DATA.ML.200 Pattern Recognition and Machine Learning

Homework 4: Neural networks

This homework prepares you for the next week exercises.

1. `pen&paper` Count the number of parameters in a neural network

   a) Consider the conventional full-connected neural network architecture of Figure 1. Suppose our inputs are 64×64 RGB images of two different traffic signs.

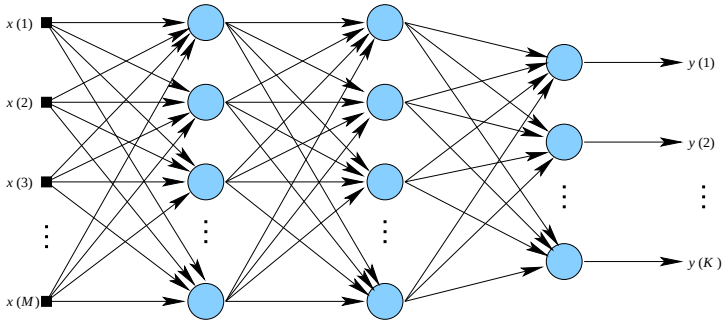

Figure 1: Vanilla neural network.

   Let the network structure be the following:

   - The input is "flattened" $3 \times 64 \times 64$-dimensional
   - On the 1st layer there are 100 nodes (marked in blue)
   - On the 2nd layer there are 100 nodes (marked in blue)
   - On the 3rd (output) layer there are 10 nodes (marked in blue; one for each class)

   Compute the number of parameters (weights) in the net.

   b) An old rule of thumb states that the number of training samples should be at least 5 times the number of coefficients. Compute the desired sample size based on this rule for (a).