

Computer Aided Identification in Forensic Dentistry

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Abstract: *Forensic Odontology or forensic dentistry is the use of dental expertise, dental findings, and dental facts in legal proceedings. The principle efforts of dentists in this regard are geared toward establishing the identity of unknown human remains or verifying the identity of visually unrecognizable human remains (1).Teeth, with their physiologic variations, pathoses and effects of therapy, record information that remains throughout life and beyond. (2). This article focuses on the use of computers in forensic identifications of unknown individuals and also about the ADIS.*

Keywords: Identity of Unknown, Human Remains, ADIS

1. Introduction

The use of computers in dental identification has been a concept since early 1970s. The crash of the Arrow air charter in garden, newfound on December 1985 was the first incident where the computerized identification system as a part of comparison was used.(3)

2. Identification of Missing Individuals

The photographs and skull radiographs of the selected individuals are collected and compiled into a database, saved to the hard drive of a computer. An algorithm is created. The photographs of the faces and corresponding skull radiographs are then drafted using common photographic software, taking caution not to alter the informational content of the images. Once computer generated, the facial images and menu are displayed on a color monitor. In the first phase, a few anatomic points of each photograph are selected and marked with a cross to facilitate and more accurately match the face with its corresponding skull. In the second phase, the above mentioned cross grid is superimposed on the radiographic image of the skull and brought to scale. In the third phase, the crosses are transferred to the cranial points of the radiograph. In the fourth phase, the algorithm calculates the distance of each transferred cross and the corresponding average. The smaller the mean value, the greater the index of similarity between the face and skull.(4.)

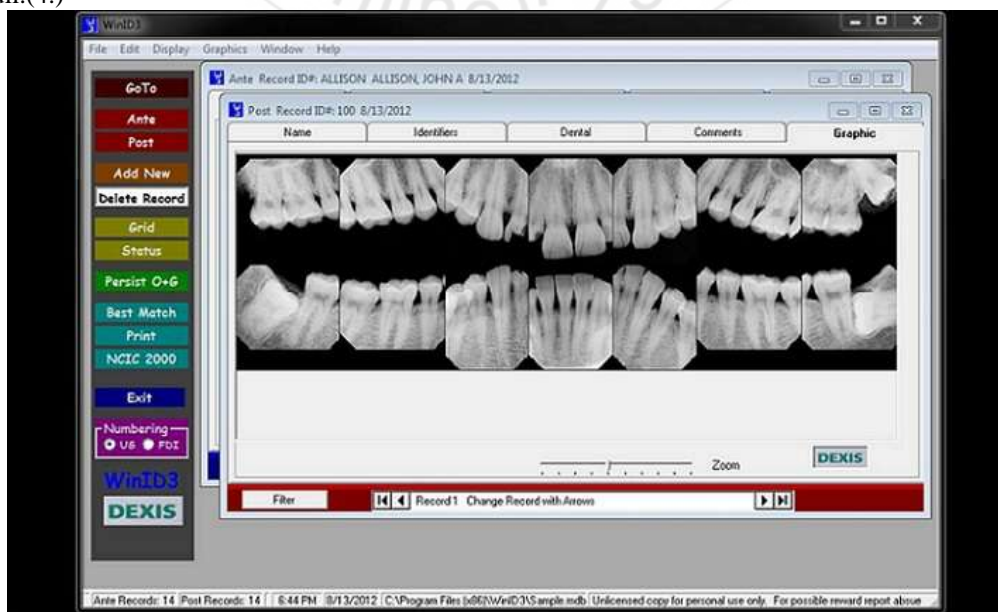
Mass fatality

The mass fatality cases have a lot of ante mortem and records which makes the manual identification impossible. This emphasizes the use of computer aided identification of these datas for easier, faster, and more accurate identification of the victims. The data bases primarily developed for this is the windID and CAPMI.

3. Identification by WinID

WinID is a dental computer system that matches missing persons to unidentified human remains. WinID makes use of dental and anthropometric characteristics to rank possible matches. (5)

WinID stores data in a Microsoft Access Database. WinID and Access provide extensive data filtering and data sorting capabilities.. Information about restored dental surfaces, physical descriptors, and pathological and anthropologic findings can be entered into the WinID database. The integration of WinID and Dexis (a digital dental imaging system) provides an “instant” radiographic image that can be displayed and compared with great rapidity in making dental “matches. (6) (10)



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4. Identification by CAPMI

The computer aided post mortem identification was designed by colonel Lewis Lorton and Mr. William H. Langley. (7) (8)

