

Comparison of Fuzzy Filters on Synthetic Aperture Radar Image

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Abstract—The Synthetic Aperture Radar (SAR) image with its advantages is becoming more popular than the optical image in earth observation in using the remote-sensing techniques. However, the speckle noise that occurs in the SAR image causes difficulties in image interpretation. Thus, speckle noise reduction needs preprocessing procedure prior to the use of the SAR images. This study is done by proposed fuzzy filters that utilize SAR data. From the comparison, the combination of Frost-Triangular Moving Average (TMAV) has the best performance in the ability to reduce speckle noise than other filters. This filter improved the Frost filter performance for speckle noise reduction parameter's measurement, shows that 13.41% for Equivalent Number of Looks (ENL) and 6.07% for Speckle Index (SI). While Frost-Asymmetric Triangular Moving Average (ATMAV) has a relatively good performance for preserved texture. This filter improved the texture parameters such as Standard Deviation improved 4.33% and improved Variance for 8.46%. However, for the Mean parameters, Frost-Triangular Median Center (TMED) combination has the best performance compared to other filters, which improved the mean value for 7.10%. The comparative study it has been verified that the fuzzy approach has the robustness in the reduction of speckle noise and preserving the texture when applied in SAR image.

Keywords—synthetic aperture radar (SAR); speckle noise; fuzzy; image filter; ALOS-PALSAR