Assignment 2: Modeling assignment: Using meta learning schemes with a strong and a weak learner for classification.

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Assignment 2: Modeling assignment: Using meta learning schemes with a strong and a weak learner for classification.

Using the *Lymphoma95x4026.arff* microarray gene dataset while implementing the same methods used in Assignment 1. The experiment aimed to determine which model provides the best (optimal cost ratio) by applying 10-fold cross-validation to the data set while using the default settings for the meta learners (bagging, boosting), the learner (J48, decision stump), and varying the type II cost ratio from N {1, 1.5, 2 ,2.5, 3, 3.5, 4, 4.5, 5...}.

The results are then compared to the assignment I part 4 result implementations utilizing cost sensitive classifiers with varying ratios on J48 leaner for different 4 variations of ensemble meta learners and classifiers each varying the cost ratio N {1, 1.5, 2 ,2.5, 3, 3.5, 4, 4.5, 5...}.

The assignment I results were then compared to 4 different variations of ensemble meta learners and classifiers with the iteration of the meta learners (bagging, boosting) set to 25. The original meta learner interaction is normally set to a default of 10. This study implemented a total of 72 instances of analysis variations and 81 instances all together with assignment I classification analysis as follows.

For this project the experiments impacted the following learners and classification methods to perform the analysis in comparison with Assignment I experiments which were implemented with cost sensitive boosting and only J48.

- Cost sensitive classifier combined with bagging and J48
- Cost sensitive classifier combined with bagging and Decision Stump
- Cost sensitive classifier combined with boosting (AdaBoostM1) and J48
- Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump

Then the ensemble experiments were altercated by changing the met-learner increments to 25 from the default of 10. The following Table:0-1 shows the best performing classifica learners with best cost ratio. The result shows that cost sensitive boosting with decision stumps had the least amount of balanced Type II errors overall with a cost ratio of 1:1.5. The best experiment proved to be the cost sensitive classifier with AdaboostM1 and decision stump leaner with a cost ratio of 1:1, ROC 94%. Other learners performed very well in comparison to the assignment I learners with only J48, cost ratio of 1:1 ~ 1:1.5, and 9 type II errors.

Experiments with default 10-iterations:

(10-iterations)	Cost Ratio	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I Error rate %	Type II Error rate %
j48	1:4.5	9	4	0.863	0.162	0.887	13.60%	0.877	17.40%	12.50%
DS	1:5	19	3	0.768	0.163	0.841	23.10%	0.866	13.00%	26.40%
Ada+J48	1:1	5	7	0.874	0.247	0.871	12.60%	0.83	30.40%	6.90%
Ada+DS	1:1 ~1:1.5	6	8	0.853	0.284	0.849	14.70%	0.87	34.80%	8.30%

Experiments with 25-iterations:

(25-iterations)	Cost Ratio	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I Error rate %	Type II Error rate %
j48	1:2.5	4	7	0.884	0.244	0.881	11.50%	0.886	30.40%	5.60%
DS	1:3	18	6	0.747	0.258	0.8	25.20%	0.842	26.10%	25.00%
Ada+J48	1:1.5	4	8	0.874	0.277	0.869	12.60%	0.909	43.50%	4.20%
Ada+DS	1:1	5	5	0.895	0.182	0.895	10.50%	0.94	21.70%	6.90%

Assignment I J48 only:

	Cost Ratio	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification	ROC	Type I Error rate	Type II Error rate

							Rate %		%	%
J48 Only	1:1 ~1.5	12	9	0.779	0.337	0.789	22.10%	0.732	87.00%	53.80%

I. Cost sensitive classifier combined with bagging and J48 compared to cost classifier with j48

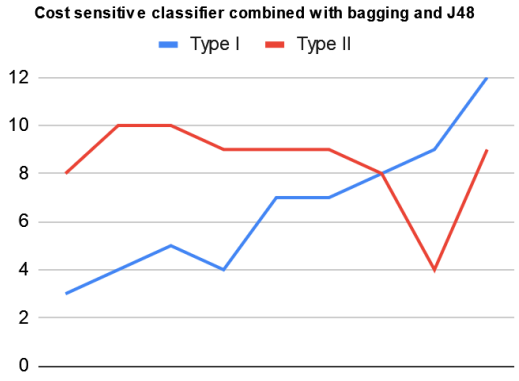
The following results in Table:1-1 show the best result for assignment II at cost ratio variance set to 4.5 with ROC of 0.877. Although at a 1:1 ratio we see less Type I and Type II errors with the lowest classification rate at 11.50%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

Table:1-1

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 cost classifier ,bagging, j48**							**Evaluation for Assignment 1 - Cost Classifier with j48**						
Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	3	8	0.884	0.274	0.881	11.50%	0.917	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	4	10	0.853	0.343	0.853	14.70%	0.876	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	5	10	0.842	0.346	0.834	15.70%	0.875	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	4	9	0.863	0.31	0.858	13.60%	0.883	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	7	9	0.832	0.32	0.827	16.80%	0.866	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	7	9	0.832	0.32	0.827	16.80%	0.866	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	8	8	0.832	0.291	0.832	16.80%	0.848	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	9	4	0.863	0.162	0.887	13.60%	0.877	9	14	0.758	0.492	0.741	24.20%	0.635
1	5	12	9	0.779	0.337	0.789	22.10%	0.828	9	14	0.758	0.492	0.741	24.20%	0.635

Chart:1-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with bagging and J48 learner. Type II error decreases as CSC variation is increased showing better performance.

Chart:1-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with bagging on the J48 learner against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique.



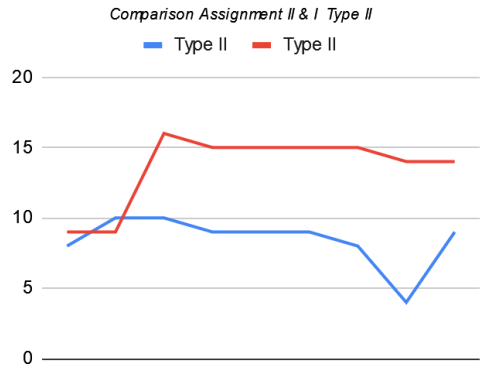


Chart:1-1

Chart:1-2

Type I & II Error Rate comparison with assignment study I

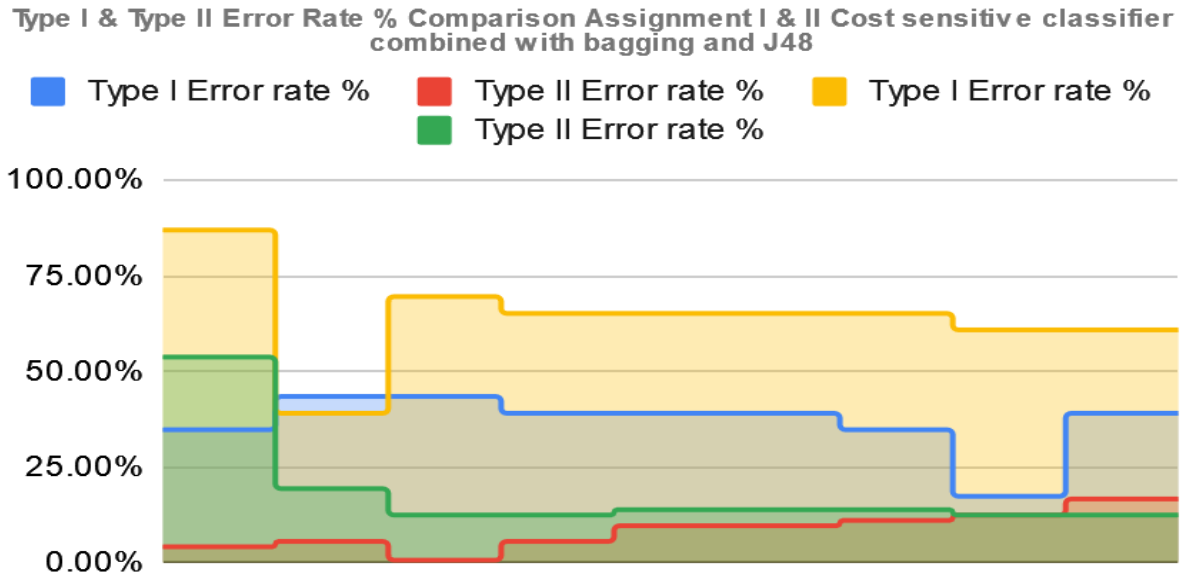
Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 cost classifier ,bagging, j48**				**Evaluation for Assignment 1 - Cost Classifier with j48**			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	3	8	34.80%	4.20%	12	9	87.00%	53.80%
1	1.5	4	10	43.50%	5.60%	14	9	39.10%	19.40%
1	2	5	10	43.50%	0.69%	9	16	69.60%	12.50%
1	2.5	4	9	39.10%	5.60%	9	15	65.20%	12.50%

1	3	7	9	39.10%	9.70%	10	15	65.20%	13.90%
1	3.5	7	9	39.10%	9.70%	10	15	65.20%	13.90%
1	4	8	8	34.80%	11.10%	10	15	65.20%	13.90%
1	4.5	9	4	17.40%	12.50%	9	14	60.90%	12.50%
1	5	12	9	39.10%	16.70%	9	14	60.90%	12.50%

Table:1-2

In the following comparison Table:1-2, we use a cost ratio of 1:2 ~1:4 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:1-3 below we see the optimal models are produced using ensembles bagging with J48 learners modele perform significantly better. With the bagging and J48 base learners, the data sets performed as significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

Note: blue and red represent the experiments Type I & Type II errors from cost sensitive classifiers with bagging on the J48 whereas green and yellow represent the Type I & Type II errors from cost sensitive classifiers with only J48 (For all Type I & II error charts for each experiment).



II. Cost sensitive classifier combined with bagging and Decision Stump

The following results in Table:2-1 show the best result for assignment II Type II error at 1:5 ratio at cost ratio variance set to 5. Though the Type II errors are significantly higher at 19. The results show an ROC of 0.866. The lowest misclassification rate is at the 1:1 cost ratio variance of 1 Although at a 1:1 ratio we see less Type I and moreType II errors with the lowest misclassification rate at 16.50%. Overall, the best balanced cost ratio would be found 1:1 ~ 1:2 for bagging with a decision stump.

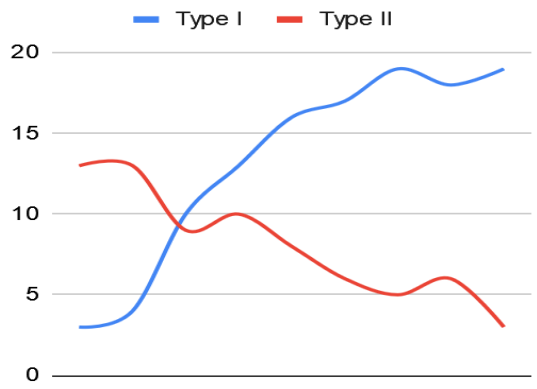
The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the Decision stump with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 Cost sensitive classifier combined with bagging and Decision Stump**							**Evaluation for Assignment 1 - Cost Classifier with j48**						
Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	3	13	0.832	0.438	0.824	16.80%	0.817	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	4	13	0.821	0.442	0.809	17.80%	0.85	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	10	9	0.8	0.33	0.803	20%	0.849	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	13	10	0.758	0.373	0.769	24%	0.807	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	16	8	0.747	0.317	0.78	25.60%	0.852	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	17	6	0.758	0.255	0.804	24.20%	0.851	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	19	5	0.747	0.229	0.81	25.20%	0.859	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	18	6	0.747	0.258	0.8	25.2%%	0.859	9	14	0.758	0.492	0.741	24%	0.635

1	5	19	3	0.768	0.163	0.841	23.10%	0.866	9	14	0.758	0.492	0.741	24%	0.635

Chart:2-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with bagging and Decision Stump learner. Type II error decreases as CSC variation is increased showing better performance.

Chart:2-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with bagging on the Decision Stump learner against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique.



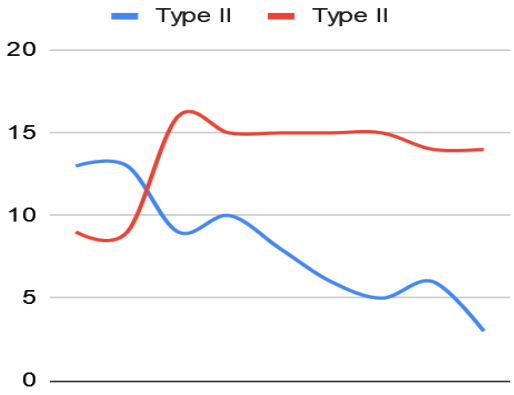


Chart:2-1

Chart:2-2

Type I & II Error Rate comparison with assignment study

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 -Cost sensitive classifier combined with bagging and Decision Stump**				**Evaluation for Assignment 1 - Cost Classifier with j48**			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	3	13	56.50%	4.20%	12	9	87.00%	53.80%
1	1.5	4	13	56.50%	5.60%	14	9	39.10%	19.40%

1	2	10	9	39.10%	13.90%	9	16	69.60%	12.50%
1	2.5	13	10	43.50%	18.10%	9	15	65.20%	12.50%
1	3	16	8	34.80%	22.20%	10	15	65.20%	13.90%
1	3.5	17	6	26.10%	23.60%	10	15	65.20%	13.90%
1	4	19	5	21.70%	26.40%	10	15	65.20%	13.90%
1	4.5	18	6	26.10%	25.00%	9	14	60.90%	12.50%
1	5	19	3	13.00%	26.40%	9	14	60.90%	12.50%

Table:1-2

In the following comparison Table:1-2, we use a cost ratio of 1:1 ~ 1:1.5 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:2-3 below we see the optimal models are produced using ensembles bagging with Decision Stump learners model perform significantly better. With the bagging and J48 base learners, the data sets performed as significantly better than to Decision Stump alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

Chart:2-3 shows significant comparison between assignment I and assignment II experiments with on J48 both Type I and Type II errors were significantly higher.

