CENG 783 - Deep Learning - Fall 2019

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Assignment 2

Due date is October 29 by 23:55. Submit online at https://odtuclass.metu.edu.tr/

Part 1 [60 pts] Implementation of a modular back-propagation network using NumPy.

In this part, you are required to implement:

- Fully connected layer (both forward and backward pass),
- Rectified linear unit layer (both forward and backward pass),
- Modular back-propagation.

Provide your implementation in `myNN.py`. The parts you are required to implement are marked with

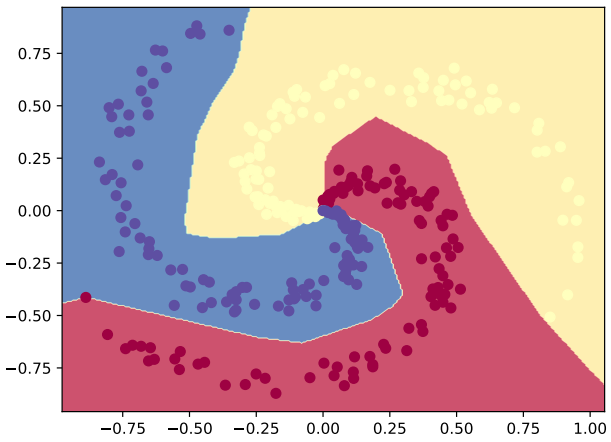
```
# <<< YOUR CODE HERE >>> #
```

Do not change any other part in the code.

Your submission will be tested using the following commands:

```
python run_softmax.py data/moon.npz
python run_softmax.py data/spiral.npz
python run_MLP.py data/moon.npz
python run_MLP.py data/spiral.npz
```

A successful implementation should produce the correct classification boundaries. For example, the last command should produce something like the following figure.



Part 2 [40 pts] PyTorch CNN, spatial pooling

In this part, you are required to write a ConvNet that works with arbitrary input image sizes, in PyTorch.

The dataset that you are going to work on is MNIST. You will notice that one of the following transformations is randomly applied to the images, thereby making the size of the input image to the network arbitrary:

```
import torchvision.transforms as transforms
transforms.RandomCrop(26), transforms.RandomCrop(27), transforms.Pad(2), transforms.Pad(1)
```

You are going to provide your implementation in `MyCNN.py`. The parts you are required to implement are marked with

```
# <<< YOUR CODE HERE >>> #
```

Do not change any other part in the code.

Your submission will be tested using the following command:

```
python pytorch_CNN.py
```

You are free to design the architecture of your CNN as you like, however, it should have at least two convolutional layers.

What to submit?

- Your `myNN.py` file.
- Your `MyCNN.py` file.

Please do not submit anything other than the items listed above.

IMPORTANT NOTE: What you submit should be **solely your own work**! By submitting your solution to this assignment, you agree to the METU Code of Honor:

> "As reliable, responsible and honorable individuals, all members of Middle East Technical University embrace only the success and recognition they deserve, and act with integrity in the use, evaluation and presentation of facts, data and documents."

Good luck!

– Emre Akbaş