

Abstract

Mohamed Saad Zaghloul

Acoustic Targets Identification Using Hybrid Classifiers

The goal of this paper is to develop classification techniques for acoustic targets. An extensive experimental study on real data of various classification and combination rules has been performed. It is applied to the problem of matching score fusion using data sets consisting of features extracted from underwater acoustics signals to produce a more effective system to identify and recognize naval targets (ships or submarine). This paper provides a comparative study between three well-known classifiers. They are, continuous hidden Markov model (CHMM), K-nearest neighbor (K-NN) and artificial neural network (ANN) and their combination (COMB) to identify and recognize the naval target. Mel frequency spectral coefficients (MFCCs) are chosen as the studied features. The general Gaussian density distribution HMM was developed for the CHMM system. We studied the effect of speed, distance and direction of the target on the identification process. The Results show that COMB has always best IR result in all experiments. In addition to the results show that CHMM gives the best identification rate (IR) at 91.67% while changing range, 100% while changing direction and 58.3% while changing the speed which is better than 75%, 83.33% and 41.67% of ANN for the same set of experiments using simulated targets data COMB achieves 100% IR which is higher than CHMM, K-NN and ANN