International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 04 | Apr-2016 www.irjet.net p-ISSN: 2395-0072

REVIEW OF DENTAL BIOMETRIC IN HUMAN FORENSIC IDENTIFICATION

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Abstract : To other medical specialties, Dentistry can contribute for the identification of human remains after any disasters or crimes in assistance.By comparing post mortem and ante mortem dental radiographs,the algorithm can be developed.In addition to radiographs, this work aims to introduce photographic images.For dental images is proposed, in this research a contour and skeleton-based shape extraction as well as matching algorithm.Set method is used for contour extraction,an active contour model with selective binary and Gaussian filtering regularized level.By both contour and skeleton-based approaches,Shape matching is done.Include both radiographs and photographs;the experimental results are obtained from a database of dental images.
The existing algorithms since it includes skeleton measures also,this algorithm provides better matching decision about the person.The better matching is observed with radiographic than the photographic images, the performance measures obtained and the hit-rate indicates.

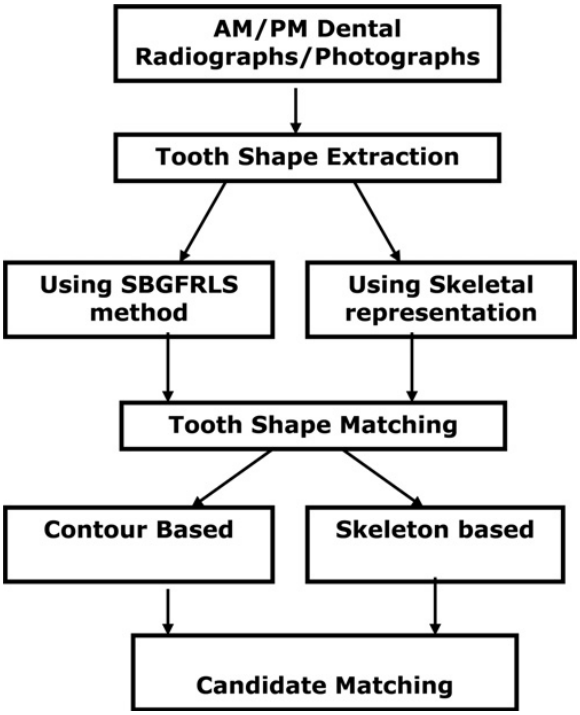
Key Words: *Dental radiograph, Dental photograph, Dental Biometrics etc*

INTRODUCTION

On dental features,forensic odontology is a branch of forensics that deals with victim identification based.It is necessary to automate the human identification system, Owing to the evolution of information technology and an urge to investigate more cases by the forensic experts.If there is no other means of physiological biometrics such as palm print, finger print, iris, face, leg print etc., are found, Dental pattern can be considered as a biometric.

if there is inaccessibility of other means of biometrics, Human identification using dental images has been proven to be the best under certain circumstances. Which yields resistant to modest force effects, high temperatures up to 1100°C, Teeth and bones are treated as the hardest and robust tissues found in the human body?It also possesses good biometric properties.such as bomb-blast, air-crash, major fire accident or flood etc,It affords resistance to decay even in some critical situations as well as mass disasters.20–35% using fingerprints and 3–20% using DNA evidence, respectively, in a recent disaster with a count rate of thousands of victims, around 50–70% of the cases are identified using dental records.for martyr identification in the Indian Ocean earthquake,The dental evidence is considered as the most suited biometric.on dental characteristics is receiving increased attention especially with the large number of victims encountered,Automating the postmortem identification of deceased individuals based.For individual and mass disaster victim's identification,this initiates the usage of dental images as a better choice.In multiple digitized dental records in order to access their similarity,an automated dental identification system compares the teeth present. The identification can be done by photographic images also, in some situations, if the dental radiographs are unavailable or severely distorted.The algorithm requires both shape extraction and matching,In case of both radiographs and photographs.For dental radiograph segmentation,there are several approaches.For shape extraction and pattern matching,a concept of semi-automatic contour method.Their algorithm may not be pertinent,the shortcomings in their approach include, if the image is too blurred and severely occluded.Since crown and root shape extraction had been done separately, the computation time of this algorithm is higher.whereas it also fails to handle severely occluded dental radiographs,For contour extraction the morphological corner detection produces comparatively better hit-rate.which uses

