Information Theoretic Approach Based on Entropy for Classification of Bioacoustics Signals

ABSTRACT

A new hybrid method for automated frog sound identification by incorporating entropy and spectral centroid concept is proposed. Entropy has important physical implications as the amount of "disorder" of a system. This study explores the use of various definitions ofentropies such as the Shannon entropy, Kolmogorov-Rényi entropy and Tsallis entropy as measure of information contents or complexity for the purpose of the pattern recognitionof bioacoustics signal. Each of these definitions of entropies characterizes different aspects of the signal. The entropies are combined with other standard pattern recognition tools such as the Fourier spectral analysis to form a hybrid spectral-entropic classification scheme. The efficiency of the system is tested using a database of sound syllables are obtained from a number of species of Microhylidae frogs. Nonparametric *k*-NN classifier is used to recognize the frog species based on the spectral-entropic features. The result showed that the *k*-NN classifier based on the selected features is able to identify the species of the frogs with relativity good accuracy compared to features relying on spectral contents alone. The robustness of the developed system is also tested for different noise levels.