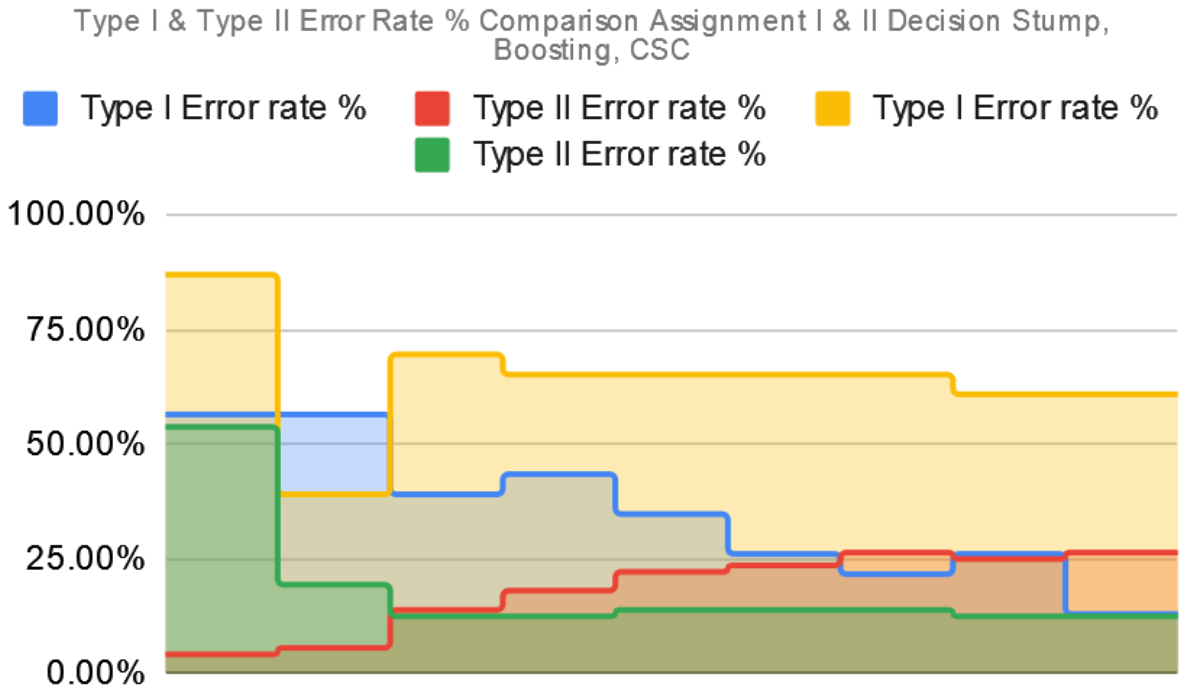


Chart:2-3

III. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48

The following results in Table:3-1 show the best result for assignment II at cost ratio variance set to 1 with ROC of 0.83. Although at a 1:1 ratio we see less Type I and Type II errors with the lowest misclassification rate at 12.60%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22.1%. Assignment II parameters show nearly double the significance for classification than the comparison performance by nearly .

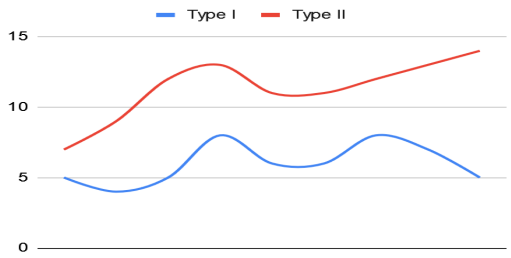
Table:3-1

Cost Sensitive	Evaluation for Assignment 2 Cost sensitive classifier combined with boosting (AdaBoostM1)	Evaluation for Assignment 1 - Cost Classifier with j48

Classifier Adj.		and J48													
Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	5	7	0.874	0.247	0.871	12.60%	0.83	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	4	9	0.863	0.31	0.858	13.60%	0.889	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	5	12	0.821	0.412	0.809	17.80%	0.74	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	8	13	0.779	0.455	0.764	22.10%	0.702	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	6	11	0.821	0.383	0.811	17.80%	0.667	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	6	11	0.821	0.383	0.811	17.80%	0.727	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	8	12	0.789	0.422	0.788	21%	0.762	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	7	13	0.789	0.452	0.774	21%	0.711	9	14	0.758	0.492	0.741	24%	0.635
1	5	5	14	0.842	0.346	0.834	16%	0.818	9	14	0.758	0.492	0.741	24%	0.635

Chart:3-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with AdBoostM1 and J48 learner. Type II error decreases as CSC variation is increased showing overall better performance.

Chart:3-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with AdBoostM1 on the J48 learner against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique. Ultimately they converge as the ratio increase.



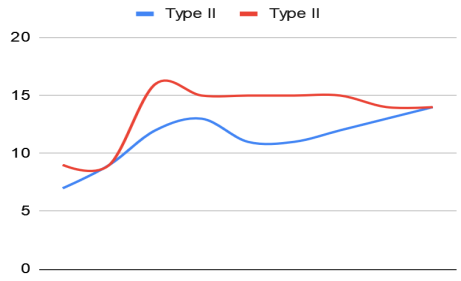


Chart:3-1 Chart:3-2

Type I & II Error Rate comparison with assignment study I

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 - Cost sensitive classifier combined with boosting (AdaBoostM1) and J48**				**Evaluation for Assignment 1 - Cost Classifier with j48**			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	5	7	30.40%	6.90%	12	9	87.00%	53.80%
1	1.5	4	9	39.10%	5.60%	14	9	39.10%	19.40%
1	2	5	12	52.20%	6.90%	9	16	69.60%	12.50%
1	2.5	8	13	56.50%	11.10%	9	15	65.20%	12.50%
1	3	6	11	47.80%	8.30%	10	15	65.20%	13.90%
1	3.5	6	11	47.80%	8.30%	10	15	65.20%	13.90%
1	4	8	12	52.20%	11.10%	10	15	65.20%	13.90%
1	4.5	7	13	56.50%	9.70%	9	14	60.90%	12.50%
1	5	5	14	60.90%	6.90%	9	14	60.90%	12.50%

Table:3-2

In the following comparison Table:3-2, we use a cost ratio of 1:1.5 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:3-3 below we see the optimal models are produced using ensembles AdBoostM1 with the J48 learners model performing significantly better. With the bagging and J48 base learners, the data sets performed as significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

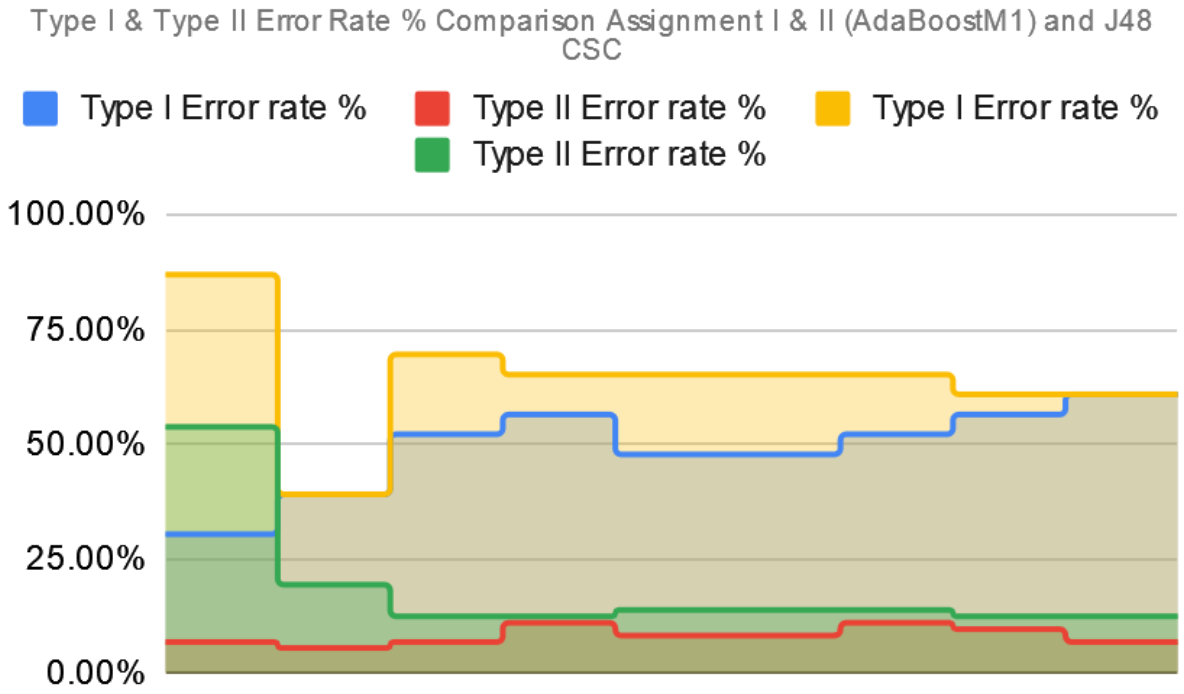


Chart:3-3

IV. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump

The following results in Table:4-1 show the best result for assignment II at cost ratio variance set to 1 with ROC of 0.87. Although at a 1:1 ~ 1:1.5 ratio we see less Type I and Type II errors with the lowest classification rate at 14.70%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

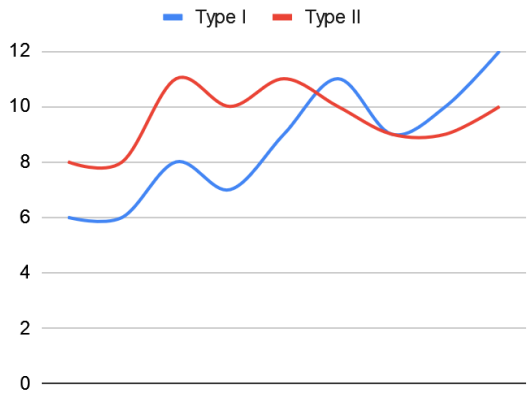
Table:4-1

Cost Sensitive Classifier Adj.	Evaluation for Assignment 2 Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump	Evaluation for Assignment 1 - Cost Classifier with j48

Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	6	8	0.853	0.284	0.849	14.70%	0.87	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	6	8	0.853	0.284	0.849	14.70%	0.87	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	8	11	0.8	0.389	0.792	20	0.772	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	7	10	0.821	0.353	0.814	17.80%	0.803	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	9	11	0.789	0.393	0.784	21%	0.825	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	11	10	0.779	0.367	0.782	22.10%	0.81	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	9	9	0.811	0.327	0.811	18.90%	0.804	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	10	9	0.8	0.33	0.803	20%	0.775	9	14	0.758	0.492	0.741	24%	0.635
1	5	12	10	0.768	0.37	0.776	23.10%	0.771	9	14	0.758	0.492	0.741	24%	0.635

Chart:4-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with AdaBoostM1 and Decision Stump learner. Type II error increases as convergence of the cost ratio increases. Ultimately cost ratio 1:1 ~ 1:1.5 shows best balanced model

Chart:4-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with AdaBoostM1 and Decision Stump learner against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging with J48 alone technique.



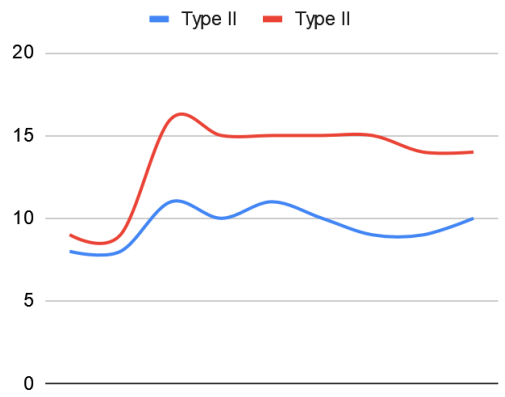


Chart:4-1 Chart:4-2

Type I & II Error Rate comparison with assignment study I

Cost Sensitive Classifier Adj.		Evaluation for Assignment 2 - Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump				Evaluation for Assignment 1 - Cost Classifier with j48			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	6	8	34.80%	8.30%	12	9	87.00%	53.80%
1	1.5	6	8	34.80%	8.30%	14	9	39.10%	19.40%
1	2	8	11	47.80%	11.10%	9	16	69.60%	12.50%
1	2.5	7	10	43.50%	9.70%	9	15	65.20%	12.50%
1	3	9	11	47.80%	12.50%	10	15	65.20%	13.90%
1	3.5	11	10	43.50%	15.30%	10	15	65.20%	13.90%
1	4	9	9	39.10%	12.50%	10	15	65.20%	13.90%
1	4.5	10	9	39.10%	13.90%	9	14	60.90%	12.50%
1	5	12	10	43.50%	16.70%	9	14	60.90%	12.50%

Table:4-2

In the following comparison Table:4-2, we use a cost ratio of 1:1 ~1:1.5 which proved to be more balanced but only slightly better than the models used with bagging and J48 only. Based on the Type I & Type II error rate percentages in Chart:4-3 below we see the optimal models are produced using ensembles AdaBoost with Decision Stump learners model performing significantly better. With the bagging and J48 base learners, the data sets performed as significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

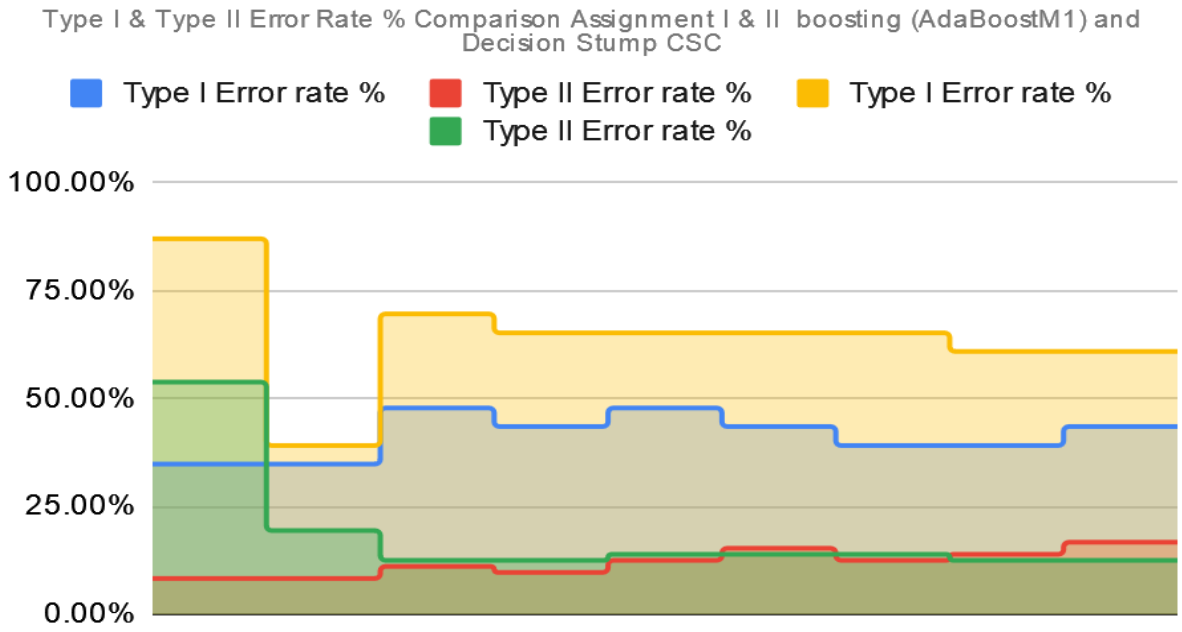


Chart:4-3

V. Cost sensitive classifier combined with bagging and J48 plus meta learner iteration set to 25.

The following results in Table:5-1 show the best result for assignment II at cost ratio 1:2.5 variance set to 2.5 with ROC of 0.886. Although at a 1:1 ratio we see less Type I and Type II errors with the lowest classification rate at 11.50%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

Table:5-1

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 cost classifier ,bagging, j48 (25-iterations)**							**Evaluation for Assignment 1 - Cost Classifier with j48**						
Cost	Cost	Type	Typ	TP	FP	Precisi	Misclassi	ROC	Type I	Type II	TP	FP	Precisi	Misclassi	ROC

of Type I Error	of Type II Error	l	e II	Rate	Rate	on	fication Rate %				Rate	Rate	on	fication Rate %	
1	1	3	10	0.863	0.34	0.859	13.60%	0.92	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	3	9	0.874	0.307	0.87	12.60%	0.911	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	5	11	0.832	0.379	0.822	16.80%	0.928	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	4	7	0.884	0.244	0.881	11.50%	0.886	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	8	8	0.832	0.291	0.832	16.80%	0.878	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	8	8	0.832	0.291	0.832	16.80%	0.878	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	12	12	0.747	0.436	0.747	25.20%	0.87	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	10	8	0.811	0.297	0.817	18.90%	0.873	9	14	0.758	0.492	0.741	24%	0.635
1	5	11	10	0.779	0.367	0.782	22.10%	0.863	9	14	0.758	0.492	0.741	24%	0.635

Chart:5-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with bagging and J48 learner with 25-iterations. Type II error decreases as CSC variation is increased showing better performance.

