Bird-Adapted Filter for Avian Species and Individual Identification Systems Improvement

Authors : Ladislav Ptacek, Jan Vanek, Jan Eisner, Alexandra Pruchova, Pavel Linhart, Ludek Muller, Dana Jirotkova

Abstract : One of the essential steps of avian song processing is signal filtering. Currently, the standard methods of filtering are the Mel Bank Filter or linear filter distribution. In this article, a new type of bank filter called the Bird-Adapted Filter is introduced; whereby the signal filtering is modifiable, based upon a new mathematical description of audiograms for particular bird species or order, which was named the Avian Audiogram Unified Equation. According to the method, filters may be deliberately distributed by frequency. The filters are more concentrated in bands of higher sensitivity where there is expected to be more information transmitted and vice versa. Further, it is demonstrated a comparison of various filters for automatic individual recognition of chiffchaff (Phylloscopus collybita). The average Equal Error Rate (EER) value for Linear bank filter was 16.23%, for Mel Bank Filter 18.71%, the Bird-Adapted Filter gave 14.29%, and Bird-Adapted Filter with 1/3 modification was 12.95%. This approach would be useful for practical use in automatic systems for avian species and individual identification. Since the Bird-Adapted Filter filtration is based on the measured audiograms of particular species or orders, selecting the distribution according to the avian vocalization provides the most precise filter distribution to date.

Keywords : avian audiogram, bird individual identification, bird song processing, bird species recognition, filter bank

Conference Title : ICAA 2017 : International Conference on Acoustics and Applications
Conference Location : Copenhagen, Denmark
Conference Dates : June 11-12, 2017