Reduksi *Noise* Menggunakan Selective Median Filter pada Citra Abdomen *Computed Tomography*

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Abstrak

Penerapan pengurangan noise pada citra abdomen computed tomography (CT) dengan dampak yang lebih kecil pada resolusi spasial perlu dievaluasi. Sebuah metode pengurangan noise berbasis median filter (MeF) telah dikembangkan dan disebut sebagai selective median filter (SMeF). SMeF mengimplementasikan nilai median secara selektif dengan pertimbangan dari threshold berdasarkan tingkat noise dari citra. Filter dievaluasi menggunakan task transfer function (TTF), noise power spectrum (NPS), signal-to-noise ratio (SNR), dan contrast-to-noise ratio (CNR) yang diperoleh dari phantom dan citra CT abdomen. Hasilnya kemudian dibandingkan dengan citra asli, dan citra terfilter dengan median filter, selective mean filter (SMF), dan mean filter (MF) pada banyak organ citra pasien dan area homogen pada phantom. Ditemukan bahwa tingkat noise citra SMeF dan SMF lebih rendah daripada citra filter MF dan median. Resolusi spasial SMeF dan SMF relatif lebih tinggi dibandingkan dengan citra asli, MF, dan median filter. Namun, tidak setinggi SMeF yang memiliki resolusi spasial sangat baik. SMeF dan SMF memiliki SNR dan CNR yang lebih tinggi jika dibandingkan dengan median filter. Berdasarkan data tersebut, metode SMeF sangat efektif dalam mengurangi noise citra abdomen CT scan dikuti dengan peningkatan resolusi spasialnya.

Kata kunci: Selective Median Filter, resolusi spasial, NPS, SNR, CNR, reduksi noise

Reduction Noise using Selective Median Filter on Abdominal Image Computed Tomography

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Abstract

The application of noise reduction to computed tomography (CT) abdominal images with less impact on spatial resolution needs to be evaluated. A median filter (MeF) based noise reduction method has been developed and is called a selective median filter (SMeF). SMeF implements the median value selectively with consideration of the threshold based on the noise level of the image. Filters were evaluated using task transfer function (TTF), noise power spectrum (NPS), signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) obtained from phantom and abdominal CT images. The results are then compared with the original image, and the image is filtered with a median filter, selective mean filter (SMF), and mean filter (MF) on many organs of the patient's image and homogeneous areas on the phantom. It was found that the noise level of SMeF and SMF images was lower than that of the MF and median filter images. The spatial resolution of SMeF and SMF is relatively higher than the original image, MF, and median filter. However, it is not as high as SMeF which has very good spatial resolution. SMeF and SMF have higher SNR and CNR

when compared to the median filter. Based on these data, the SMeF method is very effective in reducing the noise of the CT scan abdominal image followed by an increase in its spatial resolution.

Keywords: Selective Median Filter, spatial resolution, NPS, SNR, CNR, noise reduction

Pembimbing Akademik:
1. Catur Edi Widodo
2. Choirul Anam