AI Based Age Estimation and Sex Detection from Linear Measurements of the Mandible on Panoramic Radiographs

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Abstract:

Background: In Forensics, age estimation and sex determination are often performed by using panoramic radiographs (OPGs). In other similar tasks, artificial intelligence (AI) models are highly accurate (up to 94.7%) [1].

Objectives: This study aims to determine mandibular linear measurements in 93 OPGs by utilising automated AI-assisted procedures and evaluating their potential in predicting age and sex.

Methods: Automated bigonial width (BGW) and symphyseal height (SH) were calculated using menton and gonion landmarks using automated contour detection techniques. In places where readable, optical character recognition (OCR) was used to extract age and sex. Statistical tests were t-tests, ANOVA, chi-square, and logistic regression.

Results: The mean BGW was 219.5 px (SD = 215.8), the mean SH was 181.9 px (SD =132.3). OCR identified age (47) and sex (28) (15 males and 13 females). There were no significant correlations: BGW vs sex (t = 0.415, p = 0.681), ANOVA between age groups (F=0.592, p =0.706). Logistic regression was giving an accuracy of about 35%.

Conclusion: OPGs can be automatically extracted using automated pipes to learn mandibular features, although prediction capabilities are low in pixel-only datasets. It is shown in literature that CNN-based AI can achieve far greater accuracies [2-5].

Keywords:

Mandible, Forensic Odontology, Artificial Intelligence, CNN, Age Estimation, Sex Detection.