**Assignment 1: Build your own binary image classifier**

The purpose of this assignment is to let students experience the whole end-to-end procedure of building a binary image classifier using deep learning. You are required to choose two “things” (objects, scenes, environment etc.) you want to classify and gather the appropriate image data that will be used for training by yourselves. You will then design your own CNN binary classifier and use the dataset you created to train and test it.  
Details about the code are provided in the Assignment slides.

Task:

1. **Choose two classes that you want to classify**
   1. You can choose two objects (e.g. book vs wallet) or even scenes/environments (e.g. bedroom vs kitchen).
   2. The two classes should not be too different (e.g. car vs pen).
2. **Collect images for each of these classes to create a training and testing dataset**
   1. For the training dataset, you can collect images you find online or make your own by taking photos using your phone. For the testing dataset, you must use photos you took yourself using a camera.
   2. Remember: for objects, classification will work better if the objects cover a large part of the image. You can either adjust the way you take the photos (up close to the object), manually crop the images afterwards (this will take a long time since you will have to do it for each image, or use Pytorch transforms. Other methods such as using OpenCV to crop the appropriate parts are possible too.
   3. Recommendation: take burst shots while moving the camera around so that you can take many photos at once, or take a video and save each frame (may end up being blurry).
   4. Your testing dataset should contain at least 10 images for each class. Other than that, there are no requirements on the total number of images in your dataset.
3. **Preprocess your images and make train/test data loaders**
   1. You will need to resize the images so that they are all the same size and maybe even normalize them.
   2. Build a DataLoader for each of your training and testing datasets.
4. **Design your own image classifier model**
   1. Use the materials you learned from our Deep Learning lectures (lab 1 and 2) to create your own model.
      1. You can refer to existing models such as Resnet or Alexnet, but you cannot load pretrained models.
5. **Train the model and then test it to get an accuracy**
6. **Write a short 1-page report explaining:**
   1. How you made each dataset and how many images each dataset has.
   2. The type of preprocessing you conducted and why.
   3. The structure of your model and why you chose that structure.
      1. Any model or online code you refer to should be cited in your report. Not doing so will count as plagiarism and can result in a 0 for this assignment.
   4. A screenshot of your final accuracy and a technical explanation for why the accuracy is the way it is