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Multiresolution framework with Neural Network approach for Automatic Target Recognition

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Abstract

Automatic Target Recognition is an approach by which we identify one or a group of target-objects in a scene. It plays a pivotal role in the challenging fields of defense and civil. Most of the methods in this context are based on fix window-size technique.

In this thesis we proposed a novel approach which gives scale, rotation and translation invariant results for automatic target recognition in high-resolution satellite images which in turn are able to recognize the multiple targets in a scene. We make a system which can predict the possible area of interest in a scene, where target may be present or not. Prediction of areas of interest is based on edge detection and similarity measure of wavelet co-occurrence features of segmented sub-blocks. Proposed method uses a systematic approach for selecting features of area of interest.

Zernike moments, calculated for scale and translation normalized area of interest, are thereby used as the features of the concerned area. Zernike moments are rotation invariant. The extracted features are then fed to trained neural network for recognition. This approach is more suitable for the satellite images because resolution of image and idea about the target are two essential factors by which we can predict the minimum and maximum size of the target. The algorithm takes considerably less time compared to the fix window based approach because the predicted numbers of interest areas to be processed in a scene are very less. The proposed approach has successfully been tested on number of satellite images of different resolutions and their timing analysis has been compared with fix window based approach.