Pengembangan Model Klasifikasi dan Object Detection untuk Diagnosis Awal di Bidang Ortodonti = Development of Classification and Object Detection Models for Early Diagnosis in Orthodontics

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Abstrak

Pandemi COVID-19 mendorong adanya transformasi kesehatan, terutama dalam praktik kedokteran gigi. Respon terhadap risiko penularan menggiring masyarakat menuju layanan telemedicine, khususnya teledentistry. Fenomena ini menciptakan paradigma baru dalam ortodonti, mendorong perkembangan teleorthodontic. Dukungan teknologi machine learning di bidang ortodonti menawarkan solusi inovatif untuk diagnosis dini dan peningkatan aksesibilitas layanan ortodontik. Penelitian ini akan membandingkan 3 model computer vision yaitu EfficientNet, MobileNet, dan ShuffleNet disertai dengan adanya penambahan model tabular yaitu TabNet. Implementasi model computer vision ini bertujuan untuk dapat memberikan analisis awal bagi pasien ortodonti dan akan dievaluasi menggunakan metrik F1-score dan interpretability ahli dengan bantuan LIME. Berdasarkan penelitian ini, ditemukan bahwa model computer vision ShuffleNet memiliki rata-rata hasil nilai F1-score terbaik diikuti dengan EfficientNet dan terakhir MobileNet. Perbedaan nilai tersebut berkisar antara 1-5% antara EfficientNet dan ShuffleNet namun perbedaan melebar untuk MobileNet dan ShuffleNet yang berkisar antara 3-8%. Selain itu, penambahan TabNet dalam framework memberikan peningkatan rata-rata nilai F1-score sebesar 2.7% hingga 5% dibandingkan model yang tidak menggunakan TabNet.

.....The COVID-19 pandemic has driven health transformation, especially in dental practice. The response to the risk of transmission leads the public towards telemedicine services, especially teledentistry. This phenomenon creates a new paradigm in orthodontics, encouraging the development of teleorthodontics. The support of machine learning technology in orthodontics offers innovative solutions for early diagnosis and increased accessibility to orthodontic services. This study will compare 3 computer vision models, which are EfficientNet, MobileNet, and ShuffleNet, accompanied by adding a tabular model, which is TabNet. The implementation of this computer vision model aims to provide an initial analysis for orthodontic patients and will be evaluated using the F1-score metric and expert interpretability with the help of LIME. This study found that the ShuffleNet computer vision model has the best average F1-score, followed by EfficientNet, and finally MobileNet. The difference in value ranges between 1-5% between EfficientNet and ShuffleNet, but the difference widens for MobileNet and ShuffleNet, which ranges between 3-8%. In addition, adding TabNet to the framework provides an average increase in F1-score by 2.7% to 5% compared to models that do not use TabNet.