

Listening to the ecosystem: the integration of machine learning and a long-term soundscape monitoring network

Friday, 10 March 2017 09:00 (30 minutes)

Information on the variability of environment and biodiversity is essential for conservation management. In recent years, soundscape monitoring has been proposed as a new approach to assess the dynamics of biodiversity. Soundscape is the collection of biological sound, environmental sound, and anthropogenic noise, which provide us the essential information regarding the nature environment, behavior of calling animals, and human activities. The recent developments of recording networks facilitate the field surveys in remote forests and deep marine environments. However, analysis of big acoustic data is still a challenging task due to the lack of sufficient database to recognize various animal vocalizations. Therefore, we have developed three tools for analyzing and visualizing soundscape data: (1) long-term spectrogram viewer, (2) biological chorus detector, (3) soundscape event classifier. The long-term spectrogram viewer helps users to visualize weeks or months of recordings and evaluate the dynamics of soundscape. The biological chorus detector can automatically recognize the biological chorus without any sound template. We can separate the biological chorus and non-biological noise from a long-term spectrogram and unsupervised identify various biological events by using the soundscape event classifier. We have applied these tools on terrestrial and marine recordings collected in Taiwan to investigate the variability of environment and biodiversity. In the future, we will integrate these tools with the Asian Soundscape monitoring network. Through the open data of soundscape, we hope to provide ecological researcher and citizens an interactive platform to study the dynamics of ecosystem and the interactions among acoustic environment, biodiversity, and human activities.

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Session Classification: Earth, Environmental Science & Biodiversity I