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NEW APPROACH FOR IMBALANCED BIOLOGICAL DATASET CLASSIFICATION

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ABSTRACT

This paper presents a new ensemble classifier for class imbalance problem with the emphasis on two -class (binary) classification. This novel method is a combination of SMOTE (Synthetic Minority Over-sampling Technique), Rotation Forest, and AdaBoostM1 algorithms. SMOTE was employed for the over-sampling of the minority samples at 100%, 200%, 300%, 400%, and 500% of the initial sample size, with attribute selection being conducted in order to prevent the classification from being over-fitted. The ensemble classifier method was presented to solve the problem of imbalanced biological datasets classification by obtaining a low prediction error and raising the prediction performance. The Rotation Forest algorithm was used to produce an ensemble classifier with a lower prediction error, while the AdaBoostM1 algorithm was used to enhance the performance of the classifier. All the tests were carried out using the java-based WEKA (Waikato Environment for Knowledge Analysis) and Orange canvas data mining systems for training datasets. The performances of three types of classifiers on imbalanced biomedical datasets were assessed. This paper explores the efficiency of this new method in producing an accurate overall classifier and in lowering the error rate in the overall performance of the classifier. Tests were carried out on three actual imbalanced biomedical datasets, which were obtained from the KEEL dataset repository. These imbalanced datasets were divided into ten categories according to their imbalance ratios (IR) which ranged from 1.86 to 41.40. The results indicated that the proposed method, which used a combination of three methods and various evaluation metrics in its assessments, was effective. In practical terms, the use of the SMOTE-RotBoost for the classification of biological datasets results in a low mean absolute error rate as well as high accuracy and precision. The values of the Kappa Coefficient were close to 1, thus indicating that all the rates in every classification were the same even though the false negative rates, which were close to 0, showed the reliability of the measurements. The SMOTE-RotBoost has useful AUC-ROC outputs that characterise the wider area under the curve compared to other classifiers and is a vital method for the assessment of diagnostic tests.

Keywords: SMOTE, Rotation Forest, Random Subspace, Bagging, Boosting

1 INTRODUCTION

The most interesting objective of using binary classifications for class predictions is the classification of imbalanced datasets. Recently, researchers tried to come up with a training set rule-based algorithm to allocate new samples. Datasets are said to be imbalanced when the classes are unequally distributed. This means that there are fewer samples in the minority class (rare class) than in the majority class [1-5]. In reality, most training sets are imbalanced, and data mining and machine learning methods are focussing more and more on

the problem of gaining information from these datasets. The class imbalance problem is due to the impact of class distribution in imbalanced datasets on classifiers [6-15]. When the datasets are imbalanced, the learning classifiers that are produced have poor predictive accuracy and performance [15-18]. Examples of popular learning methods that are often employed to overcome this problem with various datasets are Bagging [19-24], Boosting [25-29], re-sampling [1], and Support Vector Machine (SVM) [30-35]. An important ingredient to have for learning methods is an ensemble classifier, which is a combination of several classifiers in order to have better

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ISSN: 1992-8645 www.jatit.org performance and greater accuracy than a single classifier [36-41]. Among the many ensembles, bagging, boosting, random subspace, random forest and rotation forest are more frequently combined to make use of the same learning algorithm for base classifier [20, 36, 42-54]. The main aims of the ensemble learning and classification tasks are to improve the accuracy and reduce the error rate of the classifiers [40, 55-57]. Ensemble methods, which are a combination of various models and methods, are meant to improve the accuracy of the classifier [40]. Various classification models are integrated into these ensemble methods and as such, this lowers the possibility of over-fitting occurring in the training data [54, 57, 58]. Several ensemble methods have been used on biological data sets [35, 44, 59-62]. Ensemble learning methods are being used bioinformatics increasingly in and computational biology in view of their classification benefits [44, 63-67]. This paper presents a new ensemble method, which is described in the Methods section, for solving the binary imbalanced classification problem encountered in bioinformatics.

2 MOTIVATION AND SCOPE

The objective of this paper is to come up with a new ensemble classifier to enhance the prediction accuracy of the classifier and to lower the error rate in the performance of the classifier as a whole. The main motivation this study is to add to the list of ensemble methods and to attain better predictions for classifications in bioinformatics.

