

(Research Article)
Classification of the shocks and impulsive noise using signal nonlinear dynamic based features

A. Janghorbani^{*1}, M.J. Jannati², R. Mahdiyani³

1. Department of Biotechnology, Faculty of New Sciences and Technologies, Semnan University

2. Department of Electrical Engineering, Iran University of Science and Technology

3. Researcher in Acoustic Research Area

Received: 2020/07/14, Accepted: 2020/07/22

Abstract

Classification of acoustic events in acoustic surveillance systems are of the most interesting research areas in recent years. Sniper localization systems are one of the important and applicable kinds of these systems in which detection and discrimination of the shock signals from environmental impulsive noises have a very important and significant effect on the reliability and performance of them. This study approaches the classification of the shock signals and impulsive noise using nonlinear dynamics-based features, for the first time, and the SVM with a multinomial kernel. The results of the Anova test in this study showed the good potential of the extracted features to discriminate the shocks form impulsive noises. Furthermore, the classification results confirm this remarkable ability. The performance of this study method yields to 89.6% accuracy, 88% specificity and 92% sensitivity in a 5-fold cross validation procedure. Also, the performance of the trained classifier dealing with an independent test set was 90.36% for the accuracy, 87.5% for the specificity and 91.85% for the sensitivity.

Keywords: Acoustic localization system, Nonlinear dynamics, Shock, Impulsive noise, Feature Extraction, Support vector machine.

pp. 50-60 (In Persian)

* Corresponding author E-mail: a.janghorbani@semnan.ac.ir