Chart:5-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with bagging on the J48 learners with 25-iterations against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique with 25-iterations.

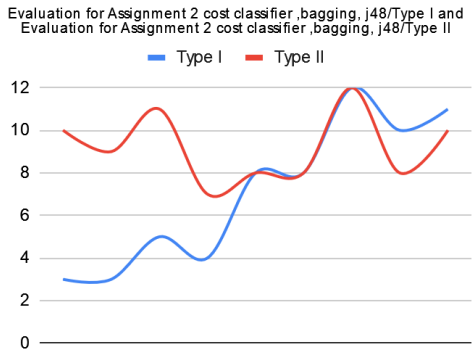


Chart:5-1

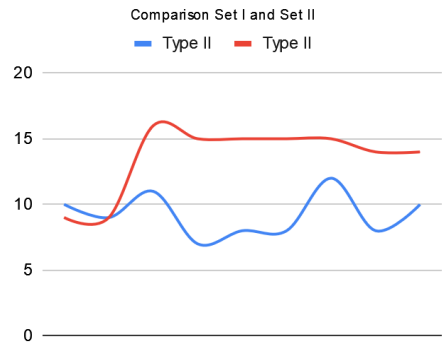


Chart:5-2

Type I & II Error Rate comparison with assignment study I

Cost Sensitive Classifier Adj.		Evaluation for Assignment 2 cost classifier ,bagging, j48 (25 Iterations)				Evaluation for Assignment 1 - Cost Classifier with j48			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	3	10	43.50%	4.20%	12	9	87.00%	53.80%
1	1.5	3	9	39.10%	4.20%	14	9	39.10%	19.40%
1	2	5	11	47.80%	6.90%	9	16	69.60%	12.50%
1	2.5	4	7	30.40%	5.60%	9	15	65.20%	12.50%
1	3	8	8	34.80%	11.10%	10	15	65.20%	13.90%
1	3.5	8	8	34.80%	11.10%	10	15	65.20%	13.90%
1	4	12	12	52.20%	16.70%	10	15	65.20%	13.90%
1	4.5	10	8	34.80%	13.90%	9	14	60.90%	12.50%
1	5	11	10	43.50%	15.30%	9	14	60.90%	12.50%

Table:5-2

In the following comparison Table:5-2, we use a cost ratio of 1:2.5 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:5-3 below we see the optimal models are produced using ensembles bagging with the J48 learners with 25-iterations model performing significantly better. With the bagging and J48 base learners with 25-iterations, the data sets performed significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

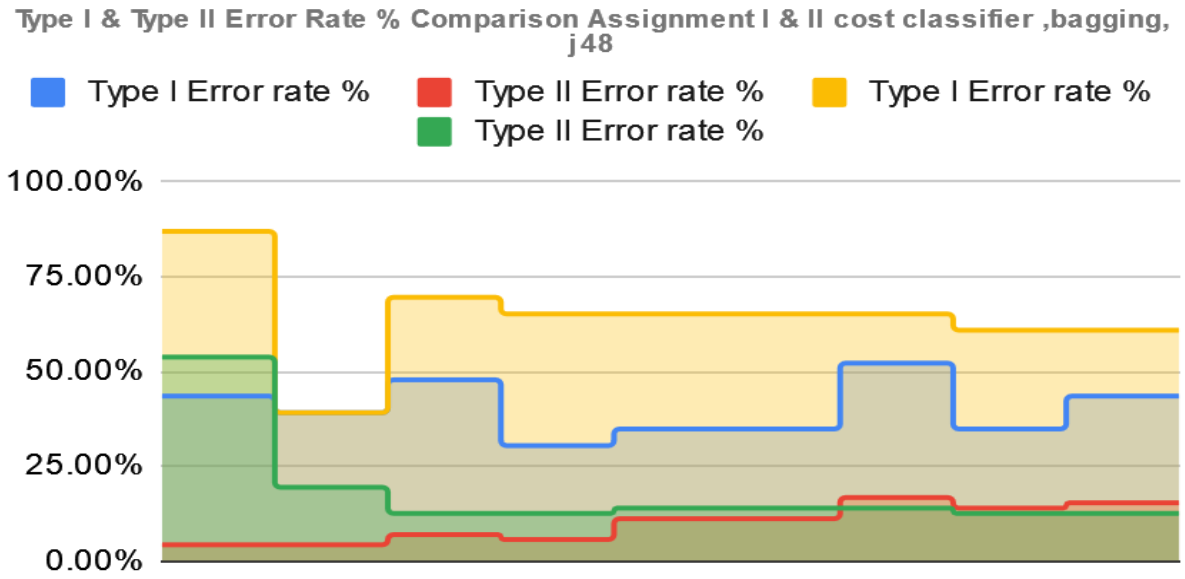


Chart:5-3

VI. Cost sensitive classifier combined with bagging and Decision Stump meta learner iteration set to 25.

The following results in Table:6-1 show the best result for assignment II at cost ratio 1:3 variance set to 3 with ROC of 0.842. At a 1:3 ratio we see more balanced Type I and Type II errors with the lowest classification error rate at 25%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 25.20%. Assignment II parameters show more significance for classification than the comparison.

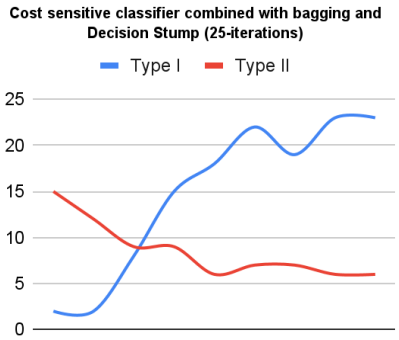
Table:1-1

Cost Sensitive Classifier Adj.	Evaluation for Assignment 2 Cost sensitive classifier combined with bagging and Decision Stump (25-iterations)	Evaluation for Assignment 1 - Cost Classifier with j48

Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	2	15	0.821	0.501	0.818	17.80%	0.825	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	2	12	0.853	0.402	0.852	14.70%	0.867	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	8	9	0.821	0.323	0.819	17.80%	0.839	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	15	9	0.747	0.347	0.771	25.20%	0.828	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	18	6	0.747	0.258	0.8	25.20%	0.842	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	22	7	0.659	0.305	0.767	30.52%	0.838	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	19	7	0.726	0.295	0.78	27.30%	0.85	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	23	6	0.695	0.275	0.778	30.50%	0.838	9	14	0.758	0.492	0.741	24%	0.635
1	5	23	6	0.695	0.275	0.778	30.50%	0.838	9	14	0.758	0.492	0.741	24%	0.635

Chart:6-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with bagging and Decisionlearner with 25-iterations. Type II error decreases as CSC variation is increased showing better performance.

Chart:6-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with bagging on the J48 learners with 25-iterations against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique with 25-iterations.



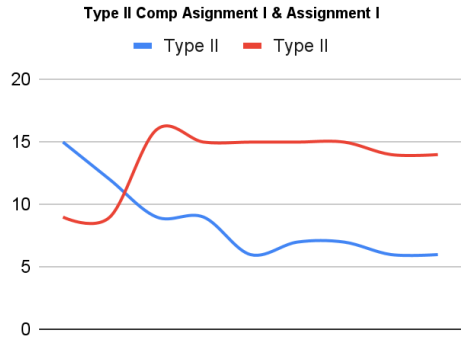
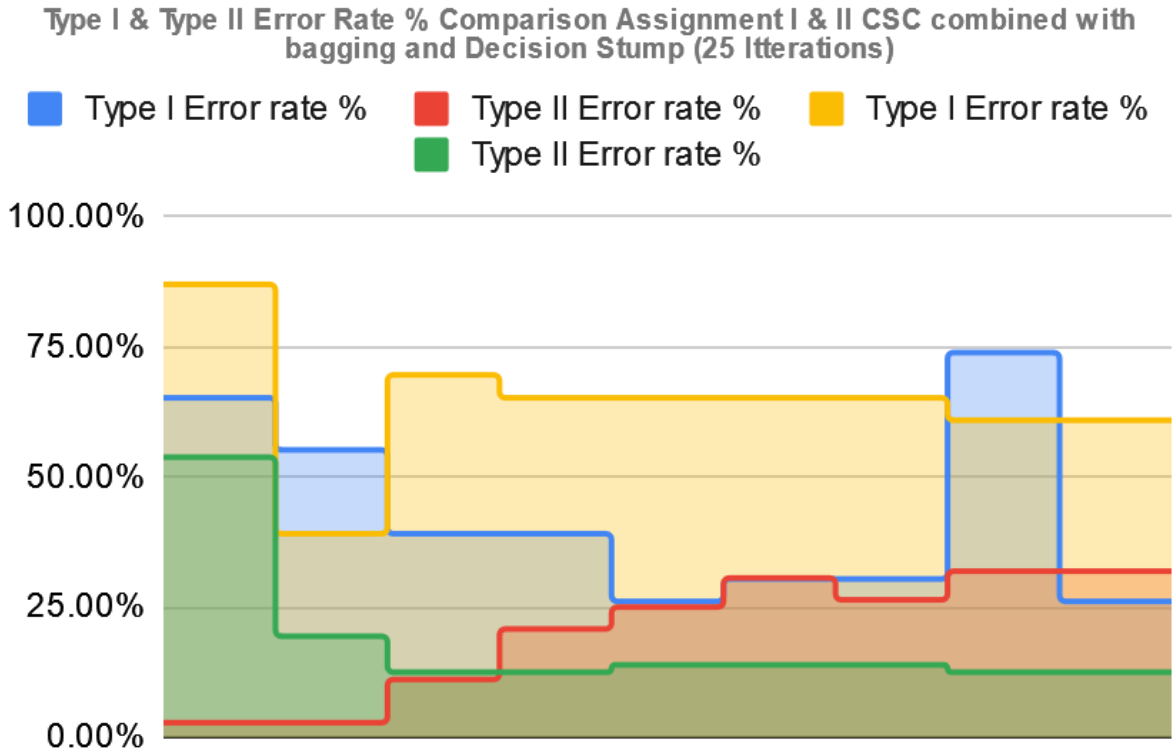


Chart:6-1 Chart:6-2

Type I & II Error Rate comparison with assignment study I

Cost Sensitive Classifier Adj.		Evaluation for Assignment 2 - Cost sensitive classifier combined with bagging and Decision Stump (25 Iterations)				Evaluation for Assignment 1 - Cost Classifier with j48			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	2	15	65.20%	2.80%	12	9	87.00%	53.80%
1	1.5	2	12	55.20%	2.80%	14	9	39.10%	19.40%
1	2	8	9	39.10%	11.10%	9	16	69.60%	12.50%
1	2.5	15	9	39.10%	20.80%	9	15	65.20%	12.50%
1	3	18	6	26.10%	25.00%	10	15	65.20%	13.90%
1	3.5	22	7	30.40%	30.60%	10	15	65.20%	13.90%
1	4	19	7	30.40%	26.40%	10	15	65.20%	13.90%
1	4.5	23	6	73.90%	31.90%	9	14	60.90%	12.50%
1	5	23	6	26.10%	31.90%	9	14	60.90%	12.50%

In the following comparison Table:6-2, we use a cost ratio of 1:3 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:6-3 below we see the optimal models are produced using ensembles bagging with the J48 learners with 25-iterations model performing significantly better. With the bagging and J48 base learners with 25-iterations, the data sets performed significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.



VII. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48 meta learner iteration set to 25.

The following results in Table:7-1 show the best result for assignment II at cost ratio 1:1 ~ 1:1.5 variance set to 1.5 with ROC of 0.909 which is significantly higher than all the experiments this far. Although at a 1:1 ~ 1:1.5 ratio we still see less Type I and Type II errors with the lowest average misclassification rate at 12.60%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

Table:7-1

Cost	Evaluation for Assignment 2 - Cost sensitive	Evaluation for Assignment 1 - Cost Classifier with j48

Sensitive Classifier Adj.		classifier combined with boosting (AdaBoostM1) and J48 - (25 iterations)													
Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	6	8	0.853	0.284	0.849	14.70%	0.852	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	4	8	0.874	0.277	0.869	12.60%	0.909	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	3	10	0.863	0.34	0.859	13.60%	0.797	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	6	12	0.811	0.416	0.798	18.90%	0.73	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	6	11	0.821	0.383	0.811	17.80%	0.715	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	3	11	0.853	0.373	0.847	14.70%	0.795	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	7	8	0.842	0.287	0.84	15.70%	0.793	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	6	13	0.8	0.449	0.784	20%	0.755	9	14	0.758	0.492	0.741	24%	0.635
1	5	5	12	0.821	0.412	0.809	17.80%	0.746	9	14	0.758	0.492	0.741	24%	0.635

Chart:7-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with AdaBoostM1 and J48 learner with 25-iterations. Type II error decreases as CSC variation is increased showing better performance.

Chart:7-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC with AdaBoostM1 on the J48 learners with 25-iterations against the CSC with only the J48 as resulted in assignment I.Type II errors were significantly less using the bagging technique with 25-iterations.

