

CS57800: Statistical Machine Learning

HOMEWORK 4

Due: Dec 05, 2018 on Wednesday

1 Table describing performance of Decision Tree and Adaboost using Decision Stumps

The comparison between decision tree classifier and adaboost is given below:

	Training Macro F1 Score	Validation Macro F1 Score	Test Macro F1 Score	Training Micro F1 Score	Validation Micro F1 Score	Test Micro F1 Score
Decision Tree Depth 18 Fold 1	99.62636255	49.25196855	51.93933642	99.4557823	56.4032698	60.7026144
Adaboost Depth 1 Fold 1	46.59746951	47.42923024	44.22179141	47.4489796	48.5013624	45.4248366
Decision Tree Depth 18 Fold 2	99.69558267	45.53459776	45.78026439	99.5918367	56.8119891	56.5359477
Adaboost Depth 1 Fold 2	35.2367299	33.50759417	34.59429601	44.2176871	43.0517711	42.4836601
Decision Tree Depth 18 Fold 3	99.76802166	48.30712871	45.95528587	99.7619048	57.3569482	56.6993464
Adaboost Depth 1 Fold 3	45.81169004	41.61383825	44.29889319	49.9319728	48.0926431	48.9379085
Decision Tree Depth 18 Fold 1	99.13206513	47.18823984	45.63895878	98.298162	56.5395095	55.7911909
Adaboost Depth 1 Fold 4	35.66060171	44.62861738	37.69001832	48.0258679	46.866485	50.0815661

2 Performance

We observe that decision stumps give comparable f1 scores on validation and test data set even though we use depth 1. The number of weak classifiers used is 20. We also notice that the training scores does not increase much for adaboost and stay at around 46% f1 score. I think the main reason for this could be the skewed dataset and the weak learners are not able to combine with each other to fit the training dataset. This could mean adaboost ensemble model is still underfitting on the training dataset even though its giving reasonable validation and test scores. The adaboost model using decision stumps is implemented using SAMME algorithm for multiclass cases.

3 Running command

The code can be run as `python adaboost.py`. The macro, micro scores along with the accuracies are shown for the 4 folds. Currently, the number of hypothesis are set to 20 i.e. there are 20 weak learners which are combined as per the alpha.