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Building Damage Information Extraction From Fully Polarimetric SAR Images Based on Variogram Texture Feature

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Rapid evaluation of building earthquake disaster information is of great significance for earthquake emergency rescue. Although polarimetric SAR has rich polarimetric information, there are still clear texture information in polarimetric SAR that could not be ignored, especially the intact artificial buildings show regular texture features in the image, and the texture distribution in the collapsed building area is disordered, so combining the texture information can also extract the building information well. In this paper, the full polarization SAR data of Yushu area in 2010 is taken as the research object, and the building area in SAR image is extracted by using the volume scattering component P_V in Yamaguchi decomposition. On this basis, the intact building area and collapsed building area are extracted based on the variogram value. Comparing and analyzing the result with the intact building area is extracted by using the secondary scattering component P_D in Yamaguchi decomposition. Finally, verified the accuracy by combing the optical remote sensing image after the earthquake, the extraction accuracy of intact buildings is 80.18%, collapsed buildings is 84.54%, and road water system is 77.58%.

Firstly, buildings and non-buildings are distinguished in SAR image. 100 sample matrixes are selected in building area and non-building area on P_V component image respectively. After calculating the mean value of sample matrixes, the threshold values of building and non-building area are obtained based on the minimum error, and the building area and non-building area are extracted respectively according to the threshold values. Secondly, in the building area, the sample matrix of intact buildings and collapsed buildings is selected to calculate the variograms value, and then the variograms curve is drawn. When the range $a = 11$, the variograms value of the building area is calculated, and the FCM algorithm is used to extract the calculation results of intact buildings and collapsed buildings respectively; In order to compare and analyze the classification results, based on P_D component, use K-means algorithm to extract intact buildings and the collapsed building areas are extracted separately, and the results are compared with the results based on the variogram texture feature method. Finally, the intact buildings and collapsed buildings extracted are calibrated and the extraction accuracy is calculated by combining the Google Earth historical image.

At the end of this paper, the shortcomings of extraction results based on Yamaguchi four component decomposition method and variogram method are discussed, and the idea of

combining geographic information data to further improve the accuracy of earthquake damage assessment is proposed.