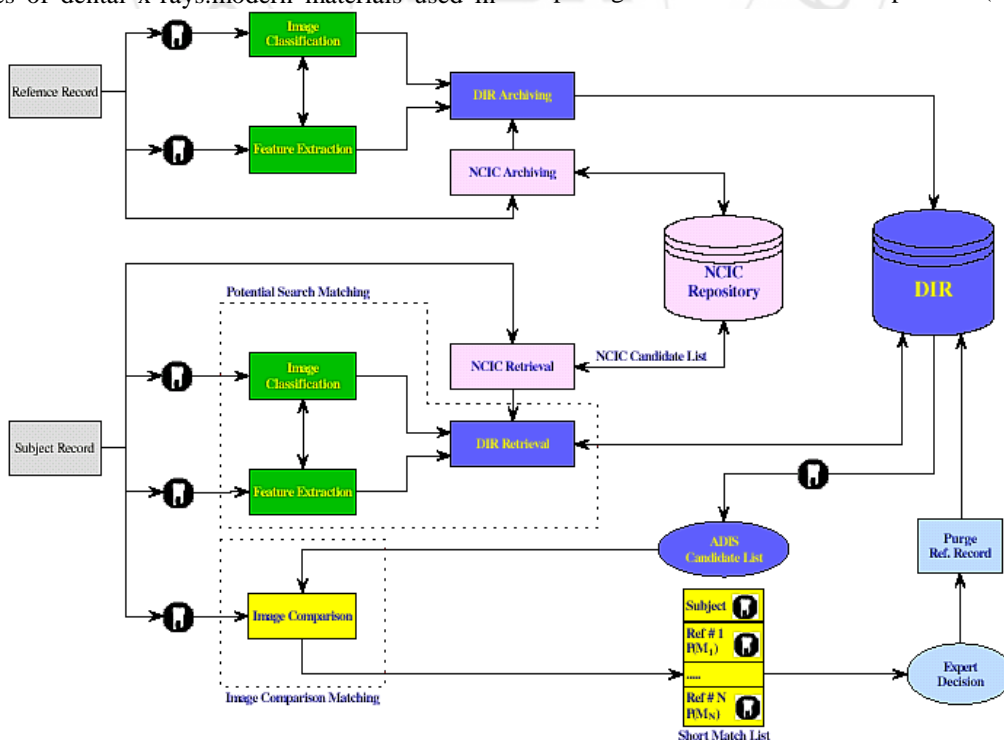
The figure shows an 'ANTEMORTEM DENTAL RECORD' form. On the left, there are two dental diagrams of a human dentition, labeled 'Mandible' and 'Maxilla', with teeth numbered 1 through 32. To the right of these diagrams is a large grid for recording dental features. The grid has columns for 'TOOTH', 'DENTAL', 'RESTORATION', 'FILLING', 'EXTRACTION', 'DENTAL', 'RESTORATION', 'FILLING', 'EXTRACTION', 'DENTAL', 'RESTORATION', 'FILLING', 'EXTRACTION'. Below the grid is a legend for 'CAPMI SYMBOLS' with two columns of symbols and their corresponding dental terms. To the right of the grid is a 'SOCIAL SECURITY NO.' field and a 'RACE' field. Below the grid is a 'CORRECT' and 'INCORRECT' field with checkboxes and a 'PURGE COMPLETELY' field. At the bottom right, there are fields for 'RACE', 'EYES', 'HAIR', 'SEX', 'AGE', 'DOB', 'MARRIAGE', 'RELIGION', 'ETHNICITY', 'OCCUPATION', 'MILITARY SERVICE', 'MILITARY BRANCH', 'MILITARY GRADE', 'MILITARY SERVICE NUMBER', 'MILITARY SERVICE DATE', 'MILITARY SERVICE TYPE', 'MILITARY SERVICE STATUS', 'MILITARY SERVICE REASON', 'MILITARY SERVICE DATE', 'MILITARY SERVICE TYPE', 'MILITARY SERVICE STATUS', 'MILITARY SERVICE REASON'.

FIG. 2—OMR form for use with the CAPMI system at a disaster scene. Antemortem data are culled from records collected from suspected decedents' health care providers. This form is based upon an Armed Forces Institute of Pathology design.

5. Automated Dental Identification System

The Automated Dental Identification System (ADIS) can be used by law enforcement agencies to locate missing persons using databases of dental x-rays. modern materials used in

restorations and fillings have poor radiographic characteristics. Hence, it is becoming important to make identification decisions based on inherent dental features like root and crown morphologies, teeth size, rotations, spacing between teeth and sinus patterns.(9).



6. Conclusion

The use of computer in forensic dentistry for the comparison of records has become indispensable. This article gives the basic idea of the use of the use of computers in identification and also the different softwares available for this comparison of datas.

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