18. Wild nights at the zoo

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Description:
In our internal research project, we have been making long audio recordings in aviaries of several zoos in Europe. These are week-long 24/7 high-quality audio recordings with metadata, for example, about the animal species and weather. Our goal is to collect a controlled data set for developing passive acoustic monitoring technology for biodiversity research, but there is a lot more in those recordings. Our collaborators, curators and animal carers of the zoos, are very interested to know what goes on in the zoo at the nighttime, how animals react to the sounds of other animals or humans, and is it possible to monitor animal welfare in a zoo by just listening.

The goal of this project is to dive into the recordings from selected zoos and build an interactive tool that finds and shows patterns of the vocal activities of birds and other animals in the data and helps to explore the data and find correlations and causalities between events. One special area of interest is the interaction between wildlife and zoo animals. The group would use existing models for animal sound recognition [1-3] and possibly develop or fine-tune specific models that work for the target combinations of species, for example, flamingos and polar bears rarely meet in a nature recording but here we have them.

The focus is on extracting insights from the recordings that are most valuable for the zoos, particularly from an animal welfare perspective. Therefore, the group will meet and discuss with curators of Dutch zoos to collect their insights and eventually show them the results and demos. The group is also welcome to use our devices to make more recordings in the zoos in collaboration with the animal carers.

Requirements: Students who choose this project should have strong signal processing and machine learning background, and skills of developing a nice software demonstrator.

References
[1] S. Kahl, C. M. Wood, M. Eibl, and H. Klinck, "BirdNET: A deep learning solution for avian diversity monitoring," Ecological Informatics, vol. 61, p. 101236, 2021.
[2] Ghani, B., Denton, Tom, Kahl, Stefan, & Klinck, Holger. (2023). Global birdsong embeddings enable superior transfer learning for bioacoustic classification. *Scientific Reports*, *13*(22876)
[3] Yang, Qiang, et al. "Advanced Framework for Animal Sound Classification With Features Optimization." *arXiv preprint arXiv:2407.03440* (2024).