CV Assignment6: Imbalanced Learning

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1 Introdution

In this assignment, you will implement three approaches for imbalanced learning and compare the performance of different imbalanced learning algorithms by using specific two evaluation criteria.

The whole framework of the implementation for classifying imbalanced dataset is shown in Figure 1, it may serve as a reference for your assignment.

To get started with the assignment, you will need to download the "Twitter Data set for Arabic Sentiment Analysis Data Set" from the website then classify the dataset by three imbalanced learning algorithms. You can change the imbalanced rate of the dataset and evaluate them. At last, your mission is to compare the results which different methods implement with different imbalanced rates.

The details of this assignment are given below in the following sections.

2 Imbalanced learning

In this section, you will implement at least three imbalanced learning algorithms on the dataset to do the classification.

2.1 Methods

- EasyEnsemble[1]

  `http://lamda.nju.edu.cn/code_EasyEnsemble.ashx?AspxAutoDetectCookieSupport=1`

- SMOTE[2]

  `https://cn.mathworks.com/matlabcentral/fileexchange/37311-smoteboost?`

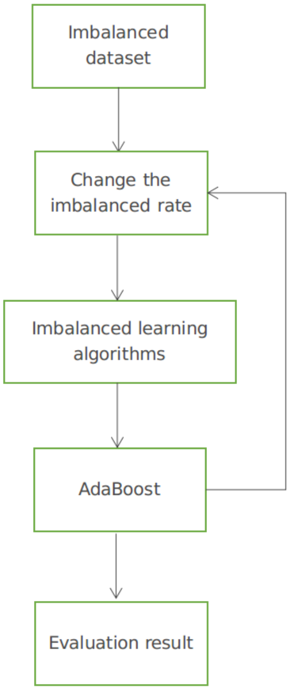
[1] Liu X Y, Wu J, Zhou Z H. Exploratory Under-Sampling for Class-Imbalance Learning. International Conference on Data Mining. IEEE Computer Society, 2006:965-969.

[2] Chawla N V, Bowyer K W, Hall L O, et al. SMOTE: synthetic minority over-sampling technique. Journal of Artificial Intelligence Research, 2002, 16(1):321-357.

- AdaCost[3]

  `http://read.pudn.com/downloads158/sourcecode/java/javascript/704298/AdaCost.java__.htm`

You need to download the code from the websites which have been given below. The provided ones are already combined with AdaBoost so you do not have to add the algorithm yourself.



2.2 Dataset

The dataset you are supposed to use is Twitter Data set for Arabic Sentiment Analysis, which is a balance dataset contains 2000 samples from two attributions in total.

Now the dataset contains two classes by 1000/1000 samples. Thus the imbalance ratio is 1 which means this is a balance dataset. In the assignment, you need to change this ratio by simply delete the samples in one class. You need to use at least 5 different ratios. The largest ratio must be greater than or equal to 20.

[3] Fan W, Stolfo S J, Zhang J, et al. AdaCost: Misclassification Cost-Sensitive Boosting. Sixteenth International Conference on Machine Learning. Morgan Kaufmann Publishers Inc. 1999:97–105.

3 Evaluation of classification

In this part of the assignment, you will compare the quality of imbalanced learning algorithms using the specific two evaluation measures.

Use such two evaluation measures:

- F-measure = $\frac{2pr}{p+r}$
- G-means = $\sqrt{acc_{+} * acc_{-}}$

Addition: You can also use the AUC[4] to evaluate the quality of imbalanced learning algorithms.

4 Submission

1. Your code
2. A report with your results of explaination and analysis

Zip all your files and submit your assignment to ouceecv@163.com with the subject: YourName_Assignment8.zip. The name of your zip file should be the same as the email subject.

[4] P. Bradley. The use of the area under the ROC curve in the evaluation of machine learning algorithms. Pattern Recognition. 1997:1145–1159