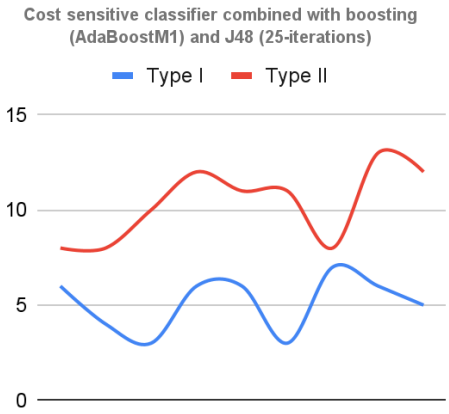


Chart:7-1

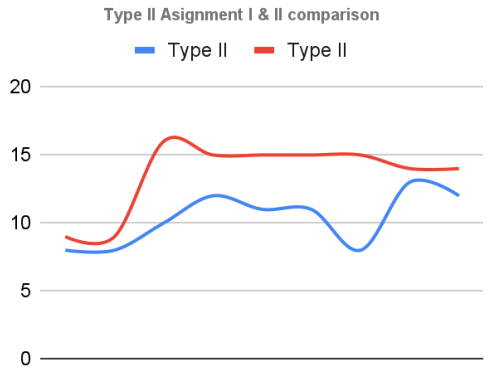


Chart:7-2

Type I & II Error Rate comparison with assignment study I

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2 cost classifier ,bagging, j48 25-iterations**				**Evaluation for Assignment 1 - Cost Classifier with j48**			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	6	8	34.80%	8.30%	12	9	87.00%	53.80%
1	1.5	4	8	43.50%	4.20%	14	9	39.10%	19.40%
1	2	3	10	34.80%	5.60%	9	16	69.60%	12.50%
1	2.5	6	12	52.20%	8.30%	9	15	65.20%	12.50%
1	3	6	11	47.80%	8.30%	10	15	65.20%	13.90%
1	3.5	3	11	47.80%	4.20%	10	15	65.20%	13.90%
1	4	7	8	34.80%	9.70%	10	15	65.20%	13.90%
1	4.5	6	13	56.50%	8.30%	9	14	60.90%	12.50%
1	5	5	12	52.20%	6.90%	9	14	60.90%	12.50%

In the following comparison Table:7-2, we use a cost ratio of 1:1.5 which proved to be more balanced.

Based on the Type I & Type II error rate percentages in Chart:7-3 below we see the optimal models are

produced using ensembles AdaBoostM1 with the J48 learners with 25-iterations model performing significantly better. With the AdaBoostM1 and J48 base learners with 25-iterations, the data sets performed significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

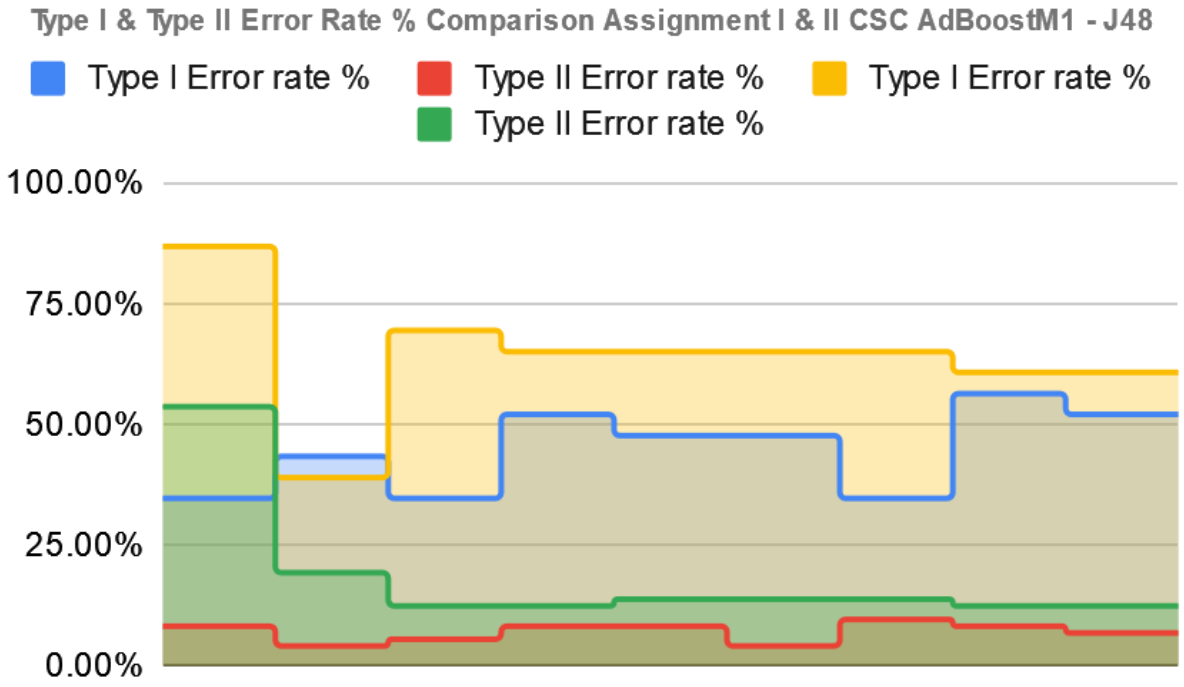


Chart:7-3

VIII. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump meta learner iteration set to 25.

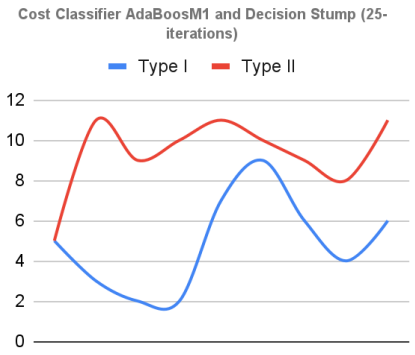
The following results in Table:8-1 show the best result for assignment II at cost ratio 1:1 variance set to 1 penalty with overall best ROC of 94%. Although at a 1:1 ratio we see less Type I and Type II errors with the lowest average misclassification rate at 10.50%. The comparison shows the cost classifier variance of 1 for assignment I with cost sensitive classifier and only the J48 with misclassification rate of 22%. Assignment II parameters show more significance for classification than the comparison.

Table:1-1

Cost Sensitive Classifier Adj.		**Evaluation for Assignment 2** - Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump - (25 iterations)							**Evaluation for Assignment 1 - Cost Classifier with j48**						
Cost of Type I Error	Cost of Type II Error	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC	Type I	Type II	TP Rate	FP Rate	Precision	Misclassification Rate %	ROC
1	1	5	5	0.895	0.182	0.895	10.50%	0.94	12	9	0.779	0.337	0.789	22.10%	0.732
1	1.5	3	11	0.853	0.373	0.847	14.70%	0.876	14	9	0.758	0.344	0.758	24.20%	0.681
1	2	2	9	0.884	0.303	0.883	11.50%	0.855	9	16	0.737	0.557	0.71	26.30%	0.591
1	2.5	2	10	0.874	0.336	0.873	12.60%	0.886	9	15	0.747	0.525	0.726	25.20%	0.616
1	3	7	11	0.811	0.386	0.801	18.90%	0.882	10	15	0.737	0.528	0.718	26.30%	0.61
1	3.5	9	10	0.8	0.36	0.797	20%	0.889	10	15	0.737	0.528	0.718	26.30%	0.61
1	4	6	9	0.842	0.317	0.836	15.70%	0.882	10	15	0.737	0.528	0.718	26.30%	0.61
1	4.5	4	8	0.874	0.277	0.869	12.60%	0.854	9	14	0.758	0.492	0.741	24%	0.635
1	5	6	11	0.821	0.383	0.811	17.80%	0.838	9	14	0.758	0.492	0.741	24%	0.635

Chart:8-1 shows the comparison of type I and type II errors evaluated for cost sensitive classifier(CSC) with AdaBoostM1 and Decision Stump learner with 25-iterations. Type II error decreases as CSC variation is increased showing better performance.

Chart:8-2 Shows comparison of both assignments I & II Type II errors. The blue-line indicates The CSC withAdaBoostM1 and Decision Stump with 25-iterations against the CSC with only the J48 as resulted in assignment I. Type II errors were significantly less using the bagging technique with 25-iterations.



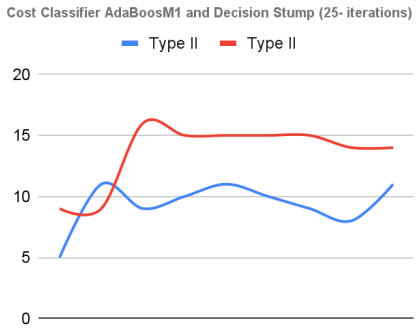


Chart:8-1

Chart:8-2

Type I & II Error Rate comparison with assignment study I

Table:8-2

		Evaluation for Assignment 2 - Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump - (25 Iterations)				**Evaluation for Assignment 1 - Cost Classifier with j48**			
Cost of Type I Error	Cost of Type II Error	Type I	Type II	Type I Error rate %	Type II Error rate %	Type I	Type II	Type I Error rate %	Type II Error rate %
1	1	5	5	21.70%	6.90%	12	9	87.00%	53.80%
1	1.5	3	11	42.80%	4.20%	14	9	39.10%	19.40%
1	2	2	9	43.50%	2.80%	9	16	69.60%	12.50%
1	2.5	2	10	47.80%	9.70%	9	15	65.20%	12.50%
1	3	7	11	43.50%	12.50%	10	15	65.20%	13.90%
1	3.5	9	10	39.10%	8.30%	10	15	65.20%	13.90%
1	4	6	9	34.80%	5.60%	10	15	65.20%	13.90%
1	4.5	4	8	47.80%	8.30%	9	14	60.90%	12.50%

1	5	6	11	43.50%	15.30%	9	14	60.90%	12.50%

In the following comparison Table:8-2, we use a cost ratio of 1:1 which proved to be more balanced. Based on the Type I & Type II error rate percentages in Chart:2-3 below we see the optimal models are produced using ensembles AdaBoostM1 and Decision Stump learners with 25-iterations models performing significantly better. With the AdaBoostM1 and Decision Stump base learners with 25-iterations, the data sets performed significantly better than to J48 alone. Type I errors are higher, but type II errors and total misclassification rates are significantly lower.

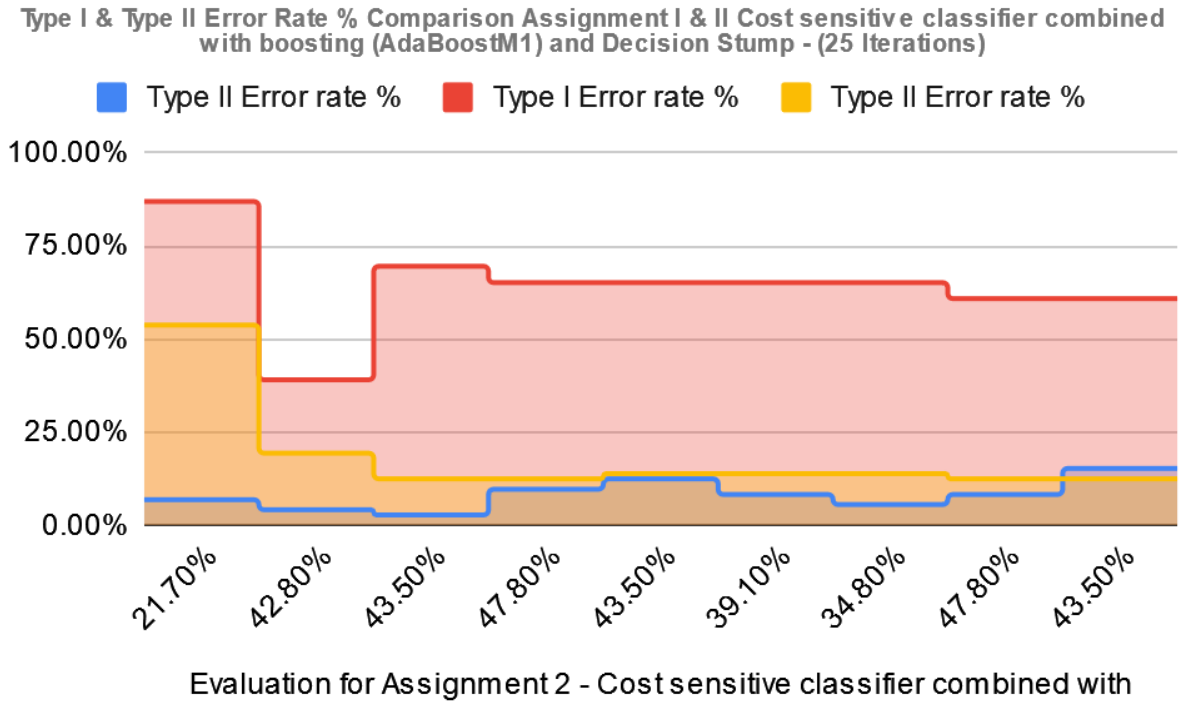


Chart:8-3

Overall the AdaBoostM1 and Decision Stump with 25 iterations performed the overall best and produced the most balanced classification models.

Appendices

Appendix of weka data analysis based on assignment I and assignment II results and instances.

