

G40 A Data-Driven Process, Prediction, and Reporting Model to Improve Human Identification Using the Mobile Application Intelligent System in Automation of Legitimated Examination Methods (iSALEM)

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Learning Overview: After attending this presentation, attendees will be informed about the development of the new innovative mobile application iSALEM. This will assist in the use of legitimate age estimation methods in a systematic form using digital automation as integrative new conceptual models to estimate and identify the age of the individual.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by acknowledging the challenge of clarity in the standard procedure to acquire estimated age. The iSALEM application is the response to usability and also the adequacy of using both the sciences and expertise to deliver a quality evaluation record.

The innovative application is part of the plan presented at the International Organization for Forensic Odonto-Stomatology (IOFOS) Conference titled “A Roadmap Plan of Developing Forensic Odontology in UAE” in 2017. Presently, the conversion of medicolegal data into a useful tool is essential to improve the process of analysis and outcome prediction by building a unique structural platform. The platform conveys tested models, techniques with specific formulas, tables of statistical values, and diagrams and X-ray films to create an impactful innovated application. iSALEM has two developing phases. In the first phase, an algorithm is used to automate the data from international practice of age estimation methods. In the second phase, a specific algorithm is intended to detect specific tooth development in medical images called image-recognition. Machine learning allows decision making to detect specific tooth development. Experts will be able to have access to a deep-learning Artificial Intelligence (AI) system for detecting developmental tooth stages.

Dealing with the many details of morphological tooth characteristics and numerous age estimation methods, iSALEM simplified the process to predict the age. The iSALEM application contains some of the most validated methods with technical procedures to narrow the search parameters and thereby assist in human identification of the deceased and living persons. Minimizing invasive assessment is essential to preserve the evidence and to reproduce the test. Therefore, radiological imaging in this process is a vital tool for iSALEM application. The new design is not only reducing the variation of error, but also enhancing accurate reporting. This paperless operation can protect case integrity of misfiling and prevents loss of immediate information by enhancing the use in the clinic, morgue, laboratory, and the area of disasters for DVI purposes. The new model’s results in the application were verified and validated for the intra-examiner by comparing the results of the age estimation model from iSALEM mobile application against the classic age estimation from experts in the field.

Authors of peer review publications set out age estimation methods for specific age phases and defined minimum requirements to perform an evaluation and reference to data and studies. Examiners should handle these necessities by allocating a case for a specific examination technique and interpreting its results. It is crucial to explain the method in the submitted report and its significance to the competent authorities. The model established in iSALEM using a mobile application is verified by the referees of the original paper, which makes it unique and the only data analyst program of its kind. It helps in reducing the subjective assessment of tooth development of the conducted subject and a comparison of the following criteria.

Dental age estimation narrows the scope in identifying unknown persons, which plays a significant role in many aspects of humanity, medicine, security, and sport. Using the iSALEM application, which is accessible software any time or place using smart phones, allows the consensus of experts internationally for improvements in methods and approaches. Furthermore, the great advantage of the process in the application is helping to calibrate examiners through exercise on solved cases before conducting a real case, which increases the examiners’ competences. Because of each methodology’s disadvantages as well as the advantages, it is essential to reduce the variation of errors in using these methods with communication technologies. The iSALEM application follows an already verified technique to produce a reliable and accurate dental age estimation report.

iSALEM, Age Estimation, Artificial Intelligence