much more recordings. Moreover the records have to be precisely annotated (species, individuals). To avoid described obstacle in our experiment the system (FA and PLDA) was trained on the human-speech data. The main scope of the research was a Bird Individual Identification on the Closed Set. We used 5,176 bird song records origin of thirteen chiffchaff individuals. The identification accuracy varies between 61.9% and 85.8%.

Dynamic Time Warping and Affinity Propagation Clustering for the categorisation of bird species: A case study

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We present an implementation of Dynamic Time Warping to calculate the pairwise acoustic dissimilarity of bird sounds. Diurnal calls of 26 bird species were recorded from February to July 2014 close to a large industrial plant of Fiat Chrysler Automobiles located within the Riserva Naturale Orientata delle Baragge (45°29'14"N; 8°07'45"E) in Northwest Italy. Recordings were collected with a RØDE NTG2 condenser transducer microphone (frequency response 20 Hz to 20 kHz, max SPL 131dB). The microphone was mounted on a RØDE PG2 Pistol Grip and connected to a TASCAM DR-680 digital recorder (44.1 kHz sampling rate). All species were recorded at a distance of between 5 and 10 m from the caller. Segments containing vocalisations (WAV format, 16-bit amplitude resolution) were selected from the original files and coupled with the information collected in the field on the vocalising species. Each segment could include the calls of one to four bird species. Overall, a spectrographic inspection provided us with a total of 2058 audio files that we used to calculate a pairwise dissimilarity matrix with a custom-built script in Python (Python Software Foundation). The matrix was then submitted to a clustering process in R (R Core Team) using the Affinity Propagation algorithm. The most robust clusterisation was selected using the Adjusted Rand Index (ARI), evaluated between successive clustering processes. The ARI showed higher values for the clustering solution with 71 leaves. Moreover, this clustering solution showed 90% agreement with the bird species or assemblage we observed in the field. Our results demonstrate that the combination of dynamic time warping and affinity propagation clustering is a powerful tool for categorisation of wild bird calls. This approach could be used to develop effective passive acoustic monitoring systems.