Mahalanobis distance as the measure of matching, The shape extraction is further efficient by using connected and fast connected component labeling. The person matching was analyzedwithvarious similarity and distance metrics. By using connected component analysis the desired region of interests are obtained,offered a mathematical morphology approach, which uses a series of morphology filtering operations to improve the segmentation.In which panoramic dental images are not handled,Human identification is also explained using shape and appearance of the tooth. The efficiency improvement by combining three different matching techniques.It seems to be efficient, although performing three different levels of matching is computationally complex.To be an efficient in terms of retrieval time,matching of dental records using hierarchical distance proves.A dental radiograph segmentation algorithm was developed,Based on analyses of tooth anatomy and tooth growthdirection.By classification and numbering of teeth,Individual identification is supported.For molar and premolar classification,Mesiodistal neck detection is introduced.One of the notable issues of automateddental identification system is the missing tooth. in order to aid content-based retrieval of dental images, A concept of finding missing tooth using classification and numbering was done. For classifying the teeth sequence which is invariant to geometrical transformation,It is differently dealt with multi slice computed tomography images using multi-resolution wavelet-Fourier descriptors. While using anatomy of teeth alone,Individual person identification may not be perfect. The person identification can be done by family photographs,in case of absence or inaccuracy of dental records. Weak and absence of dental records did not stop forensic odontology team from their contribution towards person identification;it is evident from Thailand tsunami victim identification.It can even be done with the availability of photograph of upper anterior teeth. It could be interesting to analyses the family albums or photographs taken during some functions for the missingperson identification based on its dimension, size and alignment of teeth,in case of inadequate availability of dental radiographs.Active contour model or snakes,has been proved to be anefficient framework for image segmentation. The curve moves towards its interior normal and stops on the true boundary of the object based on an energy-minimizing model, The fundamental idea of active contour model is to start with a curve around the object to be detected.to handle the segmentation of deformable structures,Level set method is based on active contour model and particularly designed.To model the boundary of an object, the classical active contour model uses spline curves. For approximating the boundary of an object, however, the level set method is to use a deformable curve front.Usually called the level set function, In the level set framework, the curve is represented by the zero level set of a smoothfunction.by evolving the level set functions instead of directly moving the curves,Moving the curves can be done.the topological changes which is also a main advantage compared with classical active contour model,Therefore level set methods exhibit interesting elastic behaviors and can efficiently handle.Whereas the goal of most anisotropic diffusion algorithms is to smooth the values of an image within homogeneous regions but not across the boundaries of such regions, the goal of most active contour algorithms is to extract the boundaries of homogeneous regions within an image.using curve evolution algorithm,Simultaneous image smoothing and segmentation algorithm was developed. Using active contours without edges, the initial contour selection and the interior contour growing concepts are presented.To produce exact contour,for some of the images the algorithm fails.Active contours were detailed,mathematical relationship between the general formulations of parametric and geometric.Following Chan–Vese model signedpressure force (SPF) function is used as energy functionfor active contours.Modestly in this algorithm, the computational complexity ofChan–Vese model is reduced.



One of the research issues addressed earlier,the dental radiographs with missing tooth.
Dental work such as crown mineralization and filling, this research work exploit radiographic images and photographic images with missing tooth. In addition with the contour-based approach both for the dental radiographs and photographs,this research will explain about the skeleton-based measures.The paper work is organized as four sections. The pipeline ofthis approach is shown in Fig. 1. The first section is contourtracing using selective binary Gaussian filtering andregularized level set (SBGFRLS) method. In the secondsection, shape extraction is done by skeleton. The thirdsection is shape matching of the contours traced. Observing
shape matching using skeleton is the fourth section.

