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DENTAL BIOMETRIC ANALYSIS OF HUMAN IDENTIFICATION

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Abstract - Dental biometry has playing major role in forensic human identification. Identifying a person in mass disasters happened due to tsunamis, fire accidents is a challenging problem if conventional biometrics such as face, fingerprint, iris is not found. Dental characteristics of persons are unique and can be used to identify individuals based on their dental radiographs. In this paper, we present a new and workable method for identifying humans, that extracts the dental features from dental radiographs which is used as a biometric identifier. The method we have proposed has five main processing stages.The initial stage is pre-processing which is the initial work on dental data. Next the Segmentation step which segments the images. Then Features extraction is extracts the features on segmented images and the biometric analysis is tested for matching and testing. The method is tested on databases such as dental radiographs and the results are highly encouraging than the existing systems.

KeyWords: *Forensic dentistry, biometric identification, dental radiographs.*

1. INTRODUCTION

The application of image processing in the field of biometric goes on improving day by day. The biometric system specifies the unique physiological features. There are different biometric feature which are unique for human such as fingerprint, iris, vein structures, face, teeth etc. In forensic identification, fingerprint, face, iris may decompose due to soft tissue decay and hence postmortem identification could not be possible. Unlike these conventional traits, the tooth is only identifier which doesn't decay year after death so teeth may be a strong identifier for post mortem identification of the person. The dental biometric systems available till now uses features of teeth like tooth shape and dental works as biometric identifiers. However, the AM and the PM radiographs of teeth may vary if tooth is damaged or dental work like filling, implants, root canals has been added to it. So, there is a need of robust biometric identifier that can resist any type of damage caused due to strong forces and high temperatures. Mandibular bone (is a strong dental biometric characteristic which does not get easily affected by these damages and also possesses unique identifying features. The main objective of the project is Dental biometric identification through the image processing. our project comprises of five main processing stages. the first stage is pre-processing which is the initial work on dental data. The second step is the Segmentation step which is used for getting the relevant part of dental data and other processing steps in segmentation. Then Features extraction is performed on segmented images by the HOG and finally biometric analysis is done for testing and matching.

2. LITERATURE SURVEY

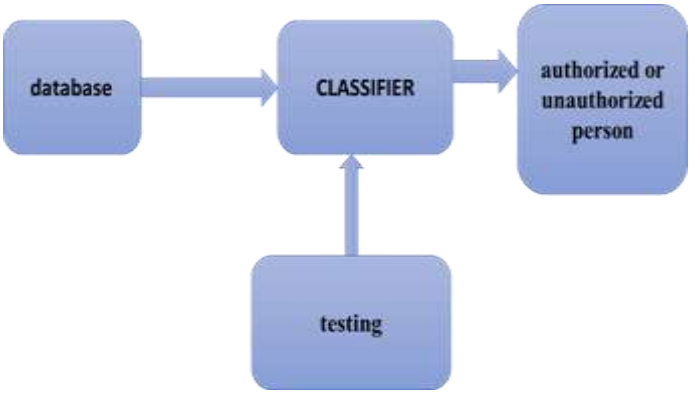
In 2016, A. Yuksel, L. Akarun and B. Sankur[1], "Teeth Feature Extraction And Matching For Human Identification Using Morphological Skeleton Transform. The proposed work uses SIFT algorithm and we use canny detection algorithm for the analysis. Then we go for edge detection and comparison with database images. The required database contains 50 images of dental photographs and 50 images of dental radiographs totally 100 images and that are taken from dental clinic. SIFT algorithm provides more accurate result. In 2016**, Zhi Liu and Shangling Song [2], "Classification and recognition of dental images using a decisional tree".** In this paper, we propose an algorithm based on a decisional tree to classify and identify 19 types of dental images. By using several extracted features acquired with a digital camera and x-ray scanner. The proposed technique has four main types such as mold, intra-oral, extra-oral and radiographic images of different patients. In 2013, **Peter M.Corcoran[3],"Dental Biometric in Human forensic Identification".** This system utilized dental radiography and dental photograph as it provides unique teeth features like shape, contour, dental work like crown, bridges and fillings, the relative distance between neighboring teeth etc. The proposed method consists of four processing stages such as image acquisition, preprocessing, feature extraction, dental code formation and matching. The proposed system gives an correctness of 94% for dental photograph and 96% for dental radiograph. In 2015**, Yiding Wang, Wei Xie, Xiaojie Yu, and Lik-Kwan Shark ,IEEE[5],** "A Study and Analysis of Image Enhancement Techniques

