

EE488 Introduction to Machine Learning, Spring
2018
Term Project

Luu Minh Tung - 20184169 and Vu Nam Dinh - 20184169

School of Electrical Engineering, KAIST

tungluu2203@kaist.ac.kr

June 13, 2018

1 Classification algorithm

In this project, we construct classifier using Neural Network. The classifier takes input is vector 128 dimension. There are 10 outputs corresponding 10 classes. The predicted class is highest output.

The architecture of our Neural Network presents as follow:

$$\text{INPUT} \rightarrow \text{ReLU} \rightarrow \text{FC} \rightarrow \text{ReLU} \rightarrow \text{OUTPUT}$$

where,

- FC: Fully connected layer
- ReLU: ReLU function $f(x) = \max(x, 0)$

To training algorithm, our Neural Network architecture support 3 method:

- *feed_forwar*: Computing forward pass of Neural Network and used to predict
- *back_propagation*: Computing backward pass Neural Network
- *weight_update*: Updating weight of Neural Network

We present the classification algorithm as bellow pseudo code:

Algorithm 1 Classification algorithm

```

1: procedure ALGORITHM
2:   Initialize weight of Network
3:   Initialize training parameter: number of epoch, regularize, batch size
4:   Prepare data: divide into k-folds
5:    $i \leftarrow 1$ 
6:   for  $i = 1$  to  $N\_EPOCH$ :
7:     Create data from (k - 1) folds for training, remaining for validation
8:     if  $string(i) = path(j)$  then
9:        $j \leftarrow j - 1$ .
10:     $i \leftarrow i - 1$ .
11:    goto loop.
12:    close;
13:     $i \leftarrow i + \max(\delta_1(string(i)), \delta_2(j))$ .
14:  goto top.

```

2 Overcome over/under fitting

3 Overcome data imbalance

4 Improving generalization

5 Learning algorithm

6 Experiment

6.1 Training

6.2 Result of classifier

6.3 Computation cost