

Supplemental document

Table S1. The common names, scientific names, and abbreviations of 43 bird species.

Common Name	Abbreviation	Scientific Name
Magnolia Warbler	MAWA	<i>Setophaga magnolia</i>
Black-throated Green Warbler	BTNW	<i>Setophaga virens</i>
Nashville Warbler	NAWA	<i>Leiothlypis ruficapilla</i>
American Redstart	AMRE	<i>Setophaga ruticilla</i>
Ovenbird	OVEN	<i>Seiurus aurocapilla</i>
Tennessee Warbler	TEWA	<i>Leiothlypis peregrina</i>
Black-throated Blue Warbler	BTBW	<i>Setophaga caerulescens</i>
Grace's Warbler	GRWA	<i>Setophaga graciae</i>
Yellow-rumped Warbler	YRWA	<i>Setophaga coronata</i>
Hooded Warbler	HOWA	<i>Setophaga citrina</i>
Chestnut-sided Warbler	CSWA	<i>Setophaga pensylvanica</i>
Cape May Warbler	CMWA	<i>Setophaga tigrina</i>
Palm Warbler	PAWA	<i>Setophaga palmarum</i>
Blackburnian Warbler	BLBW	<i>Setophaga fusca</i>
Orange-crowned Warbler	OCWA	<i>Leiothlypis celata</i>
Bay-breasted Warbler	BBWA	<i>Setophaga castanea</i>
Northern Parula	NOPA	<i>Setophaga americana</i>
Yellow Warbler	YEWA	<i>Setophaga petechia</i>
Virginia's Warbler	VIWA	<i>Leiothlypis virginiae</i>
Connecticut Warbler	CONW	<i>Oporornis agilis</i>
Pine Warbler	PIWA	<i>Setophaga pinus</i>
Lucy's Warbler	LUWA	<i>Leiothlypis luciae</i>
Blackpoll Warbler	BLPW	<i>Setophaga striata</i>
Northern Waterthrush	NOWA	<i>Parkesia noveboracensis</i>
Common Yellowthroat	COYE	<i>Geothlypis trichas</i>
Prairie Warbler	PRAW	<i>Setophaga discolor</i>
Worm-eating Warbler	WEWA	<i>Helmitheros vermivorum</i>
Blue-winged Warbler	BWWA	<i>Vermivora cyanoptera</i>
Golden-winged Warbler	GWWA	<i>Vermivora chrysoptera</i>
Golden-cheeked Warbler	GCWA	<i>Setophaga chrysoparia</i>
Hermit Warbler	HEWA	<i>Setophaga occidentalis</i>
Prothonotary Warbler	PROW	<i>Protonotaria citrea</i>
Black-and-white Warbler	BAWW	<i>Mniotilta varia</i>
Black-throated Gray Warbler	BTYW	<i>Setophaga nigrescens</i>
Cerulean Warbler	CERW	<i>Setophaga cerulea</i>
Townsend's Warbler	TOWA	<i>Setophaga townsendi</i>
Yellow-throated Warbler	YTWA	<i>Setophaga dominica</i>
Red-faced Warbler	RFWA	<i>Cardellina rubrifrons</i>
Canada Warbler	CAWA	<i>Cardellina canadensis</i>
Louisiana Waterthrush	LOWA	<i>Parkesia motacilla</i>
Wilson's Warbler	WIWA	<i>Cardellina pusilla</i>
Colima Warbler	COLW	<i>Leiothlypis crissalis</i>
Kentucky Warbler	KEWA	<i>Geothlypis formosa</i>

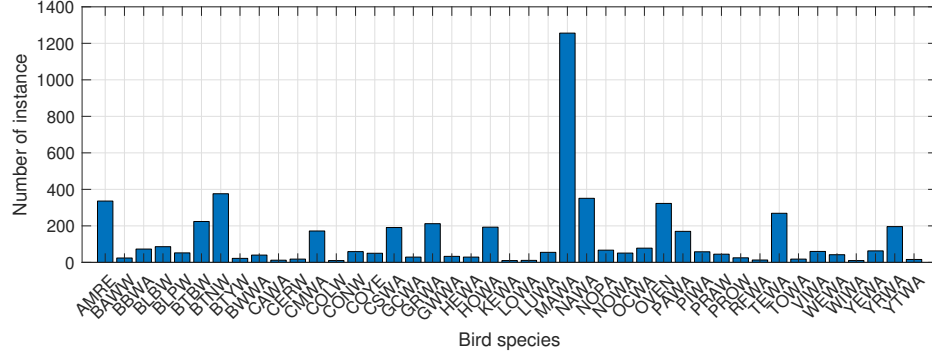


Fig. S1. The number of instances for all bird species in the CLO-43DS dataset. Here, the x-axis denotes the abbreviations of common names of those 43 bird species, which can be found in Table S1.