3 METHODS

The SMOTE-RotBoost ensemble is a combination of three methods: SMOTE, Rotation Forest algorithm and AdaBoostM1 algorithm.

3.1 SMOTE

SMOTE or the Synthetic Minority Oversampling Technique, which was introduced by [1], is the most renowned over-sampling method used for the balancing of imbalanced datasets. In this method, synthetic (artificial) minority samples are created. In the field of bioinformatics, SMOTE is used, for example, to identify the binding specificity of regulatory proteins [66, 68]; predict proteins [33, 46, 65, 67, 69]; predict Glycosylation sites [34]; predict miRNA genes [70-74]; as the LVQ-SMOTE (Learning Vector Quantization SMOTE) for biomedical datasets [75]; for histopathology annotations [76]; classification of

datasets [77]; high dimensional biomedical regulatory binding sites on mRNA [78]; and for the identification of bioinformatics class imbalance ncRNA [79]. SMOTE is useful for datasets with low dimensions, but if it is to be used for highdimensional datasets, then the variable selection before SMOTE must be described [80] and the setting must be only that of the K-Nearest Neighbour (K-NN) classifier according to the Euclidean distance provided. Therefore, according to [77, 80], variable selection was used to solve the problem of over-fitting through over-sampling of the minority class. By using variable selection, the SMOTE-RotBoost method can be employed for high-dimensional datasets in the future. In this study, the SMOTE-RotBoost was tested on lowdimensional imbalanced bioinformatics datasets.

3.2 Rotation Forest

The Rotation Forest was suggested by [81, 82] as an ensemble method for classification. In this method, each classifier is constructed with characteristics which are obtained by rotating subspaces of the original dataset. At the same time, this rotation increases the diversity and the accuracy provided by a PCA (Principle Component Analysis), which is employed for each base classifier by all the training datasets. The Rotation Forest has more advantages in terms of effectiveness compared to the other ensemble methods, namely the Bagging, Boosting, and Random subspace methods. While each base classifier is being constructed, all information is held as the same information in the original dataset since all occurrences are taken into consideration in the rotated dataset. This technique is appropriate for datasets, such as decision trees, which are influenced by rotation [83, 84]. The Rotation Forest gains new characteristics through the use of the PCA. The Rotation Forest algorithm is an important application for the improvement of regression [85, 86] and it is being increasingly used in the medical and biological science fields [87-92]. This ensemble method was employed so as not to overlook the information on the samples from the initial dataset during the construction of the base classifier. The major advantages of the Rotation Forest algorithm over Boosting and Bagging are the construction of accurate and diverse classifiers. This is because the Rotation Forest extracts features from subsets of features and then rebuilds a complete set of features for the ensemble classifiers (so as to rotate the input data for the training base classifier). Other reasons why the Rotation Forest is preferred are given by [93-95]. [93, 95] stated that

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the Rotation Forest increased the accuracy of	4	EVALUATION METR	RICS		
classifiers when it comes to the designing of computer-aided diagnosis (CADx) systems. [94]	4.1	Confusion Matrix			
describes the benefits of employing ensemble methods (such as the Rotation Forest) in DNA		There are four	outputs	in	binary

classifications (two classes) as follows:

TP = True Positive rate (class members are classified as class members) = recall = sensitivity

TN = True Negative rate (class non-members are classified as non-members) = specificity

FP = False positive rate (class non-members are classified as class members) = fall out

FN = False negative rate (class members are classified as class non-members) => it will indicate which classifier is better to be selected in a method. FN with a low percentage value is taken into consideration (refer to section on False Negative rate).

In biomedical tests, sensitivity or recall is used for patients who have tested positive for diseases. Specificity is used for patients who tested negative for diseases. Table 1 shows the confusion matrix for these outputs in the predicted class and the actual class. [99] proposed and integrated the Rotation Forest and AdaBoostM1 ensemble methods, while [42] pointed out that the Rotation Forest and Boosting algorithms performed steadily with noise-free and imbalanced datasets. In view of these major advantages,

Table 1.	Confusion	Matrix	for two-cla	uss classification
I doit I.	Conjusion	manna		iss clussification

		Predicted class					
confusi	on matrix	(Positive)	(Negative)				
	Positive	TP	FN				
Actual	class						
class	Negative	FP	TN				
	class						

Table 2 indicates the related equations between outputs (Equations 1 - 4).

