



A Fuzzy based Algorithm to Detect Bubbles in The Noisy Images of Early Universe

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With the upcoming extremely sensitive telescopes like the SKA, we may be able to image the early universe for the first time. However, analyzing the radio images from the early universe is going to be one of the most challenging problems in observational cosmology. The problem will be more complicated in the presence of various artifacts such as noise, foreground etc. One of the important problem is to detect and extract large connected object (bubble) present in the image which may be the signature of possible ionized or heated region. The presence of noise increases the complexity of the Bubble detection and extraction problem. As the existence of noise distort the actual image information, this in turn leads to false detection. To deal with the stated problem of Bubble detection and extraction in noisy astronomical images, fully fuzzy based algorithm has been proposed in this article. In the work first fuzzy based filtering approach has been implemented for removing the noise in the image. Later, fuzzy thresholding based segmentation technique has been incorporated for detection and extraction of Bubble from the image. For noise filtering asymmetrical triangular fuzzy filter with median center (ATMED) has been taken into account [1]. Threshold based segmentation has been performed on the obtained denoised astronomical image. In the step of threshold based segmentation fuzzy technique has been taken into account to determine the threshold label in the denoised image [2]. The proposed fuzzy based algorithm has been tested and compared with other existing noise removal and object detection algorithms exist in literature on some simulated datasets with different degrees of added synthetic noise.

References

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