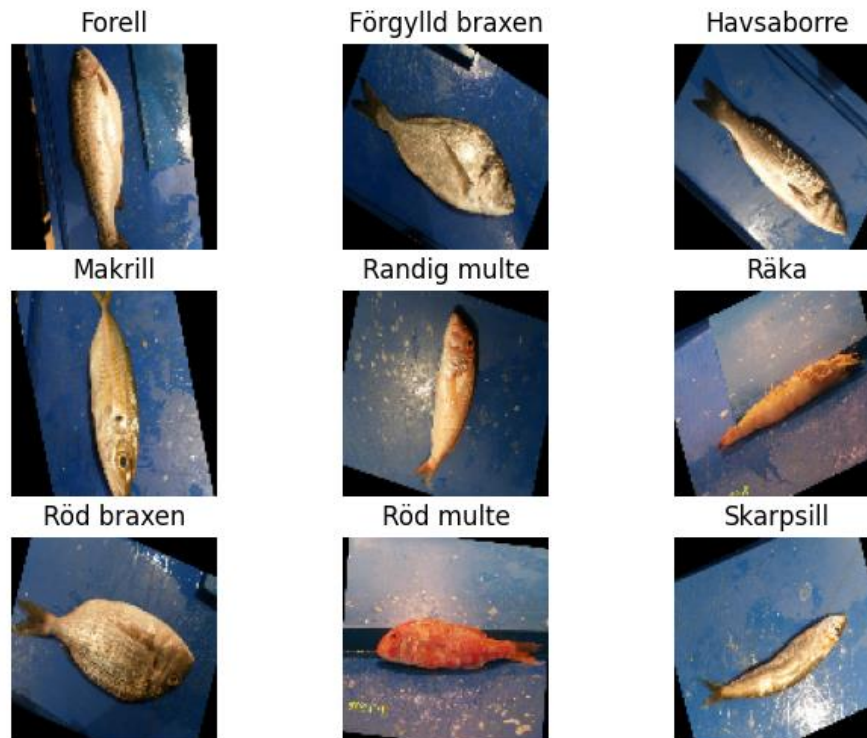


# Fish Image Classification

The task was to classify fish species from an image using a machine learning model and to explain the reasoning behind the solution.

## Exploratory Data Analysis

The data consists of 9 different species of fish with 1000 images a piece. Looking through the images it can be surmised there was a lot of data augmentation (translations, rotations, etc.) done to increase number of images. Another takeaway is that the fish species look similar to each other in shape and color, which makes the task challenging for many classifiers. I wanted to do more analysis like an average and standard variation image for each fish species as well as analyzing their average the RGB values, but getting the model training working was prioritized and time was not enough.



## Model Description

The model chosen was a simple Convolutional Neural Network (CNN) made with Keras and Tensorflow. Later, the plan was to use a more sophisticated network like EfficientNet and do transfer learning by changing the top layers of the network, as I have seen it work well before. But obstacles were encountered and time ran out, so the simple CNN would have to be enough.

