Assignment3

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Task1

Implement traditional one-versus-one and one-versus-rest task decomposition methods to solve a multi-class problem mentioned below.

1、 one versus one

We use matlab circumstance to operate the libsvm. First to compile 4 most significant function

Libsvmtrain libsvmpredict Libsvmread Libsvmwrite

(1)Load the train.txt and test.txt

(2)Devide the training data into 12 groups

(3)Reordering the data to prepare the training data

(4)Train the data with libsvmtrain function, and get 12*(12-1)/2=66 models.

(5)Predict the test data with each models and get the final predict by voting.

More details are in the attachment ‘hw3_onevsone.m’

2、 one versus rest

We use matlab circumstance to operate the libsvm. First to compile 4 most significant function

Libsvmtrain libsvmpredict Libsvmread Libsvmwrite

(1)Load the train.txt and test.txt

(2)Reordering the data to prepare the training data

(3)Change the entrance parameter of libsvmtrain function to set one versus rest structure by logic calculate.

(4)Train the data with libsvmtrain function, and get 12 models.

(5) Predict the test data with each models and get the final predict by maximum probably.

More details are in the attachment ‘hw3_onevsrest.m’

Task2

Implement part-versus-part task decomposition method to solve the same multi-class problem

part-versus-part

(1) Load the train.txt and test.txt
(2) Devide the training data into 12 groups as the ‘one’
(3) Use min-max methort devide the single group into different part.
(4) Train the combine of part to get the models
(5) Use min-max methord to predict the test data

More details are in the attachment ‘hw3_onevsrest.m’

Task3

Use two different kernel functions, namely linear and RBF, in all in all your classifiers.

To change the kernel function, we change the interface parameters of libsvmtrain

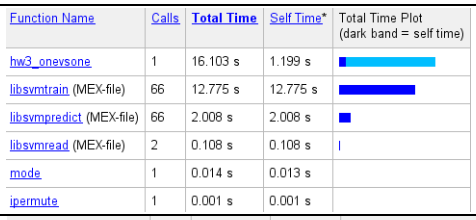
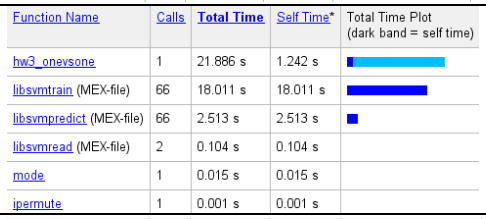
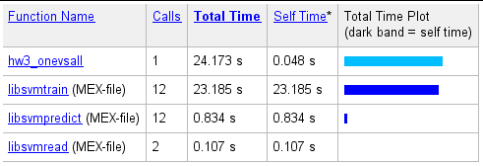
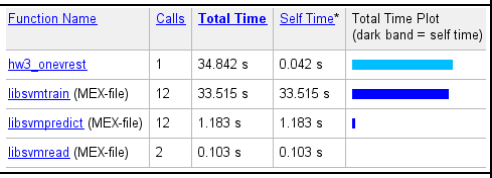
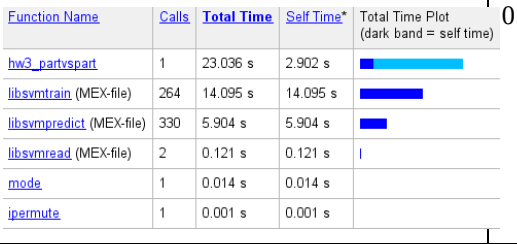
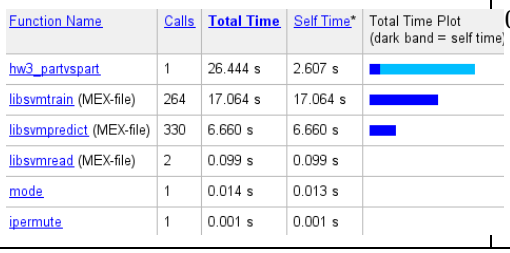
-t means the type of kernel function

- 0 – linear：u'v
- 1 – polynomial
- 2 – RBFfunction
- 3 – sigmoid：

Task4

Compare the advantages and disadvantages of these three task decompo-sition methods.

Compare of the these three task decompo-sition methods with parameter of libsvmtrain(-c 1 -g 0.2 -t 0 -b 1)

Methord	Kernel function	Time	Accuracy	Complexity
one versus one	linear		0.6063	middle
one versus one	RBF		0.5991	middle
one versus rest	linear		0.5707	concise
one versus rest	RBF		0.5779	concise
part versus part	linear		0.6030	complex
part versus part	RBF		0.5680	complex

Conclusion

1 Without adjust parameter, the accuracy is not high enough to get the optimism prediction.

2 The Linear kernal may get a higher accuracy compared with RBF kernal in same parameter of libsvmtrain.

3 One verse one methord may get the highest accuracy with the middle complexity.