***Example (1):***

***Paper Title:***

Speckle Noise Reduction in Ultrasound Images using SRAD and Guided filter

| Components of introduction section | Comments |
| --- | --- |
| Background | The background to this paper includes:<br><br>_comparing ultrasound device with other devices<br><br>Ultrasound imaging devices are more secure and portable than other medical diagnostic devices such as X-ray, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI).<br>With the development of digital signal processing technology, the resolution of ultrasonic diagnostic devices has been steadily improving; however, the image quality of this is lower than<br>other medical diagnostic devices-Over the last decades, many studies have been conducted to eliminate speckle noise<br><br>_previous studies<br><br>Over the last decades, many studies have been conducted to eliminate speckle noise. There are three main methods: linear filtering, Nonlinear filtering, and hybrid filtering methods. Linear filtering techniques, such as Gaussian filter and Mean filter, can effectively remove noise from the image |
| purpose of study | The purpose of study to this paper includes:<br><br>_ We propose a new algorithm using speckle reducing anisotropic diffusion (SRAD) [9] and a guided filter [10] to effectively remove the speckle noise and preserve the edge region.<br><br>_technique for removing noise and preserving edge information is required |
| problem statement | The problem statement to this paper include:<br><br>_The main cause of this problem is the noise of the granular pattern in the acquiring process of the ultrasound image, which is called speckle noise [1]. The speckle noise represents a characteristic of multiplicative noise that differs from the general image obtained through optical |

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| | sensors, thus it is difficult to remove the noise [2]. The noise has many difficulties in diagnosing lesions using ultrasound images, so speckle noise reduction in ultrasound images play an important role in medical image processing. |
| objectives of the study | The objective of the study includes:<br>_reduce speckle noise while minimizing degradation of the edge region<br>_ propose a new algorithm using speckle reducing anisotropic diffusion (SRAD)<br>_ remove the speckle noise and preserve the edge region. |

**Comment:**

The background need to be more specific (device identification)

The purpose study its: good

The problem: it’s good

Objective study: it’s good

***Example (2):***

***Paper title:***

Speckle noise reduction of Ultrasound images Using Extra-Energy

Reduction function

| Components of introduction section | Comments |
|---|---|
| Background | _ device identification and comparing ultrasound device with other devices<br><br>Medical imaging techniques are extremely important tools in medical diagnosis. One of these important imaging techniques is Ultrasound imaging (USG). Ultrasound imaging is highly noninvasive and widely available as compared to other medical imaging modalities (e.g. X-rays, Computed tomography, Magnetic resonance)<br><br>_introduction to the problem<br><br>Ultrasound image is internally affected by speckle noise. The presence of speckle degrades the quality of ultrasound images, and thus affects diagnosis |
| purpose of study | Proposed method reduces speckle noise from ultrasound image as well as preserves edges. |
| problem statement | Ultrasound image is internally affected by speckle noise<br><br>The presence of speckle degrades the quality of ultrasound images, and thus affects diagnosis.<br><br>Speckle noise reduction is one of the most important preprocessing tasks in the ultrasound image processing field.<br><br>Speckle reduction is a very complex and critical preprocessing step for feature extraction, segmentation, classification, registration from medical Ultrasound images |
| objectives of the study | _proposing methods to reduce speckle noise |

| | |
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| | _proposed to incorporate the modified SRAD into the Canny edge detector to replace the Gaussian blurring in the conventional Canny edge detector in order to suppress the speckle noise effectively while preserving the edges in ultrasound image.<br><br>_used for speckle reduction and edge preservation. The automatic determination of the gradient threshold used in the LPND. LPND method used MAD (Median Absolute Deviation) operator [25] for determination of the gradient threshold. An edge sensitive diffusion method [15] [i.e. speckle reducing anisotropic diffusion (SRAD)] |

## Comment:

The background: it’s good

The purpose study: it’s good

The problem: it’s good

Objective study: it’s good

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***Example (3):***

***Paper title:***

Speckle Noise Reduction in Medical Ultrasound Images using Coefficient of

Dispersion

| Components of introduction section | Comments |
|---|---|
| Background | The background to this paper includes:<br><br>_device identification<br><br>Ultrasound (US) being one of the important imaging modalities used for the purpose of diagnosis of internal organs of the human body. Among various imaging modalities, US images are the most widely used for the diagnoses purpose because of the various features viz. real time viewing, non-invasive nature, non-ionizing, portability, adaptability and cost-effectiveness of this imaging modality<br><br>_introduction to the problem<br><br>Ultrasound images are low resolution images obtained by the reflection of sound echo signals from the various parts of the human body like soft tissue, hard tissue, blood and bones |
| purpose of study | _Speckle noise reduction in ultrasound image<br><br>_Improve ultrasound image quality<br><br>_proposed method reduces speckle noise from ultrasound image as well as preserves edges. |
| problem statement | These images are corrupted due to various noises such as additive noise, system noise and multiplicative noise (speckle)<br><br>the effect of speckle noise is more significant in terms of visual quality of US images<br><br>Speckle noise is generated due to the constructive and destructive interference of sound and reflected echo signals, which can be observed as a granular pattern on US image |

| | |
|---|---|
| | This noise not only degrades the quality of imaging but also reduces the capability of post – processing operations such as compression and segmentation. In view of this, de noising of US images has gained significant attention in recent times. |
| objectives of the study | _speckle reduction and edge preservation for images degraded<br><br>_proposing methods to reduce speckle noise<br><br>Anisotropic diffusion based technique was proposed by Perona and Malik<br><br>Yu and Acton presented a method based on diffusion approach called speckle reducing anisotropic diffusion (SRAD)<br><br>A modified version of SRAD filter was presented by Krissian et al. [8]. This filter uses the combination of SRAD and flux diffusion to obtain the better restored image.<br><br>Initially, Donho et al. [9-10] has presented the concept of “wavelet shrinkage”. A speckle de-noising method based on non-Gaussian modeling of log transformed wavelet coefficients is presented in [11]<br><br>A method based on statistical approach of wavelet coefficient is presented in [12]<br><br>Some other popular methods of speckle de-noising are NL-means [13], Optimized behavior NL-means [14], bilateral filtering [15] and detail preserving anisotropic diffusion (DPAD) [16].<br><br>_speckle reduction using cod<br><br>A BCM is created based on Cod and then two de-noised images obtained from bilateral and DPAD filter are combined according to BCM. Rest of this |

**Comment:**

The background: it’s good

The purpose study: it’s good

The problem: it’s good

Objective study: it’s good

***Example (4):***

***Paper title:***

Speckle Reduction and De blurring of Ultrasound Images Using Artificial

Neural Network

| Components of introduction section | Comments |
| --- | --- |
| Background | _device identification<br><br>Ultrasound (US) being one of the important imaging modalities used for the purpose of diagnosis of internal organs of the human body. Among various imaging modalities, US images are the most widely used for the diagnoses purpose because of the various features viz. real time viewing, noninvasive nature, non-ionizing, portability, adaptability and cost-effectiveness of this imaging modality [1]<br>.<br>_introduction to the problem<br><br>Ultrasound images are low resolution images obtained by the reflection of sound echo signals from the various parts of the human body like soft tissue, hard tissue, blood and bones.<br><br>_previous studies<br><br>There are some speckle reduction methods developed using hardware modifications, such as reducing the sensor's pixel size [3]. A higher operating frequency progressively reduces speckle noise, but the pulse would have to be short enough to resolve the 20 micron cellular structure to completely eliminate speckle noise and improve the resolution. This would require a 100 MHz operating frequency which is not practical [4], [5]. Besides the hardware modifications, a number of image processing algorithms have been reported. The linear anisotropic diffusion method depends on Gaussian smoothing, but it does not only smooth the noise but also blurs important features such as edges. Linear diffusion methods also dislocate edges when moving from finer to coarser scales |
| purpose of study | Speckle reduction in ultrasound image |

| | |
|---|---|
| problem statement | These images are corrupted due to various noises such as additive noise, system noise and multiplicative noise (speckle). However, the effect of speckle noise is more significant in terms of visual quality of US images. Speckle noise is generated due to the constructive and destructive interference of sound and reflected echo signals, which can be observed as a granular pattern on US image [2]. This noise not only degrades the quality of imaging but also reduces the capability of post – processing operations such as compression and segmentation. In view of this, de noising of US images has gained significant attention in recent times |
| objectives of the study | In this paper, we propose a cascade-forward back propagation (CFBP) neural network based speckle reduction and a de blurring algorithm for US imaging |

**Comment:**

The background: it's good

The purpose study: need to be more specific

The problem statement: it's good

Objective study: need to be more specific

***Example (5):***

***Paper title:***

A review on de speckling filter in ultrasound image for speckle noise

reduction

| Components of introduction section | Comments |
|---|---|
| Background | The background to this paper includes:<br><br>_device identification<br><br>Ultrasound imaging has been one of the highest extensively supported imaging procedures in medical imaging Thanks to its key features such as low-cost non-1nvasıveness, portability, harmlessness, instantaneity and, ultrasound imaging has become one of the highest ordinaries supported imaging procedures in the medical imaging community<br><br>Speckle noise is a dominant noise that is tested in medical images used to reduce by taking care of significant characteristics without loss.<br><br>In Fig.1 For low picture quality called speckle, the back dispersed echo signals in the ultrasound picture attended. |
| purpose of study | Review on de speckle in ultrasound image |
| problem statement | Speckle noise is a dominant noise that is tested in medical images used to reduce by taking care of significant characteristics without loss.<br><br>In Fig.1 For low picture quality called speckle, the back dispersed echo signals in the ultrasound picture attended. |
| objectives of the study | Speckle reduction ultrasound image |

**Comment:**

The background: its good

The purpose study: need to be more specific

The problem statement: need to be more specific

Objective study: need to be more specific

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