I. Part 4 results Assignment 1 cost sensitive classifier combined with J48
    A. Cost set to 1
    B. Cost set to 2
    C. Cost set to 2.5
    D. Cost set to 3
    E. Cost set to 3.5
    F. Cost set to 4
    G. Cost set to 4.5
    H. Cost set to 5

II. Cost sensitive classifier combined with bagging and J48
    A. Cost set to 0.5
    B. Cost set to 1
    C. Cost set to 2
    D. Cost set to 2.5

III. Cost sensitive classifier combined with bagging and Decision Stump
    A. Cost set to 0.5
    B. Cost set to 1
    C. Cost set to 2
    D. Cost set to 2.5

IV. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48

   A. Cost set to 0.5
   B. Cost set to 1
   C. Cost set to 2
   D. Cost set to 2.5

V. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump

   A. Cost set to 0.5
   B. Cost set to 1
   C. Cost set to 2
   D. Cost set to 2.5

VI. Cost sensitive classifier combined with bagging and J48 plus meta learner iteration set to 25.

   A. Cost set to 0.5
   B. Cost set to 1
   C. Cost set to 2
   D. Cost set to 2.5

VII. Cost sensitive classifier combined with bagging and Decision Stump plus meta learner iteration set to 25

   A. Cost set to 0.5
   B. Cost set to 1
   C. Cost set to 2
   D. Cost set to 2.5

VIII. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48 plus meta learner iteration set to 25

   A. Cost set to 0.5

B. Cost set to 1

C. Cost set to 2

D. Cost set to 2.5

IX. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump plus meta learner iteration set to 25

A. Cost set to 0.5

B. Cost set to 1

C. Cost set to 2

D. Cost set to 2.5

I. Part 4 results Assignment 1 cost sensitive classifier combined with J48

A. Cost set to 1

Classifier Model

J48 pruned tree

GENE3941X <= 0.94

| GENE1125X <= 1.01

| | GENE1567X <= 2.62

| | | GENE1391X <= 0.57: nonACL (66.9)

| | | GENE1391X > 0.57

| | | | GENE3732X <= -0.74: nonACL (3.0)

| | | | GENE3732X > -0.74: ACL (2.0)

| | GENE1567X > 2.62

| | | GENE2996X <= 0: nonACL (2.1)

| | | GENE2996X > 0: ACL (6.0)

| GENE1125X > 1.01: ACL (5.0)

GENE3941X > 0.94: ACL (10.0)

Number of Leaves : 7

Size of the tree : 13

Cost Matrix

0 1

1 0

Time taken to build model: 0.13 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	74	77.8947 %
Incorrectly Classified Instances	21	22.1053 %
Kappa statistic	0.4232	

Mean absolute error	0.2178
Root mean squared error	0.4496
Relative absolute error	58.8069 %
Root relative squared error	104.8305 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.167	0.538	0.609	0.571	0.425	0.736	0.562	ACL
	0.833	0.391	0.870	0.833	0.851	0.425	0.731	0.853	nonACL
Weighted Avg.	0.779	0.337	0.789	0.779	0.783	0.425	0.732	0.782	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
12	60	b = nonACL

B. Cost set to 1.5

Classifier Model

J48 pruned tree

GENE3941X <= 0.94

| GENE1567X <= 2.62

| | GENE1131X <= 0.7: nonACL (61.84/1.34)

| | GENE1131X > 0.7: ACL (5.8/1.78)

| GENE1567X > 2.62: ACL (13.98/1.94)

GENE3941X > 0.94: ACL (13.38)

Number of Leaves : 4

Size of the tree : 7

Cost Matrix

0 1.5

1 0

Time taken to build model: 0.16 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	72	75.7895 %
Incorrectly Classified Instances	23	24.2105 %
Kappa statistic	0.3857	
Mean absolute error	0.2499	
Root mean squared error	0.4763	
Relative absolute error	67.4837 %	
Root relative squared error	111.0661 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.194	0.500	0.609	0.549	0.389	0.679	0.486	ACL
	0.806	0.391	0.866	0.806	0.835	0.389	0.682	0.832	nonACL
Weighted Avg.	0.758	0.344	0.777	0.758	0.765	0.389	0.681	0.748	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
14	58	b = nonACL

C. Cost set to 2

Classifier Model

J48 pruned tree

GENE3941X <= 0.94

| GENE1567X <= 2.62

| | GENE1126X <= 1.27

| | | GENE212X <= 0.63: nonACL (55.27)

| | | GENE212X > 0.63: ACL (4.14/0.92)

| | GENE1126X > 1.27: ACL (3.22)

| GENE1567X > 2.62: ACL (16.27/1.78)

GENE3941X > 0.94: ACL (16.1)

Number of Leaves : 5

Size of the tree : 9

Cost Matrix

0 2

1 0

Time taken to build model: 0.16 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	70	73.6842 %
Incorrectly Classified Instances	25	26.3158 %
Kappa statistic	0.2001	
Mean absolute error	0.2582	
Root mean squared error	0.4954	
Relative absolute error	69.7095 %	
Root relative squared error	115.5121 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.304	0.125	0.438	0.304	0.359	0.205	0.591	0.317	ACL
	0.875	0.696	0.797	0.875	0.834	0.205	0.591	0.795	nonACL
Weighted Avg.	0.737	0.557	0.710	0.737	0.719	0.205	0.591	0.680	

=== Confusion Matrix ===

a b <-- classified as

7 16 | a = ACL

9 63 | b = nonACL

D. Cost set to 2.5

Classifier Model

J48 pruned tree

GENE1610X <= -0.77: nonACL (30.08)

GENE1610X > -0.77

| GENE3781X <= -0.77: nonACL (11.74)

| GENE3781X > -0.77

| | GENE3332X <= 2.16

| | | GENE1879X <= 0.36: ACL (43.65/1.47)

| | | GENE1879X > 0.36: nonACL (2.84)

| | GENE3332X > 2.16: nonACL (6.69)

Number of Leaves : 5

Size of the tree : 9

Cost Matrix

0 2.5

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.2445	
Mean absolute error	0.2482	
Root mean squared error	0.4934	
Relative absolute error	67.0348 %	
Root relative squared error	115.0524 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.348	0.125	0.471	0.348	0.400	0.249	0.616	0.347	ACL
	0.875	0.652	0.808	0.875	0.840	0.249	0.616	0.804	nonACL
Weighted Avg.	0.747	0.525	0.726	0.747	0.733	0.249	0.616	0.694	

=== Confusion Matrix ===

a b <-- classified as

8 15 | a = ACL

9 63 | b = nonACL

E. Cost set to 3

Classifier Model

J48 pruned tree

GENE1610X <= -0.77: nonACL (27.62)

GENE1610X > -0.77

| GENE3781X <= -0.77: nonACL (10.78)

| GENE3781X > -0.77

| | GENE3332X <= 2.16

| | | GENE1879X <= 0.36: ACL (47.84/1.35)

| | | GENE1879X > 0.36: nonACL (2.62)

| | GENE3332X > 2.16: nonACL (6.14)

Number of Leaves : 5

Size of the tree : 9

Cost Matrix

0 3

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	70	73.6842 %
Incorrectly Classified Instances	25	26.3158 %
Kappa statistic	0.2256	
Mean absolute error	0.2593	
Root mean squared error	0.505	
Relative absolute error	70.0206 %	
Root relative squared error	117.7553 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.348	0.139	0.444	0.348	0.390	0.228	0.609	0.332	ACL
	0.861	0.652	0.805	0.861	0.832	0.228	0.609	0.802	nonACL
Weighted Avg.	0.737	0.528	0.718	0.737	0.725	0.228	0.609	0.688	

=== Confusion Matrix ===

```
 a  b   <-- classified as
 8 15 |  a = ACL
10 62 |  b = nonACL
```

F. Cost set to 3.5

Classifier Model

J48 pruned tree

```
GENE1610X <= -0.77: nonACL (25.54)
GENE1610X > -0.77
|   GENE3781X <= -0.77: nonACL (9.97)
|   GENE3781X > -0.77
|   |   GENE3328X <= 0.87
|   |   |   GENE1173X <= 1.15: ACL (48.59/0.62)
|   |   |   GENE1173X > 1.15
|   |   |   |   GENE2543X <= -0.7: ACL (2.18)
|   |   |   |   GENE2543X > -0.7: nonACL (3.74)
```

| | GENE3328X > 0.87: nonACL (4.98)

Number of Leaves : 6

Size of the tree : 11

Cost Matrix

0 3.5

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	70	73.6842 %
Incorrectly Classified Instances	25	26.3158 %
Kappa statistic	0.2256	
Mean absolute error	0.2597	
Root mean squared error	0.5026	
Relative absolute error	70.1321 %	
Root relative squared error	117.195 %	

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.348	0.139	0.444	0.348	0.390	0.228	0.610	0.336	ACL
	0.861	0.652	0.805	0.861	0.832	0.228	0.610	0.803	nonACL
Weighted Avg.	0.737	0.528	0.718	0.737	0.725	0.228	0.610	0.690	

=== Confusion Matrix ===

a	b	<-- classified as
8	15	a = ACL
10	62	b = nonACL

G. Cost set to 4

Classifier Model

J48 pruned tree

GENE1610X <= -0.77: nonACL (23.75)

GENE1610X > -0.77

| GENE3781X <= -0.77: nonACL (9.27)

| GENE3781X > -0.77

| | GENE3328X <= 0.87

| | | GENE1173X <= 1.15: ACL (51.55/0.58)

| | | GENE1173X > 1.15

| | | | GENE2543X <= -0.7: ACL (2.32)

| | | | GENE2543X > -0.7: nonACL (3.48)

| | GENE3328X > 0.87: nonACL (4.63)

Number of Leaves : 6

Size of the tree : 11

Cost Matrix

0 4

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 70 73.6842 %

Incorrectly Classified Instances	25	26.3158 %
Kappa statistic	0.2256	
Mean absolute error	0.26	
Root mean squared error	0.5036	
Relative absolute error	70.2213 %	
Root relative squared error	117.4372 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.348	0.139	0.444	0.348	0.390	0.228	0.610	0.339	ACL
	0.861	0.652	0.805	0.861	0.832	0.228	0.610	0.803	nonACL
Weighted Avg.	0.737	0.528	0.718	0.737	0.725	0.228	0.610	0.690	

=== Confusion Matrix ===

a	b	<-- classified as
8	15	a = ACL
10	62	b = nonACL

H. Cost set to 4.5

Classifier Model

J48 pruned tree

GENE1610X <= -0.77: nonACL (22.19)

GENE1610X > -0.77

| GENE3781X <= -0.77: nonACL (8.66)

| GENE3781X > -0.77

| | GENE3328X <= 0.87

| | | GENE1173X <= 1.15: ACL (54.13/0.54)

| | | GENE1173X > 1.15

| | | | GENE2543X <= -0.7: ACL (2.44)

| | | | GENE2543X > -0.7: nonACL (3.25)

| | GENE3328X > 0.87: nonACL (4.33)

Number of Leaves : 6

Size of the tree : 11

Cost Matrix

0 4.5

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	72	75.7895 %
Incorrectly Classified Instances	23	24.2105 %
Kappa statistic	0.2876	
Mean absolute error	0.2414	
Root mean squared error	0.4867	
Relative absolute error	65.1847 %	
Root relative squared error	113.4836 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.391	0.125	0.500	0.391	0.439	0.291	0.638	0.362	ACL
	0.875	0.609	0.818	0.875	0.846	0.291	0.638	0.815	nonACL
Weighted Avg.	0.758	0.492	0.741	0.758	0.747	0.291	0.638	0.705	

=== Confusion Matrix ===

a b <-- classified as

9 14 | a = ACL

9 63 | b = nonACL

I. Cost set to 5

Classifier Model

J48 pruned tree

GENE1610X <= -0.77: nonACL (20.83)

GENE1610X > -0.77

| GENE3781X <= -0.77: nonACL (8.13)

| GENE3781X > -0.77

| | GENE3328X <= 0.87

| | | GENE1173X <= 1.15: ACL (56.39/0.51)

| | | GENE1173X > 1.15

| | | | GENE2543X <= -0.7: ACL (2.54)

| | | | GENE2543X > -0.7: nonACL (3.05)

| | GENE3328X > 0.87: nonACL (4.06)

Number of Leaves : 6

Size of the tree : 11

Cost Matrix

0 5

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	72	75.7895 %
Incorrectly Classified Instances	23	24.2105 %
Kappa statistic	0.2876	
Mean absolute error	0.2415	
Root mean squared error	0.4872	
Relative absolute error	65.2018 %	
Root relative squared error	113.6003 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.391	0.125	0.500	0.391	0.439	0.291	0.638	0.362	ACL
	0.875	0.609	0.818	0.875	0.846	0.291	0.634	0.813	nonACL
Weighted Avg.	0.758	0.492	0.741	0.758	0.747	0.291	0.635	0.703	

=== Confusion Matrix ===

a b <-- classified as

9 14 | a = ACL

9 63 | b = nonACL

II. **Cost sensitive classifier combined with bagging and J48**

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 0.8 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	84	88.4211 %
Incorrectly Classified Instances	11	11.5789 %
Kappa statistic	0.6593	
Mean absolute error	0.2399	
Root mean squared error	0.3133	
Relative absolute error	64.7884 %	
Root relative squared error	73.0507 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.042	0.833	0.652	0.732	0.667	0.917	0.842	ACL
	0.958	0.348	0.896	0.958	0.926	0.667	0.917	0.960	nonACL
Weighted Avg.	0.884	0.274	0.881	0.884	0.879	0.667	0.917	0.932	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
3	69	b = nonACL

B. Cost set to 1.5

Cost Matrix

0 1.5

1 0

Time taken to build model: 0.74 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5593	
Mean absolute error	0.2376	
Root mean squared error	0.332	
Relative absolute error	64.1583 %	
Root relative squared error	77.421 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.565	0.056	0.765	0.565	0.650	0.570	0.876	0.773	ACL

	0.944	0.435	0.872	0.944	0.907	0.570	0.876	0.926	nonACL
Weighted Avg.	0.853	0.343	0.846	0.853	0.845	0.570	0.876	0.889	

=== Confusion Matrix ===

```
 a  b   <-- classified as
13 10 |  a = ACL
 4 68 |  b = nonACL
```

C. Cost set to 2

Cost Matrix

```
0 2
1 0
```

Time taken to build model: 0.7 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	80	84.2105 %
Incorrectly Classified Instances	15	15.7895 %
Kappa statistic	0.5354	

Mean absolute error	0.2583
Root mean squared error	0.3365
Relative absolute error	69.7525 %
Root relative squared error	78.4697 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.069	0.722	0.565	0.634	0.542	0.875	0.782	ACL
	0.931	0.435	0.870	0.931	0.899	0.542	0.875	0.937	nonACL
Weighted Avg.	0.842	0.346	0.834	0.842	0.835	0.542	0.875	0.899	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	a = ACL
5	67	b = nonACL

D. Cost set to 2.5

Cost Matrix

0	2.5
1	0

Time taken to build model: 0.61 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	82	86.3158 %
Incorrectly Classified Instances	13	13.6842 %
Kappa statistic	0.5973	
Mean absolute error	0.2467	
Root mean squared error	0.3277	
Relative absolute error	66.6135 %	
Root relative squared error	76.4094 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.056	0.778	0.609	0.683	0.605	0.883	0.803	ACL
	0.944	0.391	0.883	0.944	0.913	0.605	0.883	0.953	nonACL
Weighted Avg.	0.863	0.310	0.858	0.863	0.857	0.605	0.883	0.917	

=== Confusion Matrix ===

a b <-- classified as

14 9 | a = ACL

4 68 | b = nonACL

E. Cost set to 3

Cost Matrix

0 3

1 0

Time taken to build model: 0.63 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.5271	
Mean absolute error	0.2692	
Root mean squared error	0.3528	
Relative absolute error	72.6953 %	
Root relative squared error	82.2739 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.097	0.667	0.609	0.636	0.528	0.866	0.700	ACL
	0.903	0.391	0.878	0.903	0.890	0.528	0.866	0.923	nonACL
Weighted Avg.	0.832	0.320	0.827	0.832	0.829	0.528	0.866	0.869	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
7	65	b = nonACL

F. Cost set to 3.5

Cost Matrix

0	3.5
1	0

Time taken to build model: 0.62 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.5271	
Mean absolute error	0.2831	
Root mean squared error	0.3647	
Relative absolute error	76.4552 %	
Root relative squared error	85.0469 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.097	0.667	0.609	0.636	0.528	0.852	0.716	ACL
	0.903	0.391	0.878	0.903	0.890	0.528	0.852	0.944	nonACL
Weighted Avg.	0.832	0.320	0.827	0.832	0.829	0.528	0.852	0.889	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
7	65	b = nonACL

