

# Estimasi Usia Gigi Pasien Berbasis Citra Rontgen Gigi Panoramik Menggunakan Convolutional Neural Network = Estimation of Patient's Dental Age Based on Panoramic Dental X-Ray Images Using Convolutional Neural Network

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## Abstrak

Dalam konteks estimasi usia gigi sebagai metode non-invasif untuk determinasi usia kronologis pasien, teknik orthopantomography (OPG) telah luas diaplikasikan meski menghadapi kendala seperti biaya tinggi dan eksposur radiasi. Merespons limitasi pendekatan konvensional, paradigma machine learning dan deep learning kini dioptimalkan untuk mengidentifikasi pola intrinsik pada data pencitraan medis kompleks. Penelitian ini bertujuan mengembangkan algoritma YOLOv8 untuk meningkatkan akurasi estimasi usia gigi, menggunakan dataset dari RSGMP Universitas Airlangga dengan subjek pediatrik 5—15 tahun. Dataset dimodifikasi menjadi tiga variasi: tanpa augmentasi, augmentasi tiga kali per sampel, dan augmentasi lima kali per sampel. Hasil optimal dicapai oleh variasi ketiga dengan augmentasi lima kali per sampel, mendemonstrasikan akurasi 60% dan F1-Score 61,05%, mengindikasikan potensi signifikan teknik augmentasi data dalam meningkatkan kinerja algoritma deep learning untuk estimasi usia gigi.

.....In the context of dental age estimation as a non-invasive method for determining patients' chronological age, orthopantomography (OPG) techniques have been widely applied despite facing challenges such as high costs and radiation exposure. Responding to the limitations of conventional approaches, machine learning and deep learning paradigms are now being optimized to identify intrinsic patterns in complex medical imaging data. This research aims to develop the YOLOv8 algorithm to improve the accuracy of dental age estimation, using a dataset from the Dental and Oral Hospital of Airlangga University with pediatric subjects aged 5-15 years. The dataset was modified into three variations: without augmentation, triplet augmentation, and quintuplet augmentation per sample. Optimal results were achieved by the third variation with quintuplet augmentation, demonstrating 60% accuracy and 61.05% F1-Score, indicating significant potential for data augmentation techniques in enhancing the performance of deep learning algorithms for dental age estimation.