In this work, we investigate a non classical sonar imagery segmentation approach based on the Directional Filter Bank (DFB). The approach uses a decomposition of the Fourier spectrum into three spectral bands: low, medium and high frequencies. A subsequent analysis of the pattern isotropy is conducted by dividing the medium spectral band into small, overlapped, angular sectors. The features extracted from this process are assessed so as to determine their potential on the classification performances. First, a comparison with classification performances result given by texture features derived from grey level co-occurrences matrices (GLCM) is made. Finally the global performance of the segmentation is assessed using the spectral features, the features extracted from GLCM and the grasing angle. The Klein 5000 experimental data used in this study have been acquired by DGA/GESMA during BP 02 experiment conducted by NURC.

The data used for our study were obtained during the BP’02 (Battlespace Preparation) experiments carried out by the SACLANT Undersea Research Centre in La Spezia, Italy.

In this work, we propose directional filter bank DFB for spectral features analysis. A combination of the proposed spectral features with the Harlick features derived from GLCM gives better classification results.

Both, supervised and unsupervised algorithms tested on the created sonar data base confirm the ability of DFB features to discriminate of seabed textures.

We also note that the grasing angle feature improves the classification accuracy.

The splitting process of sonar images and SOFM algorithm allows a good segmentation by reducing the dependency to the grazing angle of features computed.

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References