G. Cost set to 4

Cost Matrix

0 4

1 0

Time taken to build model: 0.63 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.5411	
Mean absolute error	0.2881	
Root mean squared error	0.3742	
Relative absolute error	77.8024 %	
Root relative squared error	87.2478 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.652	0.111	0.652	0.652	0.652	0.541	0.848	0.646	ACL
	0.889	0.348	0.889	0.889	0.889	0.541	0.848	0.945	nonACL
Weighted Avg.	0.832	0.291	0.832	0.832	0.832	0.541	0.848	0.873	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
8	64	b = nonACL

H. Cost set to 4.5

Cost Matrix

0	4.5
1	0

Time taken to build model: 0.61 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	82	86.3158 %
Incorrectly Classified Instances	13	13.6842 %
Kappa statistic	0.6528	
Mean absolute error	0.2934	

Root mean squared error 0.3645

Relative absolute error 79.2142 %

Root relative squared error 85.0012 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.826	0.125	0.679	0.826	0.745	0.659	0.877	0.709	ACL
	0.875	0.174	0.940	0.875	0.906	0.659	0.877	0.926	nonACL
Weighted Avg.	0.863	0.162	0.877	0.863	0.867	0.659	0.877	0.873	

=== Confusion Matrix ===

a	b	<-- classified as
19	4	a = ACL
9	63	b = nonACL

I. Cost set to 5

Cost Matrix

0 5

1 0

Time taken to build model: 0.6 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	74	77.8947 %
Incorrectly Classified Instances	21	22.1053 %
Kappa statistic	0.4232	
Mean absolute error	0.3049	
Root mean squared error	0.3852	
Relative absolute error	82.3353 %	
Root relative squared error	89.8248 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.167	0.538	0.609	0.571	0.425	0.828	0.634	ACL
	0.833	0.391	0.870	0.833	0.851	0.425	0.828	0.938	nonACL
Weighted Avg.	0.779	0.337	0.789	0.779	0.783	0.425	0.828	0.864	

=== Confusion Matrix ===

a b <-- classified as

14 9 | a = ACL

12 60 | b = nonACL

II. Cost sensitive classifier combined with bagging and Decision Stump

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 0.3 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.4614	
Mean absolute error	0.2737	
Root mean squared error	0.3617	
Relative absolute error	73.9169 %	
Root relative squared error	84.3486 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.435	0.042	0.769	0.435	0.556	0.490	0.817	0.712	ACL
	0.958	0.565	0.841	0.958	0.896	0.490	0.817	0.926	nonACL
Weighted Avg.	0.832	0.438	0.824	0.832	0.814	0.490	0.817	0.874	

=== Confusion Matrix ===

a	b	<-- classified as
10	13	a = ACL
3	69	b = nonACL

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 0.31 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4375	
Mean absolute error	0.2886	
Root mean squared error	0.3596	
Relative absolute error	77.9282 %	
Root relative squared error	83.8506 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.435	0.056	0.714	0.435	0.541	0.458	0.850	0.690	ACL
	0.944	0.565	0.840	0.944	0.889	0.458	0.850	0.946	nonACL
Weighted Avg.	0.821	0.442	0.809	0.821	0.805	0.458	0.850	0.884	

=== Confusion Matrix ===

a	b	<-- classified as
10	13	a = ACL
4	68	b = nonACL

C. Cost set to 2

Cost Matrix

0 2

1 0

Time taken to build model: 0.3 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.463		
Mean absolute error	0.3162		
Root mean squared error	0.3704		
Relative absolute error	85.3793 %		
Root relative squared error	86.3664 %		
Total Number of Instances	95		

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.609	0.139	0.583	0.609	0.596	0.463	0.849	0.738	ACL
0.861	0.391	0.873	0.861	0.867	0.463	0.849	0.940	nonACL

Weighted Avg. 0.800 0.330 0.803 0.800 0.801 0.463 0.849 0.891

=== Confusion Matrix ===

a b <-- classified as

14 9 | a = ACL

10 62 | b = nonACL

D. Cost set to 2.5

Cost Matrix

0 2.5

1 0

Time taken to build model: 0.29 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	72	75.7895 %
Incorrectly Classified Instances	23	24.2105 %
Kappa statistic	0.3683	
Mean absolute error	0.3415	
Root mean squared error	0.4036	
Relative absolute error	92.2027 %	

Root relative squared error 94.1048 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.181	0.500	0.565	0.531	0.370	0.807	0.557	ACL
	0.819	0.435	0.855	0.819	0.837	0.370	0.807	0.930	nonACL
Weighted Avg.	0.758	0.373	0.769	0.758	0.763	0.370	0.807	0.840	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	a = ACL
13	59	b = nonACL

E. Cost set to 3

Cost Matrix

0	3
1	0

Time taken to build model: 0.3 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.3844	
Mean absolute error	0.3376	
Root mean squared error	0.3945	
Relative absolute error	91.1523 %	
Root relative squared error	91.9956 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.222	0.484	0.652	0.556	0.393	0.852	0.697	ACL
	0.778	0.348	0.875	0.778	0.824	0.393	0.852	0.945	nonACL
Weighted Avg.	0.747	0.317	0.780	0.747	0.759	0.393	0.852	0.885	

=== Confusion Matrix ===

a b <-- classified as

15 8 | a = ACL

16 56 | b = nonACL

F. Cost set to 3.5

Cost Matrix

0 3.5

1 0

Time taken to build model: 0.29 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	72	75.7895 %
Incorrectly Classified Instances	23	24.2105 %
Kappa statistic	0.4326	
Mean absolute error	0.3317	
Root mean squared error	0.3915	
Relative absolute error	89.5706 %	
Root relative squared error	91.2943 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.739	0.236	0.500	0.739	0.596	0.449	0.851	0.637	ACL
	0.764	0.261	0.902	0.764	0.827	0.449	0.851	0.952	nonACL
Weighted Avg.	0.758	0.255	0.804	0.758	0.771	0.449	0.851	0.876	

=== Confusion Matrix ===

a	b	<-- classified as
17	6	| a = ACL
17	55	| b = nonACL

G. Cost set to 4

Cost Matrix

0	4
1	0

Time taken to build model: 0.29 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.4297	
Mean absolute error	0.3376	
Root mean squared error	0.3927	
Relative absolute error	91.1716 %	
Root relative squared error	91.5747 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.783	0.264	0.486	0.783	0.600	0.456	0.859	0.605	ACL
	0.736	0.217	0.914	0.736	0.815	0.456	0.859	0.955	nonACL
Weighted Avg.	0.747	0.229	0.810	0.747	0.763	0.456	0.859	0.870	

=== Confusion Matrix ===

a	b	<-- classified as
18	5	a = ACL
19	53	b = nonACL

H. Cost set to 4.5

Cost Matrix

0 4.5

1 0

Time taken to build model: 0.29 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.4154	
Mean absolute error	0.3356	
Root mean squared error	0.3945	
Relative absolute error	90.62 %	
Root relative squared error	91.9842 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.739	0.250	0.486	0.739	0.586	0.434	0.859	0.647	ACL
	0.750	0.261	0.900	0.750	0.818	0.434	0.859	0.954	nonACL
Weighted Avg.	0.747	0.258	0.800	0.747	0.762	0.434	0.859	0.879	

=== Confusion Matrix ===

a	b	<-- classified as
17	6	a = ACL
18	54	b = nonACL

I. Cost set to 5

Cost Matrix

0	5
1	0

Time taken to build model: 0.28 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	73	76.8421 %

Incorrectly Classified Instances	22	23.1579 %
Kappa statistic	0.4897	
Mean absolute error	0.3529	
Root mean squared error	0.4073	
Relative absolute error	95.3042 %	
Root relative squared error	94.9758 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.870	0.264	0.513	0.870	0.645	0.527	0.866	0.665	ACL
	0.736	0.130	0.946	0.736	0.828	0.527	0.866	0.955	nonACL
Weighted Avg.	0.768	0.163	0.841	0.768	0.784	0.527	0.866	0.885	

=== Confusion Matrix ===

a	b	<-- classified as
20	3	a = ACL
19	53	b = nonACL

III. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 0.12 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	83	87.3684 %
Incorrectly Classified Instances	12	12.6316 %
Kappa statistic	0.6453	
Mean absolute error	0.1286	
Root mean squared error	0.3554	
Relative absolute error	34.7182 %	
Root relative squared error	82.8727 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.696	0.069	0.762	0.696	0.727	0.646	0.829	0.676	ACL
	0.931	0.304	0.905	0.931	0.918	0.646	0.830	0.903	nonACL
Weighted Avg.	0.874	0.247	0.871	0.874	0.872	0.646	0.830	0.848	

=== Confusion Matrix ===

a	b	<-- classified as
16	7	a = ACL
5	67	b = nonACL

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 1.45 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	82	86.3158 %
Incorrectly Classified Instances	13	13.6842 %
Kappa statistic	0.5973	
Mean absolute error	0.1442	

Root mean squared error 0.3715

Relative absolute error 38.9344 %

Root relative squared error 86.6184 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.056	0.778	0.609	0.683	0.605	0.886	0.806	ACL
	0.944	0.391	0.883	0.944	0.913	0.605	0.891	0.946	nonACL
Weighted Avg.	0.863	0.310	0.858	0.863	0.857	0.605	0.889	0.912	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
4	68	b = nonACL

C. Cost set to 2

Cost Matrix

0 2

1 0

Time taken to build model: 1.24 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.456	
Mean absolute error	0.1777	
Root mean squared error	0.404	
Relative absolute error	47.9947 %	
Root relative squared error	94.1999 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.069	0.688	0.478	0.564	0.468	0.733	0.537	ACL
	0.931	0.522	0.848	0.931	0.887	0.468	0.742	0.854	nonACL
Weighted Avg.	0.821	0.412	0.809	0.821	0.809	0.468	0.740	0.777	

=== Confusion Matrix ===

a b <-- classified as

11 12 | a = ACL

5 67 | b = nonACL

D. Cost set to 2.5

Cost Matrix

0 2.5

1 0

Time taken to build model: 1.15 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	74	77.8947 %
Incorrectly Classified Instances	21	22.1053 %
Kappa statistic	0.3495	
Mean absolute error	0.2197	
Root mean squared error	0.4585	
Relative absolute error	59.3189 %	
Root relative squared error	106.9038 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.435	0.111	0.556	0.435	0.488	0.354	0.689	0.462	ACL
	0.889	0.565	0.831	0.889	0.859	0.354	0.706	0.847	nonACL
Weighted Avg.	0.779	0.455	0.764	0.779	0.769	0.354	0.702	0.754	

=== Confusion Matrix ===

a	b	<-- classified as
10	13	a = ACL
8	64	b = nonACL

E. Cost set to 3

Cost Matrix

0	3
1	0

Time taken to build model: 1.4 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %

Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4734	
Mean absolute error	0.1896	
Root mean squared error	0.4256	
Relative absolute error	51.1992 %	
Root relative squared error	99.2339 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.083	0.667	0.522	0.585	0.479	0.671	0.442	ACL
	0.917	0.478	0.857	0.917	0.886	0.479	0.665	0.820	nonACL
Weighted Avg.	0.821	0.383	0.811	0.821	0.813	0.479	0.667	0.728	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
6	66	b = nonACL

F. Cost set to 3.5

Cost Matrix

0	3.5

1 0

Time taken to build model: 1.23 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4734	
Mean absolute error	0.1844	
Root mean squared error	0.4164	
Relative absolute error	49.7936 %	
Root relative squared error	97.1069 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.083	0.667	0.522	0.585	0.479	0.718	0.549	ACL
	0.917	0.478	0.857	0.917	0.886	0.479	0.730	0.851	nonACL
Weighted Avg.	0.821	0.383	0.811	0.821	0.813	0.479	0.727	0.778	

=== Confusion Matrix ===

a b <-- classified as

12 11 | a = ACL

6 66 | b = nonACL

G. Cost set to 4

Cost Matrix

0 4

1 0

Time taken to build model: 1.1 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	75	78.9474 %
Incorrectly Classified Instances	20	21.0526 %
Kappa statistic	0.3902	
Mean absolute error	0.2058	
Root mean squared error	0.4455	
Relative absolute error	55.5598 %	

Root relative squared error 103.8722 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.111	0.579	0.478	0.524	0.393	0.747	0.555	ACL
	0.889	0.522	0.842	0.889	0.865	0.393	0.767	0.879	nonACL
Weighted Avg.	0.789	0.422	0.778	0.789	0.782	0.393	0.762	0.801	

=== Confusion Matrix ===

a	b	<-- classified as
11	12	a = ACL
8	64	b = nonACL

H. Cost set to 4.5

Cost Matrix

0	4.5
1	0

Time taken to build model: 1.15 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	75	78.9474 %
Incorrectly Classified Instances	20	21.0526 %
Kappa statistic	0.3704	
Mean absolute error	0.2072	
Root mean squared error	0.4482	
Relative absolute error	55.9404 %	
Root relative squared error	104.5123 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.435	0.097	0.588	0.435	0.500	0.377	0.704	0.544	ACL
	0.903	0.565	0.833	0.903	0.867	0.377	0.713	0.837	nonACL
Weighted Avg.	0.789	0.452	0.774	0.789	0.778	0.377	0.711	0.766	

=== Confusion Matrix ===

a	b	<-- classified as

10 13 | a = ACL

7 65 | b = nonACL

I. **Cost set to 5**

Cost Matrix

0 5

1 0

Time taken to build model: 1.16 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.3713		
Mean absolute error	0.1987		
Root mean squared error	0.4276		
Relative absolute error	53.6606 %		
Root relative squared error	99.713 %		
Total Number of Instances	95		

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.391	0.069	0.643	0.391	0.486	0.389	0.697	0.535	ACL
	0.931	0.609	0.827	0.931	0.876	0.389	0.711	0.840	nonACL
Weighted Avg.	0.800	0.478	0.783	0.800	0.782	0.389	0.708	0.766	

=== Confusion Matrix ===

a	b	<-- classified as
9	14	a = ACL
5	67	b = nonACL

IV. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump.

