**Problem definition**

We will be using CIFAR-10 dataset. The dataset comprises 60000 color images with a resolution of 32×32, separated into 10 classes (airplane, automobile, bird, cat, deer, dog, frog, horse, ship, truck), with 6000 images per class. It is already split into 6 batches with 10000 images each.

Therefore, this is a classification problem with 10 classes.

**Problem specification**

To solve the classification problem, we will use 2 supervised learning algorithms, more specifically an artificial neural network (ANN), and a convolutional neural network (CNN).

Input:

* ANN: vectorized version of the image: 32\*32\*3=3072 feature vector
* CNN: the actual 32x32x3 image tensor

Output: 10 values representing class probabilities

**Specification of the learning task**

Task: 10 class classification

Performance: accuracy, precision, recall, f-score, specificity, AUC, AUPRC

Experience:

* Direct
* Teacher: Labeled data
* The training experience is representative for the performance goal

**Target function to be learned**

ANN:

f : {3072 dimensional feature vector}->{10 dimensional vector}

The input represents the image in a vectorized form, and the output represent the raw logits for each of the 10 classes that can be further transformed into probabilities using SoftMax.

3072 = 32\*32\*3 (input image shape)

CNN:

f : {32x32x3 image tensor}->{10 dimensional vector}

The input represents the image tensor, and the output is the same as in the case of ANN.