Laboratorio 11

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***Resumen*—In this laboratory is investigated the use of convolutional neuronal networks for image classification. The best nuronal network architecture founded was : with an error of and ACA**

***Index Terms*—convolutional neuronal networks, textons,deep learning, MatMonvMet.**

I. INTRODUCTION

In this laboratory is proposed a convolutional neuronal network (CNN) for image classification. It is used MatConvNet which is a MATLAB toolbox for CNN.

II. CNN DESIGN

One of the most famous CNN is GoogLeNet, in 2014 this CNN obtained the first place in ImageNet Large Scale Visual Recognition Competition 2014 (ILSVRC) [2]. The structure of GoogLeNet [1] is very big but it has many convolutional layers followed by relu layers.

II-A. 1 CNN

So for the first aproach to the classification task is used 4 convolutioal layers followed by relu layers and at the end a softmax layer. Other specifications are bellow:
Learning rate=0,0001
Epochs: 23

$$ACA = 0{,}003$$

$$Error = 0{,}960$$

II-B. 2 CNN

For the second approach we use the same layers but is included a maxpooling after each relu layer. The result was :

$$ACA = 0{,}003$$

$$Error = 0{,}960$$

We obtained the same result, so we have to use another variable in order to trying reaching a smaller error and grater ACA.

II-C. 3 CNN

the third approach is with the same structure of the 1 CNN but with a value of 0.1 for the Learning rate and with this change we increase the ACA and reduce the error.

$$ACA = 0{,}091$$

$$Error = 0{,}857$$

III. RESULTS

CNN(#)	Error	ACA
1CNN	0.960	0.003
2CNN	0.960	0.003
3c NN	0.857	0.091

IV. DISCUSION

What challenges did you face while designing the architecture?, how much you had to change your original design until it worked?

We had try different architectures by removing the maxpooling layers from the first architecture proposed but that did not change the bad results. Then we increase the learning rate from 0.0001 to 0.1 and that change improve just a little bit the results .

Ablation tests, we will try to explain why the network works by removing some layers from it, how does each removed layer affect the performance?, what does it tell about your architecture?

The ablation test was performes with the 3CNN. By ablating the first convolutional layer the scores decreases dramatically, in the case of ablating the las convolutional layer the scores also decrease but less than with the previous ablation.

V. CONCLUSIONS

By adding, after each relu layer, a maxpooling layer does not affect the results in the architectures that we proposed.
By increasing the learning rate we have better results but are not enough to reach good scores.
It is recommended to explore with deeper neronal networks and with more epochs.

The ablation results are explained by the characteristics that each layer learned. wih the ablation of the first convolutional layer we loose small features that are the basis for learning bigger features.

REFERENCIAS

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