Image Classification of Fish

# **Evan Edmunds DSC 680 - Spring https://github.com/tripleee19**

# Which Domain?

What domain is this data going to come from? Please list 10 references (with a brief annotation) to use to make sense of what you are doing with these data.

This project will cover the domains of image recognition, classification, and supervised learning.

* <https://www.datacamp.com/community/tutorials/convolutional-neural-networks-python>
  + Provides a blueprint on how to implement convolutional neural networks within Python.
* <https://q-viper.github.io/2020/06/05/convolutional-neural-networks-from-scratch-on-python/>
  + More insight into how to construct neural networks in Python
* <https://www.tutorialspoint.com/image-processing-in-python>
  + Goes over various image processing techniques that can be used to increase the performance of image models.
* <https://www.analyticsvidhya.com/blog/2020/10/create-image-classification-model-python-keras/>
  + Goes over the specific implementation of creating an image classification model within Python using the keras package.
* <https://towardsdatascience.com/common-image-processing-techniques-in-python-e768d32813a8>
  + Explores a larger variety of image processing methods, such as edge detection and denoising.
* <https://keras.io/guides/sequential_model/>
  + Explains the implementation of keras’ sequential model class, as well as the different methods that are associated with it.
* <https://www.pluralsight.com/guides/importing-image-data-into-numpy-arrays>
  + Articulates how to import image data into Python using numpy arrays.
* <https://www.analyticsvidhya.com/blog/2021/05/image-processing-using-numpy-with-practical-implementation-and-code/>
  + Teaches the basics on how Numpy can be used to handle image data within the arrays, as well as different ways to manipulate them.
* <https://towardsdatascience.com/step-by-step-guide-to-building-your-own-neural-network-from-scratch-df64b1c5ab6e>
  + The basics of creating a neural network
* <https://www.petelawson.com/post/using-an-amd-gpu-in-keras/>
  + Instructs on how to connect keras to an amd gpu to increase the speed at which models can be trained.

# Which Data?

What is the dataset you’ll be examining? Please provide a codebook if there is one or a link to the dataset as well as a detailed description.

<https://www.kaggle.com/crowww/a-large-scale-fish-dataset>

# Research Questions? Benefits? Why analyze these data?

How are you proposing to analyze this dataset? This is about your approach. Here, you’ll be proposing your research questions as well as justifications for why you’d offer these data in this way.

Is it possible to accurately and efficiently identify fish using image data processed and analyzed by machine learning methods? This can serve as a proof of concept for using image recognition in a practical setting as well as compare various image processing methods.

# What Method?

What methods will you be using? What will those methods provide in terms of analysis? How is this useful?

This project will be using the keras implementation of a convolutional network to classify the images. OpenCV will be used to process the images. Pandas and pathlib will be used to import the image data into Python.

# Potential Issues?

What challenges do you anticipate having? What could cause this project to go off schedule?

The dataset contains 430 images across 9 different classes. When combined with the need for splitting the data into testing and training datasets, there is a very small number of images to work with for the task. Due to this, it will be necessary to augment the image data to create more data that can then be used to train and evaluate the model.

I have not personally done any image processing or augmentation outside of structured examples from textbooks, so it will be a challenge to work through those issues.

# Concluding Remarks

Tie it all together. Think of this section as your final report’s abstract.

This will be a useful project that will help shape up my skills working with image recognition models, as well as image data. Creating a convolutional neural network should provide a lot of opportunity for honing my skills and problem-solving abilities. The model could be used in a straightforward manner such as identifying different types of fish, and also as a blueprint for the general process and structure of an image classification problem.