A. Cost set to 1

Cost Matrix

0	1
1	0

Time taken to build model: 0.53 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5862	
Mean absolute error	0.143	
Root mean squared error	0.3335	
Relative absolute error	38.628 %	
Root relative squared error	77.7726 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.083	0.714	0.652	0.682	0.587	0.870	0.780	ACL
	0.917	0.348	0.892	0.917	0.904	0.587	0.870	0.946	nonACL
Weighted Avg.	0.853	0.284	0.849	0.853	0.850	0.587	0.870	0.906	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
6	66	b = nonACL

B. Cost set to 1.5

Cost Matrix

0 1.5

1 0

Time taken to build model: 0.57 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5862	
Mean absolute error	0.1635	
Root mean squared error	0.3693	
Relative absolute error	44.1632 %	
Root relative squared error	86.1191 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.652	0.083	0.714	0.652	0.682	0.587	0.809	0.693	ACL

	0.917	0.348	0.892	0.917	0.904	0.587	0.809	0.902	nonACL
Weighted Avg.	0.853	0.284	0.849	0.853	0.850	0.587	0.809	0.852	

=== Confusion Matrix ===

```
 a  b   <-- classified as
15  8 |  a = ACL
 6 66 |  b = nonACL
```

C. Cost set to 2

Cost Matrix

```
0 2
1 0
```

Time taken to build model: 0.56 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.4297		
Mean absolute error	0.2006		
Root mean squared error	0.4243		

Relative absolute error 54.1804 %

Root relative squared error 98.9511 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.111	0.600	0.522	0.558	0.431	0.772	0.665	ACL
	0.889	0.478	0.853	0.889	0.871	0.431	0.772	0.890	nonACL
Weighted Avg.	0.800	0.389	0.792	0.800	0.795	0.431	0.772	0.836	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
8	64	b = nonACL

D. Cost set to 2.5

Cost Matrix

0	2.5
1	0

Time taken to build model: 0.55 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4897	
Mean absolute error	0.1851	
Root mean squared error	0.3948	
Relative absolute error	49.9873 %	
Root relative squared error	92.0498 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.097	0.650	0.565	0.605	0.492	0.803	0.681	ACL
	0.903	0.435	0.867	0.903	0.884	0.492	0.803	0.904	nonACL
Weighted Avg.	0.821	0.353	0.814	0.821	0.817	0.492	0.803	0.850	

=== Confusion Matrix ===

a	b	<-- classified as

13 10 | a = ACL

7 65 | b = nonACL

E. Cost set to 3

Cost Matrix

0 3

1 0

Time taken to build model: 0.54 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	75	78.9474 %
Incorrectly Classified Instances	20	21.0526 %
Kappa statistic	0.4088	
Mean absolute error	0.2102	
Root mean squared error	0.4218	
Relative absolute error	56.7721 %	
Root relative squared error	98.3679 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.125	0.571	0.522	0.545	0.410	0.825	0.628	ACL
	0.875	0.478	0.851	0.875	0.863	0.410	0.825	0.938	nonACL
Weighted Avg.	0.789	0.393	0.784	0.789	0.786	0.410	0.825	0.863	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
9	63	b = nonACL

F. Cost set to 3.5

Cost Matrix

0	3.5
1	0

Time taken to build model: 0.55 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	74	77.8947 %
Incorrectly Classified Instances	21	22.1053 %

Kappa statistic	0.4064
Mean absolute error	0.2156
Root mean squared error	0.4281
Relative absolute error	58.2236 %
Root relative squared error	99.8315 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.153	0.542	0.565	0.553	0.407	0.810	0.601	ACL
	0.847	0.435	0.859	0.847	0.853	0.407	0.810	0.928	nonACL
Weighted Avg.	0.779	0.367	0.782	0.779	0.781	0.407	0.810	0.849	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	a = ACL
11	61	b = nonACL

G. Cost set to 4

Cost Matrix

0	4
1	0

Time taken to build model: 0.55 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	77	81.0526 %
Incorrectly Classified Instances	18	18.9474 %
Kappa statistic	0.4837	
Mean absolute error	0.1949	
Root mean squared error	0.4102	
Relative absolute error	52.6163 %	
Root relative squared error	95.6484 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.125	0.609	0.609	0.609	0.484	0.804	0.599	ACL
	0.875	0.391	0.875	0.875	0.875	0.484	0.804	0.912	nonACL
Weighted Avg.	0.811	0.327	0.811	0.811	0.811	0.484	0.804	0.836	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
9	63	b = nonACL

H. Cost set to 4.5

Cost Matrix

0	4.5
1	0

Time taken to build model: 0.87 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.463		
Mean absolute error	0.2139		
Root mean squared error	0.4342		
Relative absolute error	57.7679 %		
Root relative squared error	101.2403 %		
Total Number of Instances	95		

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.139	0.583	0.609	0.596	0.463	0.775	0.588	ACL
	0.861	0.391	0.873	0.861	0.867	0.463	0.775	0.884	nonACL
Weighted Avg.	0.800	0.330	0.803	0.800	0.801	0.463	0.775	0.812	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	| a = ACL
10	62	| b = nonACL

I. **Cost set to 5**

Cost Matrix

0	5
1	0

Time taken to build model: 0.56 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	73	76.8421 %
Incorrectly Classified Instances	22	23.1579 %
Kappa statistic	0.3871	
Mean absolute error	0.2374	
Root mean squared error	0.462	
Relative absolute error	64.0961 %	
Root relative squared error	107.7361 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.167	0.520	0.565	0.542	0.388	0.771	0.567	ACL
	0.833	0.435	0.857	0.833	0.845	0.388	0.771	0.892	nonACL
Weighted Avg.	0.768	0.370	0.776	0.768	0.772	0.388	0.771	0.813	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	| a = ACL
12	60	| b = nonACL

V. Cost sensitive classifier combined with bagging and J48 plus meta learner iteration set to 25.

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 3.25 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	82	86.3158 %
Incorrectly Classified Instances	13	13.6842 %
Kappa statistic	0.584	
Mean absolute error	0.2442	
Root mean squared error	0.317	
Relative absolute error	65.9371 %	
Root relative squared error	73.9305 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.565	0.042	0.813	0.565	0.667	0.599	0.920	0.834	ACL
	0.958	0.435	0.873	0.958	0.914	0.599	0.920	0.968	nonACL
Weighted Avg.	0.863	0.340	0.859	0.863	0.854	0.599	0.920	0.935	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	a = ACL
3	69	b = nonACL

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 2.52 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	83	87.3684 %
Incorrectly Classified Instances	12	12.6316 %

Kappa statistic	0.6223
Mean absolute error	0.247
Root mean squared error	0.3203
Relative absolute error	66.7043 %
Root relative squared error	74.695 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.042	0.824	0.609	0.700	0.634	0.911	0.814	ACL
	0.958	0.391	0.885	0.958	0.920	0.634	0.911	0.966	nonACL
Weighted Avg.	0.874	0.307	0.870	0.874	0.867	0.634	0.911	0.929	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
3	69	b = nonACL

C. Cost set to 2

Cost Matrix

0 2

1 0

Time taken to build model: 2.32 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.4964	
Mean absolute error	0.2557	
Root mean squared error	0.3193	
Relative absolute error	69.0532 %	
Root relative squared error	74.4614 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.522	0.069	0.706	0.522	0.600	0.505	0.928	0.850	ACL

	0.931	0.478	0.859	0.931	0.893	0.505	0.928	0.971	nonACL
Weighted Avg.	0.832	0.379	0.822	0.832	0.822	0.505	0.928	0.942	

=== Confusion Matrix ===

```
 a  b   <-- classified as
12 11 |  a = ACL
 5 67 |  b = nonACL
```

D. Cost set to 2.5

Cost Matrix

0	2.5
1	0

Time taken to build model: 2.17 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	84	88.4211 %
Incorrectly Classified Instances	11	11.5789 %
Kappa statistic	0.6698	
Mean absolute error	0.2671	
Root mean squared error	0.3375	

Relative absolute error 72.1303 %

Root relative squared error 78.6991 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.696	0.056	0.800	0.696	0.744	0.673	0.886	0.780	ACL
	0.944	0.304	0.907	0.944	0.925	0.673	0.886	0.957	nonACL
Weighted Avg.	0.884	0.244	0.881	0.884	0.881	0.673	0.886	0.914	

=== Confusion Matrix ===

```
 a  b   <-- classified as
16  7 |  a = ACL
 4 68 |  b = nonACL
```

E. Cost set to 3

Cost Matrix

```
0 3
1 0
```

Time taken to build model: 2.1 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.5411	
Mean absolute error	0.2707	
Root mean squared error	0.3455	
Relative absolute error	73.1107 %	
Root relative squared error	80.5675 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.111	0.652	0.652	0.652	0.541	0.878	0.745	ACL
	0.889	0.348	0.889	0.889	0.889	0.541	0.878	0.949	nonACL
Weighted Avg.	0.832	0.291	0.832	0.832	0.832	0.541	0.878	0.900	

=== Confusion Matrix ===

a	b	<-- classified as

15 8 | a = ACL

 8 64 | b = nonACL

F. Cost set to 3.5

Cost Matrix

 0 3.5

 1 0

Time taken to build model: 2.05 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	79	83.1579 %
Incorrectly Classified Instances	16	16.8421 %
Kappa statistic	0.5411	
Mean absolute error	0.2739	
Root mean squared error	0.3395	
Relative absolute error	73.9629 %	
Root relative squared error	79.1645 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.111	0.652	0.652	0.652	0.541	0.899	0.807	ACL
	0.889	0.348	0.889	0.889	0.889	0.541	0.899	0.963	nonACL
Weighted Avg.	0.832	0.291	0.832	0.832	0.832	0.541	0.899	0.925	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
8	64	b = nonACL

G. Cost set to 4

Cost Matrix

0	4
1	0

Time taken to build model: 2.11 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.3116	
Mean absolute error	0.2825	
Root mean squared error	0.353	
Relative absolute error	76.2807 %	
Root relative squared error	82.3159 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.167	0.478	0.478	0.478	0.312	0.870	0.731	ACL
	0.833	0.522	0.833	0.833	0.833	0.312	0.870	0.956	nonACL
Weighted Avg.	0.747	0.436	0.747	0.747	0.747	0.312	0.870	0.902	

=== Confusion Matrix ===

a	b	<-- classified as
11	12	a = ACL

12 60 | b = nonACL

H. Cost set to 4.5

Cost Matrix

0 4.5

1 0

Time taken to build model: 2.02 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	77	81.0526 %
Incorrectly Classified Instances	18	18.9474 %
Kappa statistic	0.4985	
Mean absolute error	0.3001	
Root mean squared error	0.3602	
Relative absolute error	81.0261 %	
Root relative squared error	83.9862 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.139	0.600	0.652	0.625	0.499	0.873	0.759	ACL
	0.861	0.348	0.886	0.861	0.873	0.499	0.873	0.952	nonACL
Weighted Avg.	0.811	0.297	0.817	0.811	0.813	0.499	0.873	0.905	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
10	62	b = nonACL

I. Cost set to 5

Cost Matrix

0	1
1	0

Time taken to build model: 0.96 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.3963	
Mean absolute error	0.2837	
Root mean squared error	0.3615	
Relative absolute error	76.6151 %	
Root relative squared error	84.2905 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.348	0.028	0.800	0.348	0.485	0.447	0.825	0.716	ACL
	0.972	0.652	0.824	0.972	0.892	0.447	0.825	0.929	nonACL
Weighted Avg.	0.821	0.501	0.818	0.821	0.793	0.447	0.825	0.877	

=== Confusion Matrix ===

a	b	<-- classified as
8	15	a = ACL
2	70	b = nonACL

VI. Cost sensitive classifier combined with bagging and Decision Stump plus meta learner iteration set to 25

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 0.96 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.3963	
Mean absolute error	0.2837	
Root mean squared error	0.3615	
Relative absolute error	76.6151 %	
Root relative squared error	84.2905 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.348	0.028	0.800	0.348	0.485	0.447	0.825	0.716	ACL
	0.972	0.652	0.824	0.972	0.892	0.447	0.825	0.929	nonACL
Weighted Avg.	0.821	0.501	0.818	0.821	0.793	0.447	0.825	0.877	

=== Confusion Matrix ===

a	b	<-- classified as
8	15	a = ACL
2	70	b = nonACL

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 1.02 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5287	
Mean absolute error	0.2947	
Root mean squared error	0.3516	
Relative absolute error	79.5759 %	
Root relative squared error	81.9946 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.028	0.846	0.478	0.611	0.561	0.867	0.779	ACL
	0.972	0.522	0.854	0.972	0.909	0.561	0.867	0.947	nonACL
Weighted Avg.	0.853	0.402	0.852	0.853	0.837	0.561	0.867	0.906	

=== Confusion Matrix ===

a	b	<-- classified as
11	12	a = ACL
2	70	b = nonACL

C. Cost set to 2

Cost Matrix

0 2

1 0

Time taken to build model: 1 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.5051	
Mean absolute error	0.32	
Root mean squared error	0.3695	
Relative absolute error	86.4148 %	
Root relative squared error	86.1571 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.609	0.111	0.636	0.609	0.622	0.505	0.839	0.738	ACL
0.889	0.391	0.877	0.889	0.883	0.505	0.839	0.936	nonACL

Weighted Avg. 0.821 0.323 0.819 0.821 0.820 0.505 0.839 0.888

=== Confusion Matrix ===

a b <-- classified as

14 9 | a = ACL

8 64 | b = nonACL

D. Cost set to 2.5

Cost Matrix

0 2.5

1 0

Time taken to build model: 0.76 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.3677	
Mean absolute error	0.3405	

Root mean squared error 0.3936

Relative absolute error 91.9488 %

Root relative squared error 91.7766 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.208	0.483	0.609	0.538	0.372	0.828	0.698	ACL
	0.792	0.391	0.864	0.792	0.826	0.372	0.828	0.936	nonACL
Weighted Avg.	0.747	0.347	0.771	0.747	0.756	0.372	0.828	0.878	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
15	57	b = nonACL

E. Cost set to 3

Cost Matrix

0 3

1 0

Time taken to build model: 0.96 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	71	74.7368 %
Incorrectly Classified Instances	24	25.2632 %
Kappa statistic	0.4154	
Mean absolute error	0.3459	
Root mean squared error	0.3945	
Relative absolute error	93.403 %	
Root relative squared error	91.9885 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.739	0.250	0.486	0.739	0.586	0.434	0.842	0.721	ACL
	0.750	0.261	0.900	0.750	0.818	0.434	0.842	0.942	nonACL
Weighted Avg.	0.747	0.258	0.800	0.747	0.762	0.434	0.842	0.889	

=== Confusion Matrix ===

a b <-- classified as

17 6 | a = ACL

18 54 | b = nonACL

F. Cost set to 3.5

Cost Matrix

0 3.5

1 0

Time taken to build model: 0.76 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	66	69.4737 %
Incorrectly Classified Instances	29	30.5263 %
Kappa statistic	0.3192	
Mean absolute error	0.3487	
Root mean squared error	0.4068	
Relative absolute error	94.1532 %	
Root relative squared error	94.8652 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.696	0.306	0.421	0.696	0.525	0.341	0.838	0.714	ACL
	0.694	0.304	0.877	0.694	0.775	0.341	0.838	0.941	nonACL
Weighted Avg.	0.695	0.305	0.767	0.695	0.715	0.341	0.838	0.886	

