

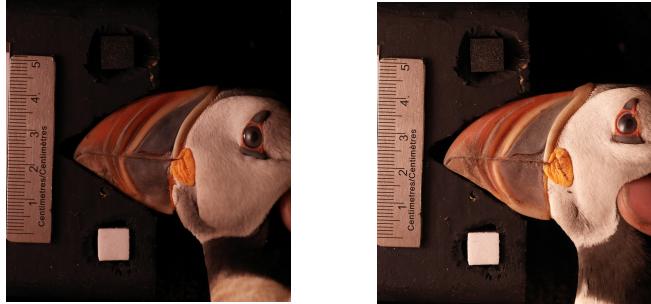
Computer Science 6915 - Winter 2020

Assignment 4

In this assignment you will get familiar with TensorFlow and construct a NN model for image classification.

1. Follow and complete the five sections of the TensorFlow tutorial “Learn and use machine learning” available at <https://www.tensorflow.org/tutorials/keras>. It is recommended that each team member completes this tutorial on their own.
2. Using TensorFlow create a deep neural network (NN) model to discriminate whether two pictures correspond to the same puffin.

In other words, suppose you give as input to the network the two pictures shown below:



The network should return a number between 0 and 1 indicating whether or not the same bird is shown in both pictures (basically, the network is answering the question: Are these two images of the same bird? 1 means yes, 0 means no).

Images are provided in Brightspace. File names are in the following format:

2019.07.15_GI_ATPU_1255-00379_R_3 where the 1255-00379 is the bird identifier so any filename with this number corresponds to the same bird. First you need to augment the dataset to increase the number of images. Second, create random pairs of images and indicate the correct classification (1 same bird, 0 different bird). Third divide your data into train and test dataset. Then, define a network architecture, train this network and evaluate its performance.

For ideas of network architectures used for image classification you can take a look at
<https://github.com/zalandoresearch/fashion-mnist#benchmark>

For this task, submit through D2L the following (one submission per team):

1. Your python code to process the data, build and train the network, and evaluate its accuracy on the test dataset.
2. A three-page description including:
 1. A description of the network architecture used including number of units on each layer, number and type of layers, activation function, regularization, etc.
 2. A short justification of why this architecture was selected.
 3. A description of how the network was trained including loss function, optimizer, metric, number of epochs, etc.
 4. A description of any data pre-processing steps.
 5. A description of the classification performance of the network on the test dataset including a figure with at least six images with their predictions (similar to the one shown in the TensorFlow tutorial).
3. An HDF5 file with your final model.

This assignment will be graded based on whether correct practices for model construction were followed (40%), quality of the description (40%), and whether the final model was correctly created and saved (20%).