华南理工大学

South China University of Technology

The Experiment Report of

Machine Learning

College Software College

Subject Software Engineering

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1. Topic: The second experiment

2. Time: 2017.12.15

3. Reporter:Zheng Li

4. Purposes:

1. Understand the differences between gradient descent and stochastic gradient descent

2. Understand the difference between logistic regression and linear classification

3. Further understand the principles of SVM and its practice on larger data

5. Data sets and data analysis:

LIBSVM Data a9a data sets ,including 32561/16281(testing) samples. each sample has 123 features

6. Experimental steps:

1 read the training set and testing set
2 model parameters initialize ,using all zeros initialization
3 choosing Loss function and gets its gradient
4 partly getting the gradient of the samples
5 using different optimization ways to update model parameters
6 choosing proper threshold value(阈值), to classify the type of samples, and getting Loss value Lnag, Lrmsprop, Ladadelta, Ladam of different optimization methods in testing set
7 repeating step 4-6 several times, drawing the tendency chart of Lnag, Lrmsprop, Ladadelta, Ladam

7. Code:

(Fill in the contents of 8-11 respectively for logistic regression and linear classification)

8. The initialization method of model parameters:

All zeros

9. The selected loss function and its derivatives:

Logistic loss :

```
def loss_fun(X,y,W,lam):
    part1 = (lam/2)*W.dot(W)
    part2 = 0
```

```
for i in np.arange(X.shape[0]):
    part2
+=math.log(1+math.exp(-y[i]*( W.T.dot(X[i]) )))
part2 /= X.shape[0]
loss = part1 + part2
return loss
```

linear classification : hinge loss

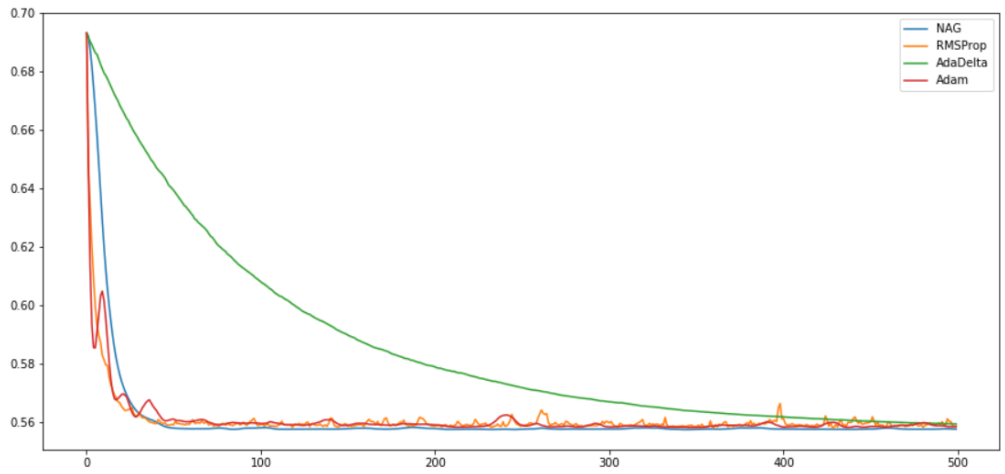
10. Experimental results and curve:(Fill in this content for various methods of gradient descent respectively)

Hyper-parameter selection:

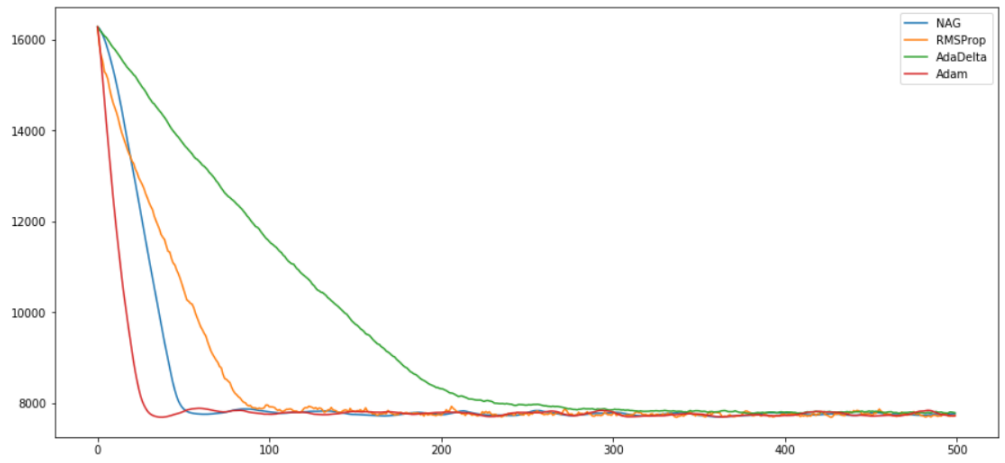
Predicted Results (Best Results):

Loss curve:

Logistic regression



Linear classification:



11. Results analysis:

12. Similarities and differences between logistic regression and linear classification：

13. Summary: