Piotr Klimkowski
ISS161387

Introduction to system simulation & application
Assigment 1.

1.Introduction

The given task was to create a simple convolutional neural network wich will be able to recognise 10 different objects from cifar-10 dataset of 60k photos. Framework used to create NN is KERAS, mentioned framework uses Tensor Flow libraries. Cifar-10 consists pictures of: airplanes, cars, birds, cats, deers, dogs, frogs, horses, ships and trucks.

2.Structure of the Network

(from input to output)
-2x Convolution layer with 32 3x3 kernels
-Max pooling layer with 2x2 pooling
-First dropout layer with 0.25 probability
-2x Convolutional layer with 64 3x3 kernels
-Max pooling layer with 2x2 pooling
-Second dropout layer with 0.5 probability
-Flatten layer
-Regular fully connected layer with 512 neurons
-Last dropout layer with 0.5 probability
-Output softmax layer with 10 classes
*Every convLayer uses relu activation and padding (filling sides of an image with zeroes to avoid shrinking after applying kernels)

3. Code syntax

Convolutional layer:
Convulotional2D(Amount of kernels,(widthOfKernel, heigthOfKernel), padding='typeOfPadding', activation='typeOfActivation')
MaxPooling layer:
MaxPooling2D(pool_size=(widthOfPool,HeigthOfPool))
Dropout layer:
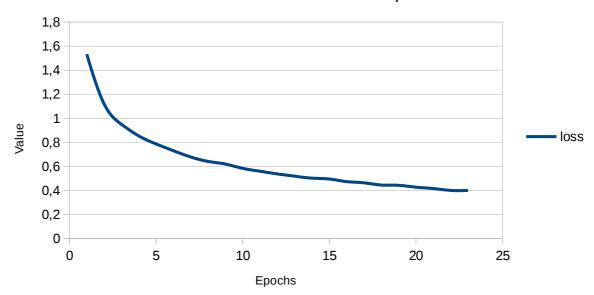*Dropout(dropOutProbability)*
Flatten layer:
Flatten()
FullyConnected layer:
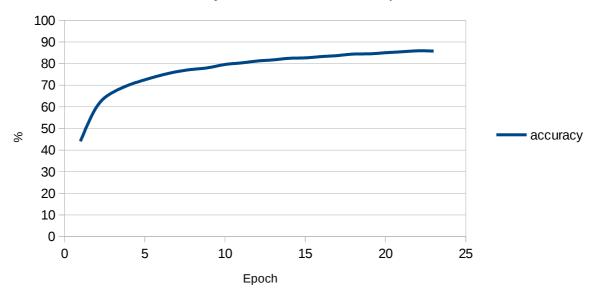*Dense(amountOfNeurons, activation='typeOfActivation')*
SoftMax layer:
Dense(amountOfClasses, activation='softmax')

6.Results

Loss value based on amount of epochs

Accuracy based on amount of epochs

7.Conclusion

Using convolutional layers instead of fully connected layers in terms of image recognition gives a lot of advanteges. Applying convolutions along with MaxPooling, outputs smaller images wich makes computations a lot easier for computers. Different kernels can outline details which only occurs on certain objects, for example 2 round objects in car pictures beacuse of the wheels. These certain details that can be only found in certain objects are used in later recognition in fully connected layer. Basically applying convolutions with pooling gives us smaller, more detailed objects that can be easier compared. It is importand to have in mind that human can tell a cat from dog really easy but computer sees only digits in matrix and as long those chunks of matrix arent easy to compare with learned scheme, the computer will fail to recognise them.