IMAGE TEXTURE PRESERVATION IN SPECKLE NOISE SUPPRESSION

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ABSTRACT:

Speckle noise which occurs due to the coherent imaging system is the best known problem of SAR images and in turn, affects classification, change detection, biomass estimation and interpretation results. Several adaptive filtering methods have been documented to deal with this issue, such as Kuan, Lee, MMSE and Frost filters. These filters do not consider the level of homogeneity in the intensity of the pixels. For this reason, they degrade the spatial resolution of image and smooth details, while significantly decreasing the speckle noise level. There are other filters such as Enhanced Lee and Gamma Map that utilize the level of homogeneity, but they cannot adequately suppress speckle noise. Moreover, pixels whose coefficients of variation are near to maximum and minimum threshold values are not correctly filtered using these filters. In addition to these weaknesses, pixels surrounding a point scatterer are also treated as point scatterers due to shortcoming of the method of evaluating the coefficient of variation for differentiating between them and the point scatterer. We have developed a new method based on the homogeneity level for speckle noise suppression and simultaneously edge and feature preservation. Also, an algorithm has been proposed based on local statistical information to filter the pixels surrounding point scatterers. The results show an improvement in speckle reduction and texture preservation as well as reduction in the number of unfiltered pixels.

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