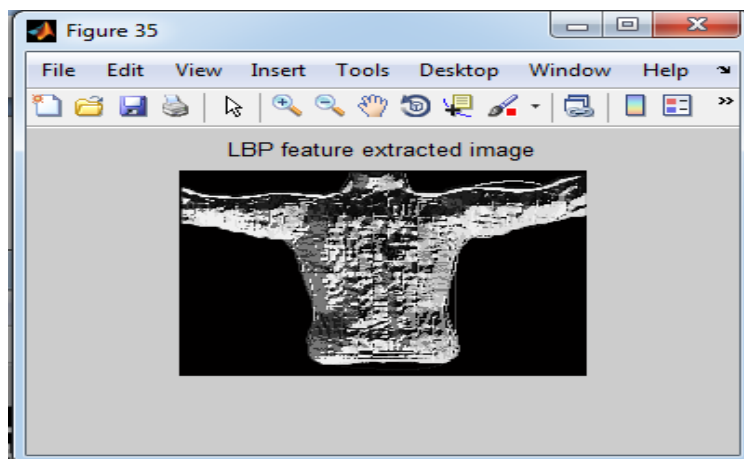


Figure 7: Local binary pattern features extracted image

Thus database of all suspects can be obtained using above techniques and whenever there is a suspect image obtained it needs to be compared with the existing database image features to detect the suspect. The results of matching images are shown in figure 8.

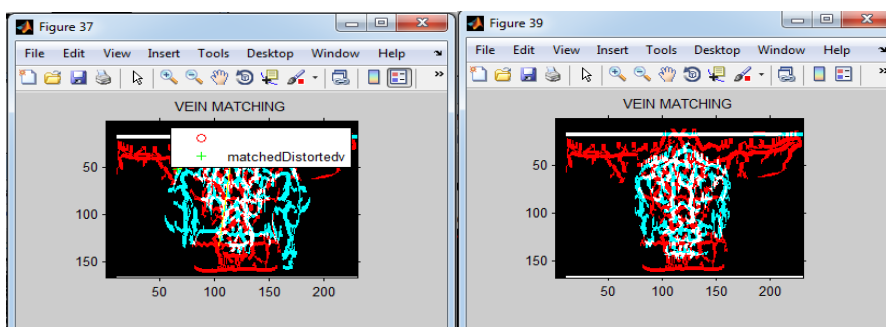


Figure 8: Vein Matching

Table I: Performance evaluation

Person	Accuracy
Person 1	96.78%
Person 2	95.16%
Person 3	96.78%
Person 4	95.16%

V. CONCLUSION

Although the identities of the perpetrators are rarely visible in video photos of child sexual exploitation, armed attackers, and riots, their nonfacial pieces are frequently visible. To identify criminals in these skin images, this paper proposes an automated identification system for

relatively permanent skin marks, which includes skin dividing, relatively permanent pigment detection algorithms. We matched multiple images of the same person and achieved high accuracy and recognition. Following vein pattern uncovering, features are extracted. The results of using support vector machine for classification are encouraging, with an accuracy of around 96%.

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