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Komparasi dan evaluasi algoritma digitally reconstructed radiographs (DRRs) : ray casting dan hardware texture mapping untuk verifikasi pasien radioterapi eksternal = Evaluation and comparison of algorithms of digitally reconstructed radiographs (DRRs) : ray casting and hardware texture mapping using for verification in external radiotherapy / Samuel Gideon

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Abstrak

ABSTRAK
Digitally reconstructed radiographs (DRRs) merupakan citra hasil rekonstruksi data set citra CT simulator yang digunakan untuk verifikasi dalam perencanaan radioterapi eksternal. Penelitian ini mencoba untuk mengimplementasikan algoritma ray casting dan hardware texture mapping sehingga dapat menghasilkan citra DRR. Akuisisi citra CT simulator dilakukan terhadap fantom modifikasi, fantom Catphan, dan fantom RANDO. Citra CT simulator kemudian dikomputasi dengan menggunakan algoritma yang digunakan serta algoritma di dalam treatment planning system (TPS). Evaluasi hasil citra DRR dilakukan secara kuantitatif dan kualitatif. Evaluasi kuantitatif meliputi evaluasi keakurasian geometri, evaluasi kontras tinggi, evaluasi kontras rendah, evaluasi uniformitas, dan evaluasi running time. Evaluasi kualitatif berupa kuesioner yang berisi pendapat praktisi radioterapi mengenai kualitas citra DRR dalam hal kontras, resolusi, dan uniformitas. Hasil evaluasi kuantitatif menunjukkan kualitas citra DRR dari algoritma dalam penelitian ini hampir sama dengan algoritma di dalam TPS dan hasil tersebut didukung oleh hasil evaluasi kualitatif.
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ABSTRACT
Digitally reconstructed radiographs (DRRs) are the CT simulator image reconstruction that used for verification in external radiotherapy planning. This thesis aims to implementation of ray casting and hardware texture mapping algorithm to produce DRR images. CT image acquisition is made to modification phantom, Catphan phantom, and RANDO phantom. These images then computed become DRR images using ray casting and hardware texture mapping algorithm, as well as the algorithm used in the treatment planning system (TPS) . Evaluation of the DRR images conducted quantitatively and qualitatively. Quantitative evaluation includes evaluation of geometric accuracy, high contrast, low contrast, grey scale uniformity running time. Qualitative evaluations are questionnaires which contain the opinion of radiotherapy practitioners regarding DRR image quality in terms of contrast, resolution, and grey scale uniformity. Quantitative evaluation shows that there are some similarities of DRR image quality between

algorithm used in this thesis study is similar to the algorithm in the TPS. This also supported by the results of a qualitative evaluation.