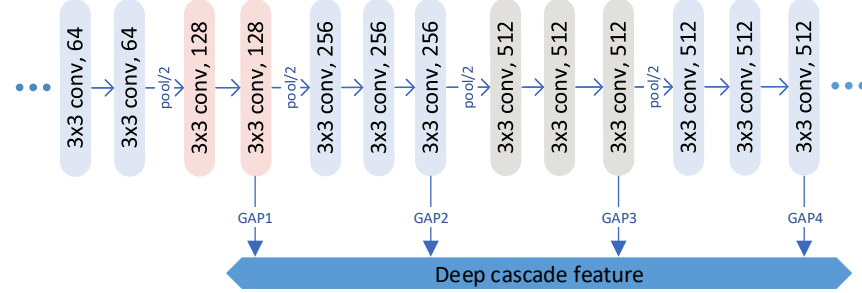


Fig. S2. Flowchart of bird sound classification system. Here, four main steps are included which are preprocessing, multi-view representation, model training, and classification

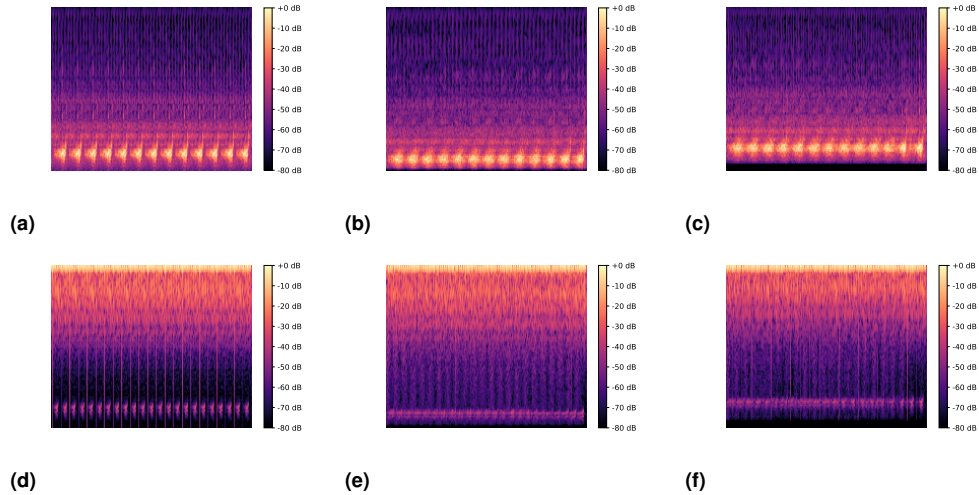


Fig. S3. The example of *Setophaga occidentalis* and *Vermivora chrysoptera* using pitch shift. (a) original *Setophaga occidentalis*, (b) *Setophaga occidentalis* using pitch shift with a factor of 2, (c) *Setophaga occidentalis* using pitch shift with a factor of -2. (d) original *Vermivora chrysoptera*, (e) *Vermivora chrysoptera* using pitch shift with a factor of 2, (f) *Vermivora chrysoptera* using pitch shift with a factor of -2.

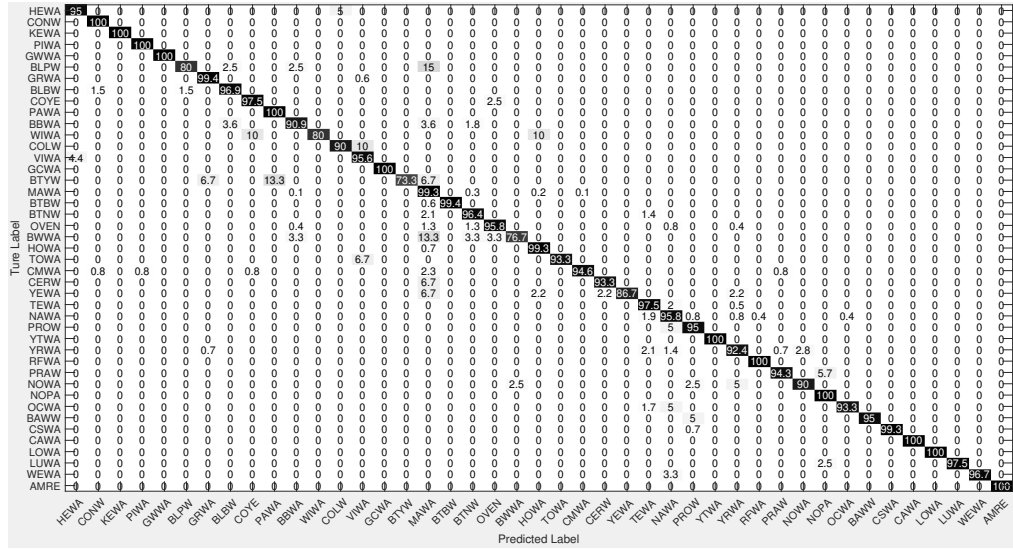


Fig. S4. Confusion matrix (%) of the best result using the fusion of selected pre-trained models. Here, the x and y axes denote the code of each bird species to be classified. The x-axis is the true label and y-axis is the predicted label.