

Exercise “Convolutional Neural Network in Keras”

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Introduction:

Convolutional Neural Networks (CNN) are probably the most important Deep Learning model and have initiated the boom in machine learning.

For this, it is important that we do not only understand its theory, but also know how to build one.

In this exercise, you shall build your own CNN for classification using Keras and train and test it using some downloaded images of different object categories.

Detailed steps:

1. Get training and test data:

The WWW is full of images. Some websites have emerged that provide image datasets as Kaggle and ImageNet. Search for a website that provides you some hundreds of images of five different object categories (e.g.: cars, bikes, trucks, trains, ships or: birds, mice, cats, dogs, horses).

2. Reading in the data:

Use OpenCV's `imread()` method to read in the data and display it using Matplotlib. Why are the colors in the images so strange? Fix this problem!

3. Define a CNN model for classification in Keras:

There is GitHub and there are many blogs that show you how to define a CNN model for classification in Keras. Use these examples to write your own CNN model.

4. Train your model:

Prepare the image data such that you can feed it into your Keras CNN model for training, i.e., such that the `model.fit()` method accepts the data. What is the shape for the training input and training output data that `model.fit()` expects?

5. Test your model:

Keep some of the images for a test dataset and use it not for training! Then test your model for image classification on these test images. How good can your CNN discriminate the five object categories?