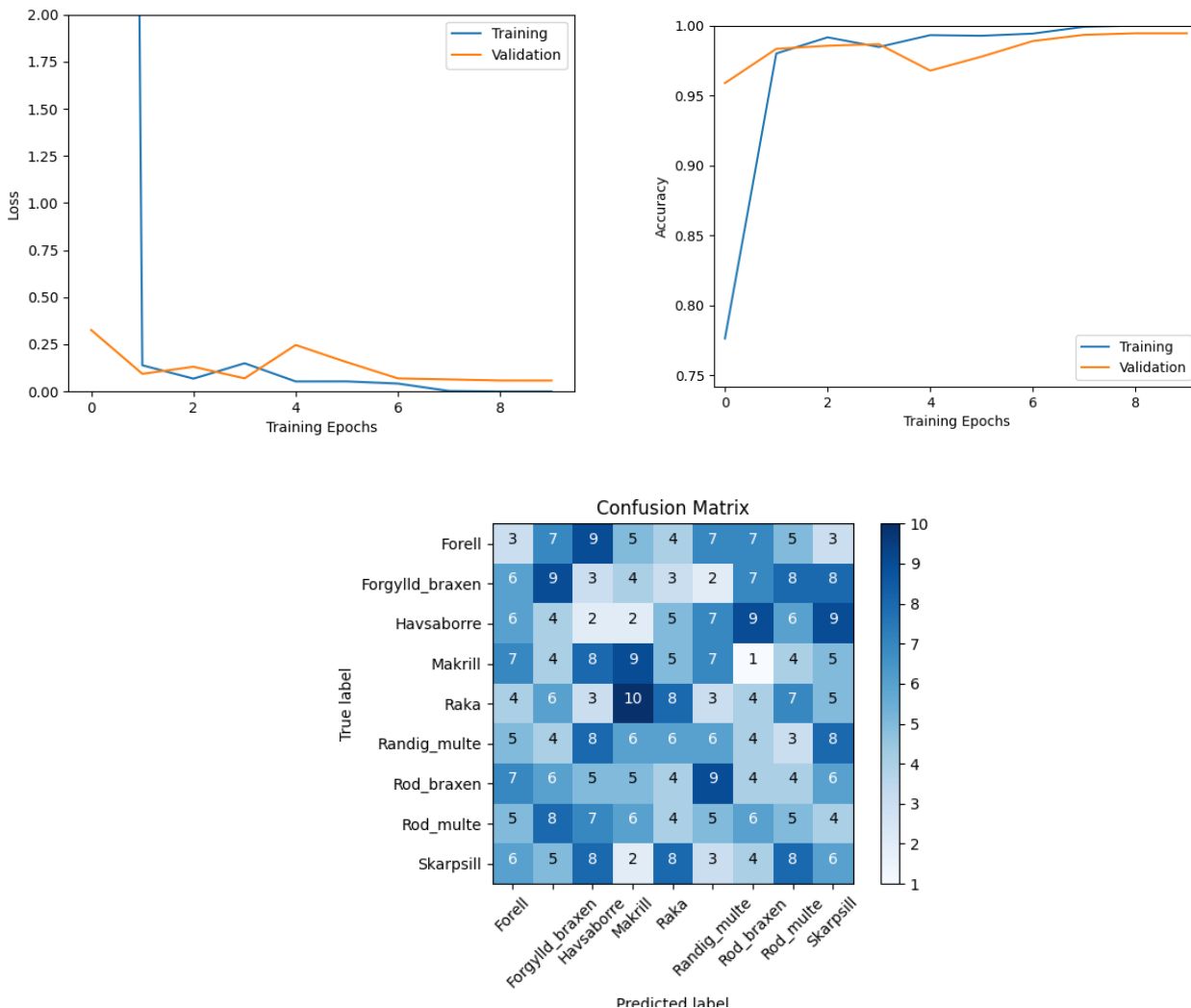
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Date: 2021-04-06

The main reason for using a CNN for this task is the simplicity to train it and its proven performance in image classification. The CNN in this task is very small with 7.5 million parameters. But this was fully intended as time was of the essence.

## Results

Below the training plots for the loss and accuracy show a very fast training. But the confusion matrix show that the model suffers from a severe case of overfitting. To combat overfitting one could introduce regularization, dropout or improve the variation of the images and train slower.



## Future Work and Thoughts

The task was straightforward, except for the model choice.

What the next stage of this hypothetical project should be depends on what the goal is. A typical use would be in the form of a fish classifier app. Where, someone who caught a fish could find out what kind of fish it is by using the app. If we continue on the app idea, the next step would be to increase the number and variation of images by downloading large labeled datasets or using a web scraper on social websites. Also, adding more fish species would make the app much more useful.

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With better training data, larger and more advanced classifier models could be tested. Next, move the models and computations to the cloud for easy access. And finally, make an app that communicates with the cloud based models using some APIs.