Logistic Regression

Homework 1 for Deep Learning, Spring 2020

Deadline: 2020.03.08 12:00:00

1 Introduction

In this homework, you will implement logistic regression and apply it to a simple 2-class handwritten digit recognition. We will use a subset of MNIST dataset, which only contains digit 3 and 6.

Please refer to the lecture slides for details about logistic regression.

You need to submit all codes and a short report: record the training and testing accuracy, plot the training loss curve and training accuracy curve in the report.

2 Starter Code

2.1 Download and processing

To use the processed dataset, you need to install **TensorFlow>=2.0**.

```
import mnist_data_loader

mnist_dataset = mnist_data_loader.read_data_sets("./MNIST_data/", one_hot=False)

# training dataset
train_set = mnist_dataset.train
# test dataset
test_set = mnist_dataset.test

print(Training dataset size: , train_set.num_examples)
print(Test dataset size: , test_set.num_examples)
```

2.2 Visualization

```
import matplotlib.pyplot as plt
example_id = 0
image = train_set.images[example_id] # shape = 784 (28*28)
label = train_set.labels[example_id] # shape = 1
print(label)
plt.imshow(np.reshape(image,[28,28]),cmap='gray')
plt.show()
```

2.3 Training

```
batch_size = xxx
max_epoch = xxx

for epoch in range(0, max_epoch):
  iter_per_batch = train_set.num_examples // batch_size
  for batch_id in range(0, iter_per_batch):
      # get the data of next minibatch (have been shuffled)
      batch = train_set.next_batch(batch_size)
      input, label = batch

      # prediction

      # calculate the loss (and accuracy)

      # update weights
```

3 Attention

- You need to submit all codes and a report (at least one page **in PDF format**). Delete the MNIST dataset before submit.
- Do not paste a lot of codes in your report (only some essential lines should be included).
- Any open source neural network toolkits, such as TensorFlow, Caffe, PyTorch, are **NOT** permitted in finishing homework-1.
- **Plagiarism is not permitted**.