



MARINE VESSELS ACOUSTIC RADIATED NOISE CLASSIFICATION IN PASSIVE SONAR USING PROBABILISTIC NEURAL NETWORK AND SPECTRAL FEATURES

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ABSTRACT—Development of intelligent systems for classifying marine vessels based on their acoustic radiated noise is of major importance in the sonar systems. This paper focuses on three topics. The first topic is applying some modifications to the conventional Probabilistic Neural Network (PNN), as a common classifier in supervised pattern recognition, and suggesting a new configuration of PNN which we call it, Multi-Spread Probabilistic Neural Network (MSPNN). The second topic is proposing a method for estimating the required spread values of MSPNN from training data. The third topic is introducing discriminating features which can be used for ship noise classification. These features are: the poles of autoregressive (AR) model with proper order, the coefficients of AR model with proper order and six features which are directly extracted from Power Spectral Density (PSD) of acoustic radiated noise of marine vessels.

The performance of the conventional PNN and the suggested multi-spread PNN in classifying real ship noise data will be examined in this paper. A bank of 71 files of real radiated ship noise data is used for this performance evaluation. The results of this performance examination show that the proposed features are suitable for ship noise classification and the performance of the multi-spread PNN is generally better than the conventional PNN.

Key Words: target classification, acoustic radiated noise, probabilistic neural network