Related Work

This paper address review of new methodologies for postmortem Identification Using dental records that means the Automated Dental Identification System (ADIS) can be used by Law enforcement agencies to locate missing persons also to identify Victims in Mass disasters (e.g. earthquakes, Tsunami, airplane Crash etc.) Using databases of dental X-rays. In PM identification, forensic odoncologists rely mainly on dental radiographs, among other types of records (e.g., oral photographs, denture models, and CAT scans) to compare the morphology of dental restorations of unidentified individuals to choose those of candidates in the missing persons file. This paper reviews the new methods & techniques in which Identification is carried out by Comparing post Mortem (PM) images with Ante mortem (AM) dental records of missing people to find similar records.

Forensic odontology and anthropology providevaluable support with regard to humanidentification. In some cases, when soft tissue isdestroyed, carbonized or absent for whateverreason, bones and teeth become the only sourceof information about the identity of the deceased.In human identification, anything different, such asvariation from normality, becomes an importanttool when trying to establish the identity of thedeceased. This paper illustrates a positiveidentification case achieved by the diagnosis of ananomaly of tooth position, with confirmation usingskull-photo superimposition. Even though forensicscience presents modern techniques, in thisparticular case, the anomalous position of thecanine played a key role on the identification,showing that the presence of a forensic dentist onthe forensic team can be of great value.

Dental biometrics utilizes the evidence revealed by dentalradiographs for human identification. This evidence includesthe tooth contours, the relative positions of neighboringteeth, and the shapes of the dental work (e.g., crowns,fillings and bridges). The proposed system has two main
Stages: feature extraction, and matching. The feature extractionstage uses anisotropic diffusion to enhance the imagesand a Mixture of Gaussians model to segment the dentalwork. The matching stage has three sequential steps:shape registration, computation of image similarity, andsubject identification. In shape registration, we align thetooth contours and obtain the distance between them. A secondmethod based on overlapped areas is used to match thedental work. The distance between the shapes of the teethand the distance between the shapes of the dental work arethen combined using likelihood estimates to improve the retrievalAccuracy. At the second step, the correspondence ofteeth between two given images is established. A distancemeasure based on this correspondence is then used to representthe

similarity between the two images. Finally, thedistances are used to infer the subject's identity.

Automating the process of postmortem identificationof individuals using dental records is receiving increased attention.Teeth segmentation from dental radiographic films is an essentialstep for achieving highly automated postmortem identification.In this paper, we offer a mathematical morphology approachto the problem of teeth segmentation.We also propose a grayscalecontrast stretching transformation to improve the performance ofteeth segmentation. We compare and contrast our approach with
other approaches proposed in the literature based on a theoreticaland empirical basis. The results show that in addition to its capabilityof handling bitewing and per apical dental radiographicviews, our approach exhibits the lowest failure rate among all approachesstudied.

Conclusion

Developing an automated dental identification system is ademanding challenge at present. In this paper a novel shapematching algorithm using skeleton is proposed for dentalimages. Another novel focus of this paper is usage of dentalphotographs if there is unavailability of dental radiographs. Itis an attempt to provide an aid for forensic law enforcement
with the help of photographic images also. The contourtracing is implemented using a level set method namedSBGFRLS method. This contour tracing algorithm holdsgood even for bitewing images with dental works. Sincematching with contour alone may not produce convincingresults, an additional information using skeleton is worn inthis paper. The experimental results clearly show that thealgorithm which is adapted to radiographic images is suitedfor photographic images also with fewer computations. Theprecision and overall measures are higher for skeleton thancontour, while considering the whole image, either maxillaor mandible separately for matching. Whereas for individualtooth, radiographic images with contour based approach isbetter than photographic images. In future, some moreadditional descriptors can be considered for photographicimages in order to improve the performance.

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