=== Confusion Matrix ===

a	b	<-- classified as
16	7	a = ACL
22	50	b = nonACL

G. Cost set to 4

Cost Matrix

0	4
1	0

Time taken to build model: 0.74 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	69	72.6316 %
Incorrectly Classified Instances	26	27.3684 %
Kappa statistic	0.3667	
Mean absolute error	0.3533	
Root mean squared error	0.4041	
Relative absolute error	95.4033 %	
Root relative squared error	94.2334 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.696	0.264	0.457	0.696	0.552	0.383	0.850	0.699	ACL
	0.736	0.304	0.883	0.736	0.803	0.383	0.850	0.948	nonACL
Weighted Avg.	0.726	0.295	0.780	0.726	0.742	0.383	0.850	0.888	

=== Confusion Matrix ===

a	b	<-- classified as

16 7 | a = ACL

19 53 | b = nonACL

H. Cost set to 4.5

Cost Matrix

0 4.5

1 0

Time taken to build model: 0.73 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	66	69.4737 %
Incorrectly Classified Instances	29	30.5263 %
Kappa statistic	0.3353	
Mean absolute error	0.3578	
Root mean squared error	0.4126	
Relative absolute error	96.6163 %	
Root relative squared error	96.2123 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.739	0.319	0.425	0.739	0.540	0.364	0.838	0.676	ACL
	0.681	0.261	0.891	0.681	0.772	0.364	0.838	0.944	nonACL
Weighted Avg.	0.695	0.275	0.778	0.695	0.715	0.364	0.838	0.879	

=== Confusion Matrix ===

a	b	<-- classified as
17	6	a = ACL
23	49	b = nonACL

I. Cost set to 5

Time taken to build model: 0.93 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	66	69.4737 %
Incorrectly Classified Instances	29	30.5263 %
Kappa statistic	0.3353	

Mean absolute error	0.3679
Root mean squared error	0.4244
Relative absolute error	99.3489 %
Root relative squared error	98.953 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.739	0.319	0.425	0.739	0.540	0.364	0.838	0.699	ACL
	0.681	0.261	0.891	0.681	0.772	0.364	0.838	0.944	nonACL
Weighted Avg.	0.695	0.275	0.778	0.695	0.715	0.364	0.838	0.885	

=== Confusion Matrix ===

a	b	<-- classified as
17	6	a = ACL
23	49	b = nonACL

VII. Cost sensitive classifier combined with boosting (AdaBoostM1) and J48 plus meta learner iteration set to 25.

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 0.13 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5862	
Mean absolute error	0.1503	
Root mean squared error	0.3794	
Relative absolute error	40.5846 %	
Root relative squared error	88.4727 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.652	0.083	0.714	0.652	0.682	0.587	0.832	0.691	ACL

	0.917	0.348	0.892	0.917	0.904	0.587	0.859	0.926	nonACL
Weighted Avg.	0.853	0.284	0.849	0.853	0.850	0.587	0.852	0.869	

=== Confusion Matrix ===

```
 a  b   <-- classified as
15  8 |  a = ACL
 6 66 |  b = nonACL
```

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 3.54 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	83	87.3684 %
Incorrectly Classified Instances	12	12.6316 %
Kappa statistic	0.6341	
Mean absolute error	0.1269	

Root mean squared error 0.3402

Relative absolute error 34.2791 %

Root relative squared error 79.3359 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.056	0.789	0.652	0.714	0.639	0.895	0.823	ACL
	0.944	0.348	0.895	0.944	0.919	0.639	0.914	0.958	nonACL
Weighted Avg.	0.874	0.277	0.869	0.874	0.869	0.639	0.909	0.926	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
4	68	b = nonACL

C. Cost set to 2

Cost Matrix

0	2
1	0

Time taken to build model: 3.01 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	82	86.3158 %
Incorrectly Classified Instances	13	13.6842 %
Kappa statistic	0.584	
Mean absolute error	0.143	
Root mean squared error	0.3722	
Relative absolute error	38.606 %	
Root relative squared error	86.794 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.042	0.813	0.565	0.667	0.599	0.759	0.599	ACL
	0.958	0.435	0.873	0.958	0.914	0.599	0.809	0.901	nonACL
Weighted Avg.	0.863	0.340	0.859	0.863	0.854	0.599	0.797	0.828	

=== Confusion Matrix ===

a b <-- classified as

13 10 | a = ACL

3 69 | b = nonACL

D. Cost set to 2.5

Cost Matrix

0 2.5

1 0

Time taken to build model: 3 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	77	81.0526 %
Incorrectly Classified Instances	18	18.9474 %
Kappa statistic	0.4334	
Mean absolute error	0.1835	
Root mean squared error	0.424	
Relative absolute error	49.5467 %	
Root relative squared error	98.8595 %	

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.083	0.647	0.478	0.550	0.441	0.711	0.519	ACL
	0.917	0.522	0.846	0.917	0.880	0.441	0.736	0.862	nonACL
Weighted Avg.	0.811	0.416	0.798	0.811	0.800	0.441	0.730	0.779	

=== Confusion Matrix ===

a	b	<-- classified as
11	12	a = ACL
6	66	b = nonACL

E. Cost set to 3

Cost Matrix

0	3
1	0

Time taken to build model: 2.78 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4734	
Mean absolute error	0.1834	
Root mean squared error	0.4223	
Relative absolute error	49.5208 %	
Root relative squared error	98.4687 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.083	0.667	0.522	0.585	0.479	0.692	0.486	ACL
	0.917	0.478	0.857	0.917	0.886	0.479	0.722	0.856	nonACL
Weighted Avg.	0.821	0.383	0.811	0.821	0.813	0.479	0.715	0.766	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
6	66	b = nonACL

F. Cost set to 3.5

Cost Matrix

0 3.5

1 0

Time taken to build model: 3.07 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5445	
Mean absolute error	0.1529	
Root mean squared error	0.3842	
Relative absolute error	41.2843 %	
Root relative squared error	89.5844 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class

	0.522	0.042	0.800	0.522	0.632	0.564	0.766	0.664	ACL
	0.958	0.478	0.863	0.958	0.908	0.564	0.805	0.897	nonACL
Weighted Avg.	0.853	0.373	0.847	0.853	0.841	0.564	0.795	0.841	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
3	69	b = nonACL

G. Cost set to 4

Cost Matrix

0	4
1	0

Time taken to build model: 2.82 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	80	84.2105 %
Incorrectly Classified Instances	15	15.7895 %

Kappa statistic	0.5633
Mean absolute error	0.1609
Root mean squared error	0.3964
Relative absolute error	43.4554 %
Root relative squared error	92.4227 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.097	0.682	0.652	0.667	0.564	0.771	0.641	ACL
	0.903	0.348	0.890	0.903	0.897	0.564	0.800	0.895	nonACL
Weighted Avg.	0.842	0.287	0.840	0.842	0.841	0.564	0.793	0.834	

=== Confusion Matrix ===

a	b	<-- classified as
15	8	a = ACL
7	65	b = nonACL

H. Cost set to 4.5

Cost Matrix

0 4.5

1 0

Time taken to build model: 2.88 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.3921		
Mean absolute error	0.1978		
Root mean squared error	0.4423		
Relative absolute error	53.3999 %		
Root relative squared error	103.1264 %		
Total Number of Instances	95		

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.435	0.083	0.625	0.435	0.513	0.402	0.725	0.615	ACL
0.917	0.565	0.835	0.917	0.874	0.402	0.765	0.875	nonACL

Weighted Avg. 0.800 0.449 0.784 0.800 0.787 0.402 0.755 0.812

=== Confusion Matrix ===

a b <-- classified as

10 13 | a = ACL

6 66 | b = nonACL

I. Cost set to 5

Cost Matrix

0 5

1 0

Time taken to build model: 2.89 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.456	
Mean absolute error	0.1748	
Root mean squared error	0.4145	
Relative absolute error	47.1946 %	

Root relative squared error 96.6536 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.478	0.069	0.688	0.478	0.564	0.468	0.704	0.565	ACL
	0.931	0.522	0.848	0.931	0.887	0.468	0.759	0.873	nonACL
Weighted Avg.	0.821	0.412	0.809	0.821	0.809	0.468	0.746	0.799	

=== Confusion Matrix ===

a	b	<-- classified as
11	12	a = ACL
5	67	b = nonACL

VIII. Cost sensitive classifier combined with boosting (AdaBoostM1) and Decision Stump plus meta learner iteration set to 25

A. Cost set to 1

Cost Matrix

0 1

1 0

Time taken to build model: 1.36 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	85	89.4737 %
Incorrectly Classified Instances	10	10.5263 %
Kappa statistic	0.7132	
Mean absolute error	0.0995	
Root mean squared error	0.2919	
Relative absolute error	26.8809 %	
Root relative squared error	68.0697 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.783	0.069	0.783	0.783	0.783	0.713	0.940	0.901	ACL
	0.931	0.217	0.931	0.931	0.931	0.713	0.940	0.978	nonACL
Weighted Avg.	0.895	0.182	0.895	0.895	0.895	0.713	0.940	0.959	

=== Confusion Matrix ===

a	b	<-- classified as
18	5	a = ACL
5	67	b = nonACL

B. Cost set to 1.5

Cost Matrix

0	1.5
1	0

Time taken to build model: 1.66 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	81	85.2632 %
Incorrectly Classified Instances	14	14.7368 %
Kappa statistic	0.5445	
Mean absolute error	0.1449	
Root mean squared error	0.3628	
Relative absolute error	39.1255 %	
Root relative squared error	84.5966 %	

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.042	0.800	0.522	0.632	0.564	0.877	0.779	ACL
	0.958	0.478	0.863	0.958	0.908	0.564	0.876	0.932	nonACL
Weighted Avg.	0.853	0.373	0.847	0.853	0.841	0.564	0.876	0.895	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
3	69	b = nonACL

C. Cost set to 2

Cost Matrix

0 2

1 0

Time taken to build model: 1.37 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	84	88.4211 %
Incorrectly Classified Instances	11	11.5789 %
Kappa statistic	0.648	
Mean absolute error	0.1349	
Root mean squared error	0.3408	
Relative absolute error	36.4165 %	
Root relative squared error	79.4708 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.028	0.875	0.609	0.718	0.665	0.855	0.772	ACL
	0.972	0.391	0.886	0.972	0.927	0.665	0.855	0.937	nonACL
Weighted Avg.	0.884	0.303	0.883	0.884	0.877	0.665	0.855	0.897	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
2	70	b = nonACL

D. Cost set to 2.5

Cost Matrix

0 2.5

1 0

Time taken to build model: 1.62 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	83	87.3684 %
Incorrectly Classified Instances	12	12.6316 %
Kappa statistic	0.6096	
Mean absolute error	0.1392	
Root mean squared error	0.3479	
Relative absolute error	37.5914 %	
Root relative squared error	81.126 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.028	0.867	0.565	0.684	0.631	0.886	0.802	ACL
	0.972	0.435	0.875	0.972	0.921	0.631	0.886	0.948	nonACL
Weighted Avg.	0.874	0.336	0.873	0.874	0.864	0.631	0.886	0.913	

=== Confusion Matrix ===

a	b	<-- classified as
13	10	a = ACL
2	70	b = nonACL

E. Cost set to 3

Cost Matrix

0	3
1	0

Time taken to build model: 1.39 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	77	81.0526 %
Incorrectly Classified Instances	18	18.9474 %

Kappa statistic	0.4512
Mean absolute error	0.1826
Root mean squared error	0.4086
Relative absolute error	49.3097 %
Root relative squared error	95.2693 %
Total Number of Instances	95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.097	0.632	0.522	0.571	0.455	0.882	0.763	ACL
	0.903	0.478	0.855	0.903	0.878	0.455	0.882	0.959	nonACL
Weighted Avg.	0.811	0.386	0.801	0.811	0.804	0.455	0.882	0.911	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
7	65	b = nonACL

F. Cost set to 3.5

Cost Matrix

0	3.5
1	0

Time taken to build model: 1.44 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	76	80	%
Incorrectly Classified Instances	19	20	%
Kappa statistic	0.4468		
Mean absolute error	0.1879		
Root mean squared error	0.4104		
Relative absolute error	50.7335 %		
Root relative squared error	95.7093 %		
Total Number of Instances	95		

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.565	0.125	0.591	0.565	0.578	0.447	0.889	0.742	ACL
	0.875	0.435	0.863	0.875	0.869	0.447	0.889	0.964	nonACL
Weighted Avg.	0.800	0.360	0.797	0.800	0.798	0.447	0.889	0.910	

=== Confusion Matrix ===

a b <-- classified as

13 10 | a = ACL

9 63 | b = nonACL

G. Cost set to 4

Cost Matrix

0 4

1 0

Time taken to build model: 1.38 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	80	84.2105 %
Incorrectly Classified Instances	15	15.7895 %
Kappa statistic	0.5498	
Mean absolute error	0.1518	
Root mean squared error	0.3666	

Relative absolute error 40.9966 %

Root relative squared error 85.4955 %

Total Number of Instances 95

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.609	0.083	0.700	0.609	0.651	0.552	0.882	0.721	ACL
	0.917	0.391	0.880	0.917	0.898	0.552	0.882	0.958	nonACL
Weighted Avg.	0.842	0.317	0.836	0.842	0.838	0.552	0.882	0.900	

=== Confusion Matrix ===

a	b	<-- classified as
14	9	a = ACL
6	66	b = nonACL

H. Cost set to 4.5

Cost Matrix

0	4.5
1	0

Time taken to build model: 1.35 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	83	87.3684 %
Incorrectly Classified Instances	12	12.6316 %
Kappa statistic	0.6341	
Mean absolute error	0.1417	
Root mean squared error	0.36	
Relative absolute error	38.2564 %	
Root relative squared error	83.9359 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.652	0.056	0.789	0.652	0.714	0.639	0.854	0.678	ACL
	0.944	0.348	0.895	0.944	0.919	0.639	0.854	0.944	nonACL
Weighted Avg.	0.874	0.277	0.869	0.874	0.869	0.639	0.854	0.880	

=== Confusion Matrix ===

a b <-- classified as

15 8 | a = ACL

4 68 | b = nonACL

I. **Cost set to 5**

Cost Matrix

0 5

1 0

Time taken to build model: 1.57 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	78	82.1053 %
Incorrectly Classified Instances	17	17.8947 %
Kappa statistic	0.4734	
Mean absolute error	0.1802	
Root mean squared error	0.4096	
Relative absolute error	48.6726 %	
Root relative squared error	95.5086 %	
Total Number of Instances	95	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.522	0.083	0.667	0.522	0.585	0.479	0.838	0.617	ACL
	0.917	0.478	0.857	0.917	0.886	0.479	0.838	0.943	nonACL
Weighted Avg.	0.821	0.383	0.811	0.821	0.813	0.479	0.838	0.864	

=== Confusion Matrix ===

a	b	<-- classified as
12	11	a = ACL
6	66	b = nonACL