ONC-MERIDIAN Joint Passive Acoustics Workshop Series Summary

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Overview

Two 2-day workshops hosted at Ocean Networks Canada

1. Developing Standards for Annotating & Storing Marine Passive Acoustic Data & Metadata

- Agenda by ONC

2. Detection and classification in marine bioacoustics with Deep Learning – from academic exercises to practical tools

- Agenda by MERIDIAN

~30% attendance turnover between workshops, with more metadata specialists in workshop 1 and more deep learning specialists in workshop 2

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Developing Standards for Annotating & Storing Marine Passive Acoustic Data & Metadata

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Goals:

- Facilitate cross-organization and cross-disciplinary sharing of knowledge and methods

- Begin collaborative work on defining passive acoustic annotation and metadata standards or best practices

- Get user-derived recommendations that can guide development of ONC's new passive acoustic data annotation environment

- Support ESP partner MERIDIAN in publicizing their metadata catalog, which will publicly list ONC's data

- Increase ONC's visibility in the marine mammal research community to increase use of ONC acoustic data

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Developing Standards for Annotating & Storing Marine Passive Acoustic Data & Metadata

Attendees:

- 26 attendees from Canada, USA, and France

- Representatives from ONC, MERIDIAN, JASCO, DFO-West, DFO-East, NOAA, APL, OSmOSE, SDSU, and OrcaSound

- Expertise in marine mammal research, passive acoustics, classical machine learning, deep learning, and metadata

Structure:

- Morning: presentations
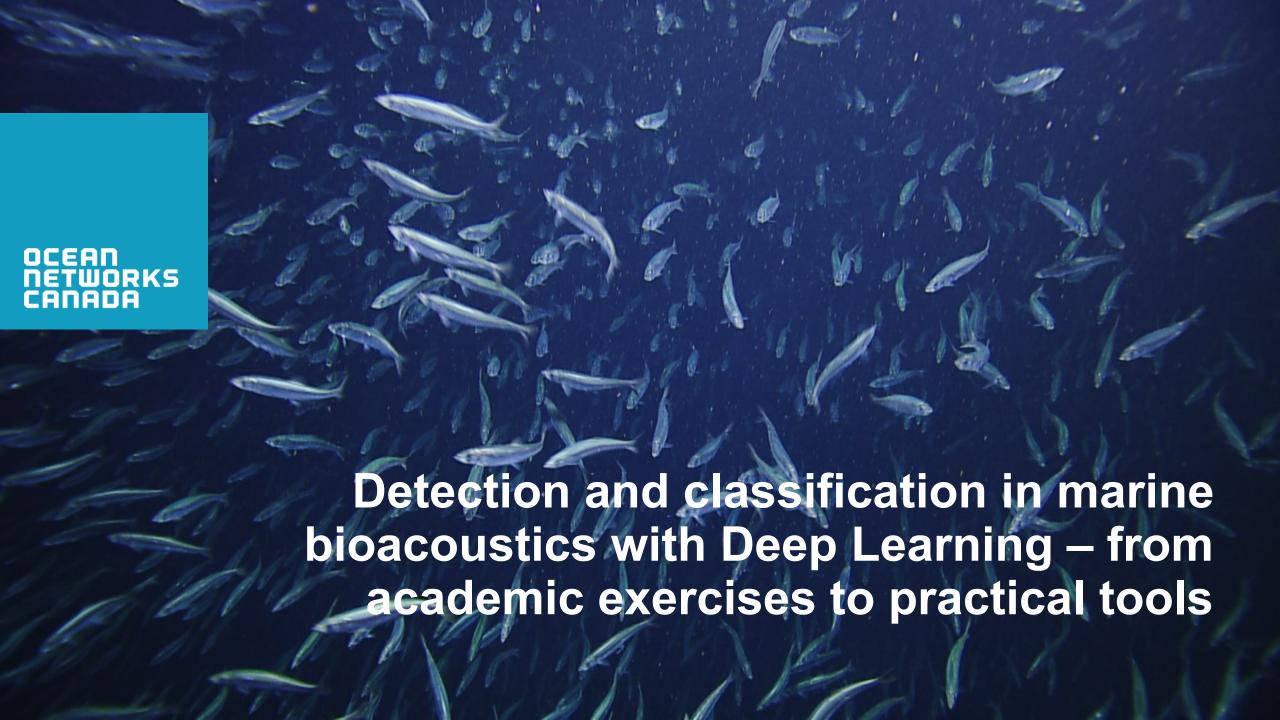
- Afternoon: breakout discussion sessions

Developing Standards for Annotating & Storing Marine Passive Acoustic Data & Metadata

Outcomes:

- Extensive preliminary recommendations for minimum requirements and best practices for annotating passive acoustic data (both manually and when using detectors), and for metadata to include with passive acoustic data sets
  - Could be assembled into best practices guide to maximize cross-disciplinary and cross-project usefulness of annotated data sets
  - Will guide development of ONC's annotation environment

- Continued collaborative efforts via 3 working groups:
  - Call type vocabulary standardization
  - Marine passive acoustic detector/classifier development, use, and reporting standardization
  - ANSI passive acoustic metadata working group (participants invited to join)

- Many participants have indicated desirability of and intent to use MERIDIAN's catalog after their presentation

- Four participants have since put other researchers and graduate students in contact to access ONC data or plan collaborations

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Detection and classification in marine bioacoustics with Deep Learning – from academic exercises to practical tools

Detection and classification in marine bioacoustics with Deep Learning – from academic exercises to practical tools

ONC's Goals:

- Facilitate discussions between marine mammal and machine learning research communities to improve the applicability and utility of new machine learning solutions and accelerate passive acoustic data analysis

- Support ESP partner MERIDIAN in publicizing their deep learning solutions for marine mammal scientists, developed in part using ONC data

- Make new connections in the Deep Learning research community that could result in future collaborations or publications

Detection and classification in marine bioacoustics with Deep Learning – from academic exercises to practical tools

Attendees:

- 27 attendees from Canada, USA, and France

- Representatives from ONC, MERIDIAN, JASCO, DFO-West, DFO-East, NOAA, APL, SDSU, OrcaSound, SFU, Axiom Data Science, Cornell, Google, and OrcaLab

- Expertise in marine mammal research, passive acoustics, classical machine learning, and deep learning

Structure:

- Morning: presentations

- Afternoon: presentations and panel discussions

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Detection and classification in marine bioacoustics with Deep Learning – from academic exercises to practical tools

Outcomes:

- Bi-directional knowledge transfer
  - Marine mammal scientists learned about Deep Learning and existing tools to make Deep Learning more accessible to them
  - Deep Learning experts learned about common issues rarely considered when computer scientists apply learning techniques to labelled passive acoustic data (the violation of the assumption of sample independence has far-reaching consequences)

- MERIDIAN launched their Deep Learning tool KETOS through a hands on tutorial with participants

- New connections:

  - Opportunity for ONC to work with Dr. Lauren Harrell of Google AI For Social Good on classifying ONC acoustic data

  - Dr. Steven Bergner (SFU) will use ONC data as training data for his students in his deep learning classes

Overall Outcomes

- 6 new users or collaborations (so far)

- Ongoing involvement of ONC in work on defining standards and best practices for passive acoustics

- Successful conclusion of ONC's enhanced support of MERIDIAN with the launch of their metadata catalog and deep learning tools

- Lots of positive feedback from participants of both workshops –

- Improved visibility in and rapport with the marine mammal research and deep learning research communities

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Questions?