**Autoencoder for coloring black and white images**

Project Description:

● The goal of the task is to create an autoencoder neural network capable of colorize images for a selected set of data, and test the effectiveness of of its different variants, in particular those using regularization.

Requirements:

● [10 pts] Implementation of an autoencoder performing the task of coloring black and white images and prepare a learning dataset. You can choose an existing image set or prepare your own.
○ The input data are black and white images (1 channel), created by converting the the collected learning images to grayscale.
○ The output data are color images (3 channels), which are the original images teaching images.

● (*) [5 pts] Examine the effect of regularization methods on the output:
○ effect of momentum parameter and batch size using batch normalization,
○ effect of dropout rate,
○ effect of weight decay.

● (*) [5 pts] Enabling colorization of black and white images of different input sizes. input, whereby the task is not to scale the input images to one fixed size, but to prepare a network that is capable of "natively" process such images (in practice: convolutional networks). By implementing from the beginning convolutional network from the beginning, this point of the requirements is passed automatically.

● [5 points] Report. Part of the evaluation of the report is its "editorial" quality, and the instructor can deduct points if there are many typos in the report, or the text is unstructured. The report should include:

○ Description of the selected learning set.
○ Description of the autoencoder architecture (it is advisable to include a drawing of the architecture).
○ A graph showing the error function during learning for the approaches tested, including those using regularization.
○ At least 6 images showing the effect of the coloring performed by the network.
○ A verbal evaluation of the effects of the network.