Objective: Supervised Binary Classification on subset of Imagenet dataset.

Please implement the following experiment in pytorch:

a) Download the train, validation and test data of Cat and Fish Images from ImageNet dataset using the following link:

   https://drive.google.com/file/d/16h8E7dnj5TpxF_ex4vF2do20iMWziM70/edit

b) Use the image transforms to resize the images to size 64×64, followed by the normalization of every image using mean: [0.485, 0.456, 0.406] and standard deviation: [0.229,0.224,0.225].

c) Read the training, validation and test data from their respective folders using "Imagefolder" and "DataLoader" packages defined in *torchvision* and *torch* after fixing the batch size as 64.

d) Define the simple network architecture using the three linear layers: L1 ; L2 and L3 using arguments (12288, 84); (84,50) and (50,2) respectively.

e) Use the Adam optimizer.

f) Copy the model to GPU and complete the training function below:

```
def train(model, optimizer, loss_fn, train_loader, val_loader, epochs=25, device="cpu"):
    …
    …
    for epoch in range(1, epochs + 1):
        ….
        model.train()
        for batch in train_loader:
            …
            …
            …



        model.eval()
        …
        …
        for batch in val_loader:
            …
            …
            …

        print(epoch, training_loss, val_loss, accuracy)

    print(average_accuracy)
```

g) Repeat the above steps i.e. b) to f) and define the AlexNet using convolution layers and ReLU activation functions.

h) Tweak the following parameters for both the simple network and AlexNet:
   1) Learning rate: 0.1, 0.01, 0.001, 0.0001
   2) Batch size: 8, 16, 32, 64, 128
   3) Activation functions: ReLU, GeLU, SeLU , SiLU, Sigmoid
   4) Epochs: 25, 50, 100
   5) Number of input/output features only for simple network

Result:

i) Report the best accuracies on both the networks.
j) Take some random image of fish/cat from validation dataset and print its label using simple and AlexNet.