

Classification of dolphin whistle types using an eigen-whistle algorithm

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We propose a classifier of types of dolphin whistles by adapting the method of eigenfaces used to identify human faces. The association is based on the observation that time-frequency representations such as spectrograms are images that are informative displays of marine mammal vocalizations. The narrow-band dolphin whistles and short duration clicks display identifying features that are localized contours in the image. Their contour-like nature suggests that the class of signals may be efficiently represented by a small number of eigenvectors derived from the principle component analysis (PCA). The Eigen-Whistle Classifier is developed by applying PCA on a set of pre-classified training whistles to construct an eigen-whistle space. The classification is performed by projecting the unclassified testing whistles onto the eigen-whistle space.

In this research, we attempt to classify types of dolphin whistles only. Pre-classification processing to remove underwater noise and clicks and multiple harmonics uses spectral subtraction and various image enhancement techniques. Initial results on a small data set are encouraging. Most misclassifications are among whistles whose contours have dominant similarities. The performance of the algorithm can be improved by refining the eigen-whistle space using a larger training data set and with effective preprocessing.

This project is partially supported by a grant from the Southeast National Marine Renewable Energy Center.