Project Dory
COMP 3106 (Intro to AI)
Carleton University

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Background:
For decades, researchers have been collecting sound data from the Earth's oceans without an efficient way to classify it. NOAA (National Oceanic and Atmospheric Administration) and the U.S NAVY have collected over 300 terabytes of oceanic sound data over a 4 year period through the SanctSound project which aims to allow people to easily explore and access as much of this data as possible. Classifying this data is already happening thanks to the NOAA Big Data Program. Project Dory hopes to build on this effort by providing a platform that is able to listen to and identify sounds created by marine mammals. Inspired by Dr. Roger Payne's multi-platinum album 'Songs of The Humpback Whale', we hope this project will be used in the effort to preserve and study marine life.

Objectives:
The objective of Project Dory is to develop a platform to aid researchers in classifying marine mammals from sound data. We aim to develop an AI model that is able to classify the presence of one or multiple marine mammals inside a sound clip. The platform will be able to take an audio file (.wav) and output what animals are present with a time stamp corresponding to the original audio file.

Methods:
Project Dory will utilize deep learning techniques, such as convolutional neural networks (CNNs), and classify data using The Mel-frequency cepstral coefficients (MFCCs) to classify the features of the audio data based on time and frequency. The AI model will be trained using a supervised learning approach, where it will be trained on labeled marine mammal sound data.

Datasets:
Project Dory plans on using the Watkins Marine Mammal Sound Database. This database contains the labeled recordings of over 60 different marine mammals collected over 7 decades.

Validation & Analysis:
Project Dory will validate its findings through the introduction of new data not seen by the model. We will perform loss validation calculations to see how well our model is able to predict the marine mammals present in the audio clip. Once our model archives reasonable performance levels, we will continue with the validation of labeled data by comparing our ground truth labels with the outputs from our model.

Project Novelty:
Project Dory will offer an easily accessible, intuitive-to-use platform for researchers to upload single or multiple sound files to help them classify their recordings correctly and efficiently. This type of platform does not yet exist, yet there are plenty of GitHub links and publications about the subject.

Schedule and Presentation Availability:

Date Deadline	**Goal**
Oct 22	Have a Full Project outline ready with tasks broken down and allotted to group members. Select a platform to host Project Dory.
Oct 29	Finish Data preprocessing operations.
Nov 5	Begin the Model selection process.
Nov 12	Finish Selecting a model.
Nov 19	Fine-tune our model and QA testing.
Nov 26	Expand the number of Identifiable marine mammals (Have at least 5).
Dec 3	Platform Integration

Presentaion Times: Dec 4 @ 1pm, Dec 4 @ 2pm, Dec 5, @1pm, Dec 5, @2pm, Dec 8, @ 1pm

Hardware Requirments:
Due to the number of features our data will have, it is important that we reserve a powerful GPU. A request form has been filled out at the time of this submission.