聲音與生態：錄音系統與機器學習在鳥類生物多樣性監測的應用

In recent decades, Autonomous Recording Units (ARUs) have gained popularity for bird census through passive acoustic monitoring. Advances in hardware and automatic species identification have expanded the potential applications of passive acoustic monitoring. This study applied passive acoustic monitoring to assess avian biodiversity in the dry sub-boreal spruce biogeoclimatic zone in British Columbia, Canada. Audio recordings were collected at 66 sites, each at least 2 km apart for independent sampling, accounting for the ARUs' audio detection radius. One AudioMoth was deployed per site during the breeding season for owls (Feb-Apr) and songbirds (May-Jul) over three years (2020-2022). The open-source machine learning algorithm, BirdNET Analyzer, processed approximately 1,500 hours of recordings, requiring around 150 computer hours. We detected 96 species, with around 67% overlapping with human observations. Richness was highest in old-growth forests (age > 80) and sites near water, as revealed by rarefaction curves accounting for difference in efforts. A richness hotspot map was created for further management planning. This project explores the potential of passive acoustic monitoring and machine learning for broad-scale avian acoustic studies.