DETEKSI DINI SKOLIOSIS SECARA *REAL-TIME* PADA TUBUH MANUSIA MENGGUNAKAN YOLO

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ABSTRAK

Penelitian ini dilakukan karena skoliosis idiopatik sering tidak terdeteksi sejak dini akibat keterbatasan akses terhadap pemeriksaan medis dan kurangnya kesadaran masyarakat terhadap postur tubuh abnormal. Penelitian ini mengembangkan sistem deteksi dini skoliosis secara *real-time* berbasis algoritma YOLOv8n-Pose dan mengimplementasikannya ke dalam aplikasi Android. YOLOv8n-Pose dipilih karena kemampuannya dalam mendeteksi objek sekaligus melakukan estimasi pose manusia melalui *keypoints*. 102 data gambar didapatkan dengan melakukan *scraping* data menggunakan API dari Bingsearch, dilakukan juga praproses dan augmentasi sehingga total data menjadi 218. Model dilatih menggunakan *dataset* gambar punggung sebanyak 218 gambar yang terbagi ke dalam dua kelas: normal dan abnormal. Hasil evaluasi menunjukkan bahwa model mampu mendeteksi skoliosis dari garis tulang belakang dengan akurasi yang memadai, yaitu mAP@0.5 sebesar 0.958 dan mAP@0.5:0.95 sebesar 0.727. Model selanjutnya diintegrasikan ke dalam aplikasi Android menggunakan Flutter dan TensorFlow Lite, memungkinkan deteksi dini skoliosis dilakukan melalui kamera ponsel secara langsung. Aplikasi ini menampilkan visualisasi garis tulang belakang dan deteksi skoliosis berdasarkan pose, sehingga memberikan kemudahan bagi pengguna dalam melakukan skrining awal sebelum berkonsultasi ke ahli medis.

Kata Kunci: Skoliosis, YOLOv8n-Pose, Deteksi Real-Time, Estimasi Pose, Aplikasi Android

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ABSTRACT

This study was conducted because idiopathic scoliosis often goes undetected at an early stage due to limited access to medical examinations and a general lack of public awareness regarding abnormal body posture. The research aims to develop a real-time early detection system for scoliosis based on the YOLOv8n-Pose algorithm and implement it into an Android application. YOLOv8n-Pose was selected for its ability to perform object detection while simultaneously estimating human pose through keypoints. A total of 102 images were collected through data scraping using the Bing Search API, followed by preprocessing and augmentation, resulting in 218 images. The model was trained using a dataset of 218 back view images, classified into two categories: normal and abnormal. Evaluation results showed that the model could effectively detect scoliosis from the spinal line, achieving a satisfactory accuracy with an mAP@0.5 of 0.958 and an mAP@0.5:0.95 of 0.727. The trained model was then integrated into an Android application using Flutter and TensorFlow Lite, enabling real-time scoliosis detection directly through the smartphone camera. The application displays a visualization of the spinal line and scoliosis detection based on pose estimation, providing users with an accessible tool for early screening before consulting a medical expert.

Keywords: Scoliosis, YOLOv8n-Pose, Real-Time Detection, Pose Estimation, Android Application