

Applied Machine Learning Evaluation

Date: 25th April 2015

Time: 8:30 am to 1:30 pm IST

Problem # 1: To build an Optical Character Recognition System using Neural Network

Problem Statement

You are provided with a labeled character dataset. Each entry in the dataset corresponds to one of the twenty six letters of the lower case English Alphabet, along with its bitmap representation. The bitmap image for each letter is of size 16 X 8 pixels and hence the representation contains 128 binary values.

The format of the data in the dataset is also provided to you in the file (file name). Please note that this is a tab separated data. You may use csv module of Python in order to load this dataset.

The dataset consists of 52152 entries. For the purpose of evaluation, just consider around 1000 entries: 800 for training and 200 for testing.

You may write a function to visualize the bitmap and get a feel for the input images. An example code to do this is as below:

```
import matplotlib.pyplot as plt

def visualize(img):
    plt.imshow(img)
    plt.show()
    return
```

Build a neural network to recognize the letters in the English Alphabet. You can use any implementation of neural network. The input to the neural network will be the pixel values of the bitmap representation and the output should be the predicted alphabet.

The input layer should have 128 units. The output layer can be a Softmax or Logistical Regression layer that provides the predicted value. This is a probability distribution across 26 letters if you use a Softmax. For a logistic regression based output, only one output unit out of 26 will be 1 for the given input. For the Softmax, the output unit with the maximum probability will be the predicted alphabet.

Define the accuracy as the ratio of the number of tests correctly classified (where the predicted alphabet and expected alphabet match) by the total number of test cases.

You are likely to get accuracy levels over 80% if the system is well designed. Report the accuracy of the system.

Deliverables

1. Source code of your program
2. The accuracy of the system
3. Documentation that describes your system

Your submissions should be made to course.aml.2015@gmail.com 😊 Have fun 😊