Augmenting Dental Pentagrams to review Jawbone Cysts and Tumors". Orthopantomograms (OPG) or Panoramic Imaging is one of the imaging methodologies used to identify any dental inconsistency. The aim of processing is to evaluate their local descriptors and to segment the regions of jaw bone cysts. For example, territory, border, circularity, strength can be utilized as a component vectors in Image characterization. In 2016 **Fateme Saadat and Mehdi Nasri [6], "Characterization of Dental Pathologies using Digital Panoramic X-Ray Images based on Texture Analysis"** Panoramic radiography/ Orthopantomography (OPG) is a common modality to screen patients with an convenience of ease of imaging and reduced exposure to patients. The panoramic images obtained with this equipment are oppressed by noise embedded during its acquisition making the detection of this dental caries difficult. The first part of this paper presents a novel route for detection of dental caries using hybridized negative transformation. The second part of paper presents, statistical texture investigation for the dental images containing cysts along with dental caries. The texture analysis is used when the objects to be segmented based on texture content rather than its strength. The texture features acquired from the GLCM are energy, entropy, homogeneity, dissimilar and correlation. Results obtained by both the methods were adequate associating with the diagnosis made by the maxillofacial radiologists.

3. PROPOSED SYSTEM

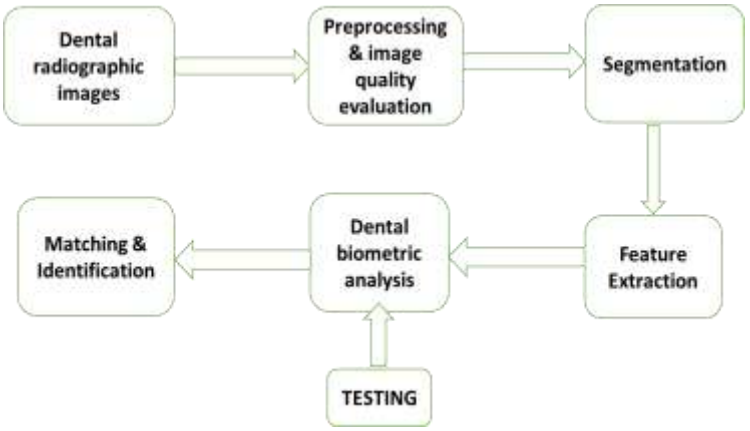
In the proposed system radiograph images of tooth is analysed. k means algorithm used for image segmentation. To avoid this, we will develop technique to detect problem and remove the blur. Then next step of pre-processing consists of separation of the region of interest associated which is part of the image comprises some desired teeth of the. After pre-processing , segmentation is done to implement a system which has biometric identification method based on dental data. First an image for dental identification is selected. Then it is converted from RGB to grayscale image. Then it is filtered by gaussian filter to remove the noises. The filtered image is segmented using K MEANS algorithm by this method the teeth pattern segmented and will be shown. The features of the teeth images are extracted using HOG. The extracted features of an image compared with the training dataset by using KNN classifier. Finally, we show whose dental biometric that the selected image at the result.

BLOCK DIAGRAM DISCRIPTION:



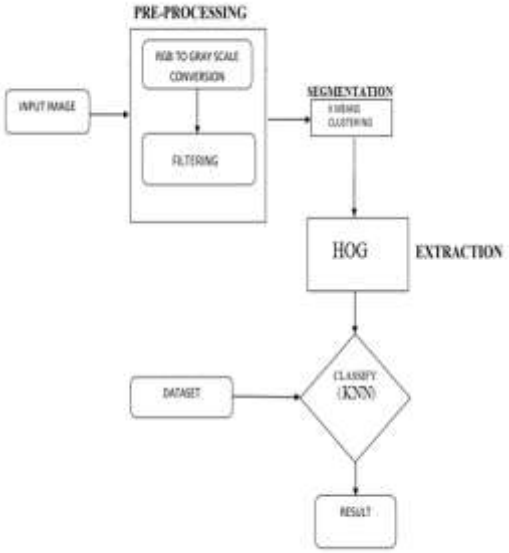
METHODS:

- Input image dataset with 10 images
- Preprocessing
- Segmentation
- Feature Extraction
- Classification
- Testing



- First an image for dental identification is selected
- Then it is converted from RGB to grayscale image.
- Then it is filtered by the gaussian filter to remove the noises
- The filtered image is segmented using K MEANS algorithm by this method the teeth pattern segmented and will be shown.
- The features of the teeth images are extracted using HOG.
- The extracted features of an image compared with the training dataset by using KNN.
- Finally, we show whose dental biometric that the selected image at the result.

ArchitectureDiagram:



PROCESSING PHASE:

- In the first phase, the tooth image is given which is converted to grayscale.
- Feature extraction is the means through which one trains the training set data which is to be used in the next step.

PRE-PROCESSING:

Resize:

- Resizing of image makes all the image as same size to give as input.
- Gaussian filter is use to remove the noises in the images.

Image Segmentation:

- The Image segmentation technique will segment the image based on their properties.
- Acquiring the image and splitting it into several regions (or segments) which are further used individually for extracting out the image features is termed as the segmentation.
- In this work, the k-mean segmentation technique used for the image segmentation.

K-Means Clustering:

- k-mean clustering algorithm is used for segmentation. It is one of the popular methods used for segmentation. The image is segmented into various clusters i.e. divides a set of data into specific number of groups.
- k number of disjoint sets are obtained. A k-centroid is determined and then each point which has least distance from the centroid is taken into consideration. There are several ways o The Image segmentation technique is applied which will segment the image based on their properties.
- This is how k-mean clustering works.

FEATURE EXTRACTION:

- Histogram of Oriented Gradients is used to extract features from image data.

	Population	Sample
# of subjects	N	n
Mean	$\mu = \frac{\sum_{i=1}^{N} X_i}{N}$	$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$
Variance	$\sigma^2 = \frac{\sum_{i=1}^{N} (X_i - \mu)^2}{N}$	$s^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$

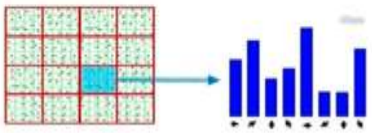
Note: s^2 is the formula for unbiased sample variance, since we're dividing by $n-1$.

Standard deviation	$\sigma = \sqrt{\frac{\sum_{i=1}^{N} (X_i - \mu)^2}{N}}$	$s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$

Note: Finding s by taking $\sqrt{s^2}$ reintroduces bias.

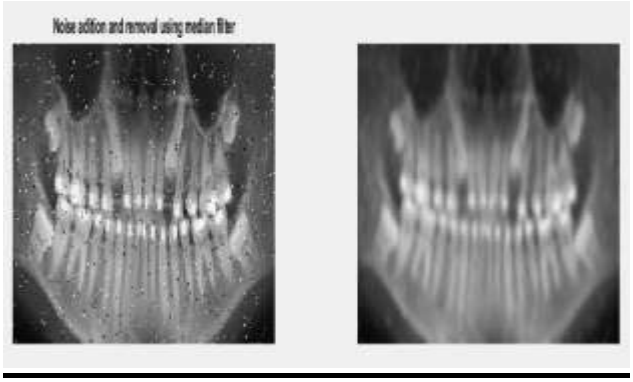
Feature Descriptor

Histogram of Oriented Gradients



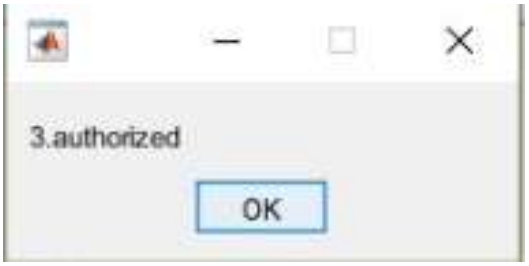
4. RESULT:

Input image

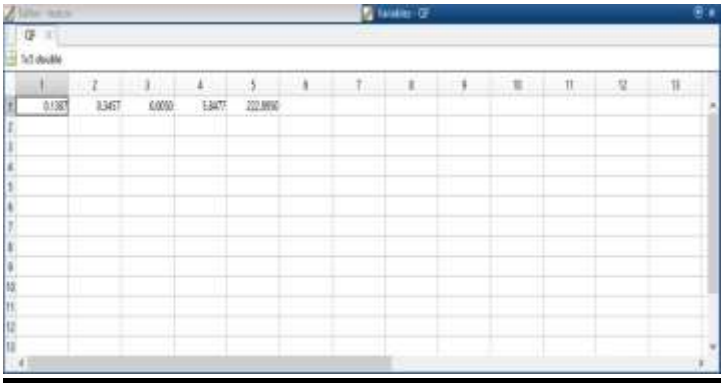


Gaussian Filter Output

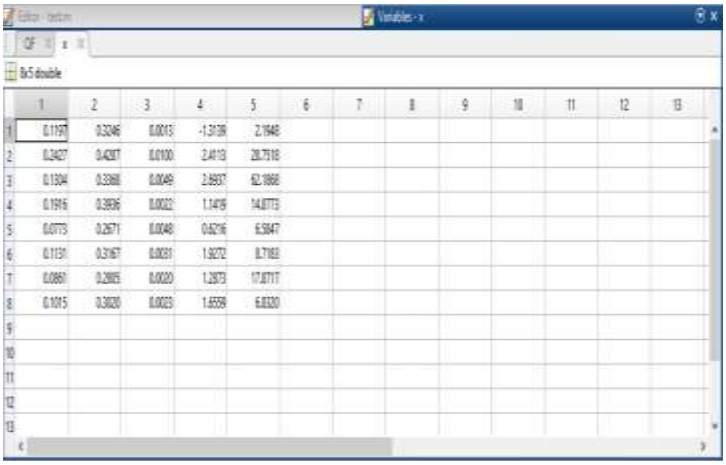
Segmentation Output



classifier Output



Test Image Features



Trained Features

5. CONCLUSION

Dental biometrics is a growing forensic human identification discipline that uses dental features from the dental radiograph images to identify individuals. The presented technique overcomes the disadvantages related to teeth and dental workbasedidentification systems and provides an aid to the forensic experts for automatically identifying the victims of major catastrophes and fire disasters. For providing that we used k-means algorithm for image segmentation. Here median filter is used to remove the noises and the features of teeth images are extracted using HOG. We took human teeth for identification due to its stable

and unique features rather than finger prints, facial recognition, voice recognition etc. The findings of this research will aid forensic dentistry in human identification and it save the time of forensic dentists. In future work, huge number of data set can be selected and dental image identification can be done on larger dataset. With increased size of dataset various issues such as uploading data, managing feature set, increased execution time of matching algorithms etc. can be considered. More image features can be extracted for better identification

6. REFERENCES

1. Nourdin Al-sherif, AymanAbaza, and HanyAmmar, "Dental Record Retrieval Based on Guided SIFT Descriptors", ICCIT 2012.

2. Wang Xinzui, Dong Ningning, and Li Huanli, "Features Extraction and Matching of Teeth Image Based on the SIFT Algorithm", The 2nd International Conference on Computer Application and System Modelling, 2012.

3. ShubhangiDighe, RevatiShriram, "Pre-processing, Segmentation and Matching of Dental Radiographs used in Dental Biometrics", International Journal of Science and Applied Information Technology, 2012, 1, 2.

4. RohitThanki and Deven Trivedi, "Introduction of Novel Tooth for Human Identification based on Dental Image Matching", International Journal of Emerging Technology and Advanced Engineering, 2012, 2, 10.

5. Elizabeth BonsagliaBarboza, AparecidoNilceo Marana and Denise Tostesliveira, "Semiautomated Dental Recognition using a Graph-based Segmentation Algorithm and Teeth Shape Features", IEEE, 2012 978-1-4673- 0397-2/12.