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“Challenges of developing an Automated Dental Identification System“

Law enforcement agencies have been exploiting biometric identifiers for decades as key tools in forensic identification. With the evolution in information technology and the huge volume of cases that need to be investigated by forensic specialists, it has become important to automate forensic identification systems.

Antemortem (AM) identification, that is identification prior to death, is usually possible through comparison of many biometric identifiers. While postmortem (PM) identification, that is identification after death, is impossible using behavioral biometrics (e.g. speech). Moreover, under severe circumstances, such as those encountered in mass disasters (e.g. airplane crashes, wars) or if identification is being attempted more than a couple of weeks postmortem (e.g. late discovery of dead bodies), under such circumstances, most physiological biometrics may not be employed for identification, because the soft tissues of the body decay to unidentifiable states. Therefore, a postmortem biometric identifier has to resist the early decay that affects body tissues. Because of their survivability and diversity, the best candidates for postmortem biometric identification are the dental features.

Forensic odontology is the branch of forensics concerned with identifying human individuals based on their dental features. Traditionally, forensic odontologists relied on the morphology of dental restorations (fillings, crowns, .. etc.) to identify victims. However, contemporary generations have less dental decay than their predecessors do. Hence, it is becoming important to make identification decisions based on inherent dental features like root and crown morphology,

In the Spring, 1997, The Criminal Justice Information Services Division (CJIS) of the FBI created a dental task force (DTF) whose goal is to improve the utilization and effectiveness of the National Crime Information Center's (NCIC) Missing and Unidentified Persons (MUP) files. The DTF recommended the creation of a Digital Image Repository (DIR) and an Automated Dental Identification System (ADIS) with goals and objectives similar to the Automated Fingerprint Identification System (AFIS) but using dental characteristics instead of fingerprints. The proclaimed dental identification system is a near-fully automated system that when fed with raw PM dental records, will find a minimum set of candidate Antemortem (AM) records, ideally one, for each of the input Postmortem (PM) records. A victim identity is discovered once his/her PM record matches an AM record.

In this paper, we discuss the challenges of developing an ADIS system prototype. We present a simple model for ADIS and discuss its differences with the AFIS system.