

Evaluasi Pengukuran Otomatis *Slice Thickness* Citra *Computed Tomography* Dengan Variasi *ISO Center* Dan Filter rekontruksi

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Abstrak

Penelitian ini bertujuan untuk mengevaluasi pengukuran otomatis dari *slice thickness* pemindai *tomografi* (CT) 128 *slice* menggunakan phantom AAPM *performance CT American Association of Physicists in medicine* (AAPM). phantom AAPM *performance CT* dipindai menggunakan CT *scanner* 128-*slice* dengan parameter perolehan konstan 120 kV, 200 mA, pitch 0,984, Fov 260 mm dan waktu rotasi 1 detik. Phantom dipindai dengan variasi tiga parameter berbeda yaitu *slice thickness*, posisi dari *ISO Center* dan filter rekontruksi. Variasi *slice thicknes* yang digunakan 1 mm, 2 mm, 3 mm, 4 mm dan 5 mm. posisi phantom di *ISO Center*, 2 cm dan 4 cm di atas *ISO Center*, 2 cm dan 4 cm dibawah *ISO Center*. Citra direkontruksi menggunakan 5 filter rekontruksi yang berbeda yaitu filter *Lung*, Filter *Soft tissue*, filter *bone*, filter *Cardiac* dan Filter *Brain*. Semua hasil otomatis dibandingkan dengan pengukuran manual. *Slice thickness* 5 mm diperoleh nilai FWHM atau nilai *slice thickness* terukur sebesar $5,4 \pm 0,1$ mm untuk *slice thickness* 5 mm dan menunjukkan konsistensi bahwa *slice thickness* 5 mm memberikan hasil pengukuran yang akurat. Pengukuran bisa dianggap valid ketika nilai deviasi hasil pengukuran yang diperoleh tidak lebih dari 0,5 mm. pengukuran otomatis tidak bergantung pada posisi phantom terhadap *ISO Center* perhitungan otomatis mampu secara konsisten memberikan hasil nilai *slice thickness* yang mendekati nilai aslinya. Variasi posisi *ISO Center*, hasil pengukuran *slice thickness* dengan metode pengukuran otomatis juga tidak terpengaruh oleh filter rekonstruksi. Metode pengukuran otomatis mampu secara konsisten memberikan hasil pengukuran yang mendekati nilai *slice thickness* aslinya, dengan deviasi hanya 0,1 mm saja pada semua jenis filter rekonstruksi. Variasi *slice thickness*, pengukuran otomatis pada variasi posisi phantom terhadap *ISO Center* dan pada variasi filter rekonstruksi juga mampu memperkecil deviasi hasil pengukuran jika dibandingkan dengan metode pengukuran manual. Algoritma yang dikembangkan untuk melakukan pengukuran otomatis. Pengukuran otomatis yang dikembangkan dalam penelitian ini valid dan dapat memberikan hasil pengukuran dengan akurasi yang tinggi. Ini memberikan metode yang mudah dan efektif menentukan *slice thickness* walaupun dilakukan dengan menggunakan 3 parameter.

Kata kunci : AAPM CT Performance Phantom, *Slice thickness*, CT-scan, FWHM, pengukuran otomatis

Evaluation of Automatic Measurement of *Slice Thickness* Computed Tomography Image With *ISO Center* Variations and Reconstruction Filters

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Abstract

This study aims to evaluate the automatic measurement of the slice thickness of a 128 slice tomography (CT) scanner using the AAPM phantom performance CT of the American Association of Physicists in medicine (AAPM). AAPM phantom performance CT was scanned using a 128-slice CT scanner with constant gain parameters: 120 kV, 200 mA, pitch 0.984, Fov 260 mm and rotation time of 1 second. The phantom was scanned with a variation of three different parameters, namely slice thickness, position of the flashlight and the

reconstruction filter. The variation of slice thickness used is 1 mm, 2 mm, 3 mm, 4 mm and 5 mm. The position of the phantom is in the flashlight iso, 2 cm and 4 cm above the flashlight iso, 2 cm and 4 cm below the flashlight iso. The image was reconstructed using 5 different reconstruction filters namely Lung filter, Soft tissue filter, bone filter, Cardiac filter and Brain filter. All results are automatic compared to manual measurements. The results of the 5 mm slice thickness obtained by the FWHM value or the measured slice thickness value were 5.4 ± 0.1 mm for a 5 mm slice thickness and showed consistency that the 5 mm slice thickness provided accurate measurement results. The measurement can be considered valid when the deviation value of the measurement results obtained is not more than 0.5 mm. Automatic measurement does not depend on the position of the phantom against the iso. The automatic calculation of the flashlight is able to consistently provide slice thickness values that are close to the original value. Variations in the position of the iso flashlight, the results of measuring the slice thickness with the automatic measurement method were also not affected by the reconstruction filter. The automatic measurement method is able to consistently provide measurements close to the original slice thickness, with a deviation of only 0.1 mm for all types of reconstruction filters. Variations in slice thickness, automatic measurement of the variation in the phantom position against the flashlight iso and the reconstruction filter variations are also able to reduce the deviation of the measurement results when compared with manual measurement methods. Algorithm developed to perform automatic measurements. The automatic measurement developed in this study is valid and can provide measurement results with high accuracy. This provides an easy and effective method of determining slice thickness even though it is performed using 3 parameters.

Keywords: AAPM CT phantom performance, Slice thickness, CT-scan, FWHM, automatic measurement

Pembimbing Akademik

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