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Human Identification through Smile Photograph Analysis

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Abstract:

Forensic Odontology provides valuable secondary support for identification. In few cases when some of the hard and soft tissues are destroyed, carbonized, charred or absent, other teeth and bones become the only mode of identification. Every individual person's smile has unique characteristics and it has found wide acceptance all over the world. Identification of human through smile is a time saving, less tedious and economical way. The photographs while autopsy of smile are used for comparison of AM and PM images. The objective is to analyze the aspect of smile through photographs in forensic odontology field, its significant use and the possible advancements of the same in near future.

Keywords: *Forensic Odontology, Smile Photographs, Selfie, Human Identification, Skull Photo Superimposition.*

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Introduction

Forensic Odontology itself is a less explored path in India and the technique of Smile Photograph analysis is at its blooming stage. The smile Photograph that show specific characteristic of each individual has found wide acceptance.

Methodology

The methods are as stated below:

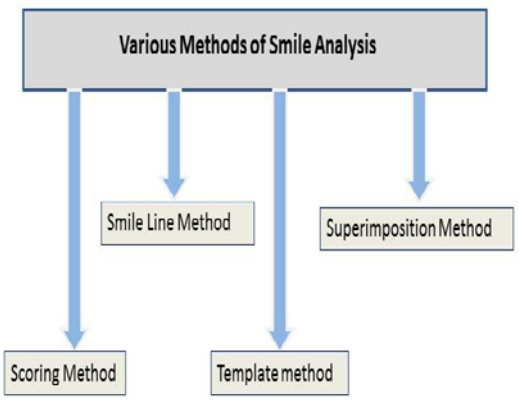

Figure No. 1: Various Methods of Smile Analysis

1. Scoring Method

In scoring method each tooth is outlined and then matched with the tooth on deceased and scored 0 to 2, 0 for non-valuable portion, 1 for compatibility and 2 for significant correspondence.

Demerit is that attributing score would involve a degree of subjectivity i.e. vary from one individual to other.

2. Smile Line Method

The smile line is traced on AM and PM photographs, highlighting the incisal outline from right canine to left canine of maxillary teeth. The two outlines are superimposed with layers of gradual transparency 0% 25% 75% 100%, if they coincide there are chances they belong to same individual.

However it is an indefinite method and not accurate and cannot be solely used for identification **(Miranda *et al*., 2016)**
There has been tremendous growth in creating applications for smartphones. The main objective of all missing person applications is to find the persons alive although the use of application for deceased is not taken into consideration. The application Selfie

3. Template Method

Template method is usually used by orthodontists for smile correction, however for Odontologist it may be used as reference template and the biometric measurements of each teeth can be recorded and studied.

Demerit is understanding the sequence is tedious and it requires frontal view AM photographs**. (Silva *et al*., 2012)**

4. Super Imposition Technique

Here we superimpose the ante mortem and post mortem images gradually by layering technique increasing the transparency. However slight change in magnification of either AM or PM Photograph may lead to discrepancy.

But the discrepancies in each method can be solved by combined aid of multiple techniques.
The advantage is that these methods are highly reliable, less expensive and consume less time. **(Miranda *et al*., 2016)**

Case Study

On 28th June 2018, there was a plane crash at Ghatkopar in Mumbai, the family members were in grief due to the sudden loss and demanded their dear ones at the earliest. Therefore smile photographs were used for victim identification. **(www.hindustantimes.com, 2019)**

Software

Adobe Photoshop is used for preparing the matrix for comparison in the scoring method of the ante mortem and the postmortem photographs, superimposition could be done in Microsoft PowerPoint by reducing the transparency of photographs. **(Silva *et al.*, 2008)**

Application

The global use of internet is quite evident in the recent times, as seen during the pandemic times people tend to socialize by posting their pictures on various social media platforms. Instagram, Facebook, Twitter, LinkedIn etc. can provide adequate information.

Forensic Id was created with a view of maintaining dental data and characteristic dental features of the anterior teeth of the individuals those registered in the application.

Each individual has distinct features such as rotation, transposition, proclination, reclination, diastema, supernumerary teeth, crowding, fluorosis, discoloration, piercings etc. that could be cross checked during dental autopsy of the dead unidentified individuals.

Smile photographs with teeth visibility are the frequent source of dental information especially when ante mortem dental data cannot be retrieved from the families. Such applications can be proved to be of immense significance in disaster victim identification. **(Nuzzolese *et al*., 2018)**

Discussion

The anterior teeth are usually visible in the photographs. If not the soft copy of photographs the old album photographs too can be used for analysis. The teeth exhibit biometric properties which can determine the characteristics of crown such as crown outline, size, width, anomalies, facial profile, spaces, alignment, and mandibular morphology.

Examination of mandibular morphology in the photographs will provide additional advantage during identification if a unique or distinguished feature is noticed while evaluation.

Conclusion

There are limitations such as limited number of teeth visible in the photographs, poor image quality, likelihood of morphological changes in teeth after ante mortem photograph was taken and during the incident and difficulty in comparison due to orientation of photograph.

But the fact cannot be denied that there exists variant dental features which can be potentially found in the anterior tooth , hence smile photograph are reliable and can be considered as an adequate information source when the sample size can be determined as in the above case study and can establish positive identification.

The multiple methods as mentioned above in addition to each other can be successfully used in identification of the deceased individual.

However more research has to be performed in this field to acquire accuracy in the dental data. Proper maintenance of the dental records in every clinic for a specified duration of time must be made mandatory as in few foreign nations.

Acknowledgement

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References:

Miranda, Geraldo Elias, et al. “An Unusual Method of Forensic Human Identification: Use of Selfie Photographs.” *Forensic Science International*, vol. 263, 2016, pp. e14–17. *Crossref*, doi:10.1016/j.forsciint.2016.04.028.

Nuzzolese, Emilio, et al. “Selfie Identification App as a Forensic Tool for Missing and Unidentified Persons.” *Journal of Forensic Dental Sciences*, vol. 10, no. 2, 2018, p. 75. *Crossref*, doi:10.4103/jfo.jfds_80_17.

Silva, Rhonan Ferreira Da, et al. “Comparative Study among Dentistry Undergraduates and Forensic Odontology Postgraduate Students through Smile Photographs for Human Identification.” *South Brazilian Dentistry Journal RSBO (Online)*, vol. 9, no. 4, 2012, pp. 407–15.

Silva, Rhonan Ferreira et al. “Forensic odontology identification using smile photograph analysis--case reports.” *The Journal of forensic odonto-stomatology* vol. 26,1 12-7. 1 Jun. 2008

Tripathi, Neha. “Ghatkopar Aircraft Crash: A Year on, Probe Report yet to Be Released.” *Hindustan Times*, 27 June 2019, Accessed Date 29th June 2021, Accessed from www.hindustantimes.com/mumbai-news/ghatkopar-aircraft-crash-a-year-on-probe-report-yet-to-be-released/story-9Y9Os357RBmSsxrjp5h68M.html.