Fish Family Classification using Deep Learning

Data analysis and preparation

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https://www.overleaf.com/read/sqkwpscdbrsk

1 Introduction

Deep Learning can be used to classify what type of fish is pictured in a photograph. This project's focus will be on classifying five different Linnaean families of fish. There are multiple species within each family, and there are significant variations in size, shape, and coloration between the species.

1.1 Project Motivation

I created a website called MyScubaDives.com in 2011, and the primary purpose of the website was to create a database of all dive sites and dive operators around the world, and allow people to log their dives and share images of what they saw. Around this time, image "tagging" and facial recognition was being popularized by Facebook, and I thought it would be interesting to attempt to use AI to help people identify what fish where in their photos. The site ultimately failed to gain popularity, and I lost interest in the project as usage and revenue never really grew. This class project seems like a good opportunity to explore what I failed to do a decade ago.

2   Data

2.1   Data Collection

To create the dataset, online image searches were used to find and download more than 1000 images, split across five different Linnaean families of fish.

The photographs are of multiple species within each family, and are taken from various angles and with various lighting conditions.

Each image is limited to one family of fish, but multiple individuals within the same family may be present.

2.2   Data Preprocessing

The images were imported into Apple Photos and exported as JPEG High Quality with a maximum height and width of 500px to reduce the overall dataset file size and limit any file format issues.

2.3   Data Distribution

1. Clownfish — Item Count: 201

2. Lionfish — Item Count: 215

3. Parrotfish — Item Count: 210

4. Triggerfish — Item Count: 215

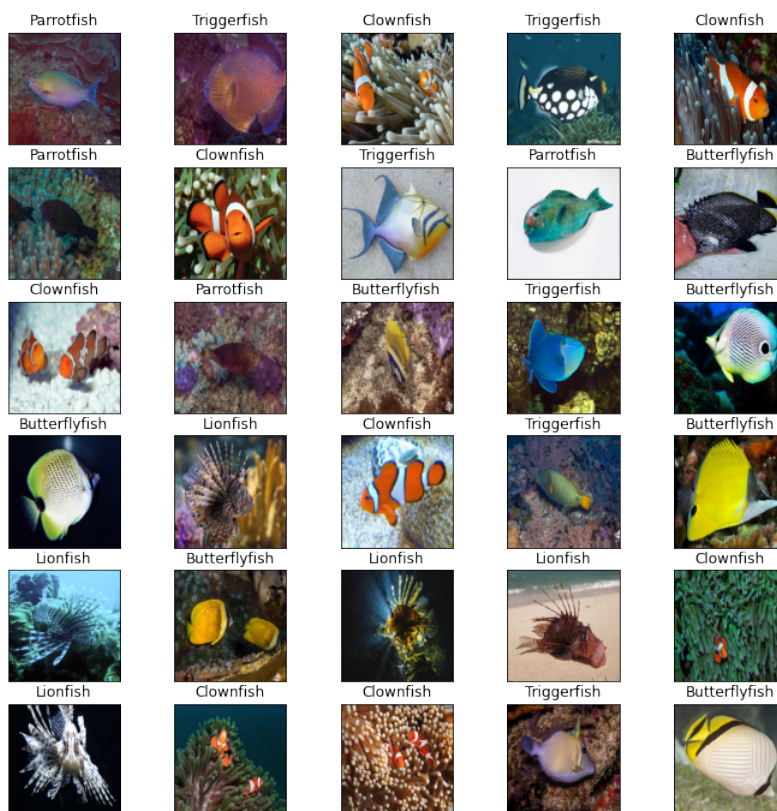5. Butterflyfish — Item Count: 210

There are 1051 images total.

Figure 1: Dataset example

2.4   Data Normalization

The ImageDataGenerator included with Keras will be used to re-scale each image with a 1/255 ratio. I believe the color will be relevant to effective categorization, and will keep all color channels.

2.5 Project Data Processing Code

The data for this project was manipulated using Google Colab and Python.

URL: https://colab.research.google.com/drive/12tNNGjWssaP43wdXAOhgY41qJ8AIDNhn