Table 2: Equations of Confusion Matrix

Predicted class							
class	$TP = \frac{TP}{TP + FN}$	(1)	$FN = \frac{FN}{FN + TP}$	(2)			
Actual	$FP = \frac{FP}{FP + TN}$	(3)	$TN = \frac{TN}{TN + FP}$	(4)			

3.3 AdaBoostM1

The AdaBoostM1 (Adaptive Boosting), which was introduced by [28, 97], is an efficient ensemble method of classification. The base classifier, be it a new or weak classifier, is constructed at each iteration by means of the base learning methods. When the original weights of all the samples are the same, then the samples are categorised by the AdaBoostM1 according to the following steps in order to generate the final classifier:

microarray gene expression data by enhancing the accuracy of the base classifier when it is used in the Kent Ridge Biomedical Dataset repository [96].

•Each sample is assigned a weight (the distribution of the dataset is changed)

•The weight is adjusted based on the accuracy of the prediction for each sample

•The final classifier is obtained from a weighted vote of the base classifier (the performance function of a classifier is used as a weight for voting)

The AdaBoostM1 was employed because it is less prone to the risk of over-fitting and it can be modified by adjusting the weak classifier depending on which samples were wrongly classified by earlier classifiers [58, 98].

3.4 RotBoost and SMOTE-RotBoost

In order to reduce the classification error rate, [99] proposed and integrated the Rotation Forest and AdaBoostM1 ensemble methods, while [42] pointed out that the Rotation Forest and Boosting algorithms performed steadily with noisefree and imbalanced datasets. In view of these major advantages, the Rotation Forest and AdaBoostM1 methods were combined and utilized together with SMOTE to come up with the SMOTE-RotBoost. The detailed structure of the SMOTE-RotBoost is shown in Figure 1.



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4.2 Accuracy, precision, recall, and f-score

Table 3 indicates the related equations of accuracy, precision, recall and f-score. Equation 5 (table 3) denotes the relationship between outputs and the accuracy of the classifier, while Equations 6, 7 and 8 are used to calculate the Precision, Recall, and F-score, respectively. The precision, recall, and F-measure are important measurements of the performance of binary classifications with regard to issues pertaining to imbalanced classes [100-103]. Precision means the degree to which class members have been correctly classified as class members out of a total number of classified samples (Equation 6). Recall means the degree to which class members have been classified correctly out of the total number of class members (Equation 7). The harmonic mean (average) of Precision and Recall is defined as the F-score or F-measure. The F-score indicates an exchange between Precision and Recall. The Precision will be reduced with an increase in TP and FP (refer to Equation 6). Hence, the F-score is an effective measure of the quality of a classifier. However, one drawback of using the Fscore as an assessment tool in machine learning is that it cannot withstand the TN rate [104, 105]. This problem can be solved by using Cohen's Kappa coefficient.

Table 3: Equations of Accuracy, Precision, Recall and Fscore

Classifier Accuracy = $\frac{TP + TN}{TP + FN + FP + TN}$	(5)
$Precision = \frac{TP}{TP + FP}$	(6)
$Recall = \frac{TP}{TP + FN} = TP$	(7)
$F - value = 2 \times \frac{\text{precision} \times \text{recall}}{\text{precision} + \text{recall}}$	(8)

4.3 False negative rate

According to [8, 10], a False Negative rate which is closer to 0 indicates the effectiveness of a machine learning classifier in comparison to other classifiers with values that are further from 0. However, it was demonstrated by [106] that the ROC (Receiver Operating Curve) was inadequate as an evaluation measurement due to the occurrence of bias in the class distribution when it came to a minority class. This limitation can be overcome by a False Negative rate, which considers a low percentage magnitude as an indication of an effective classifier.

4.4 Area Under Curve of ROC

Receiver Operating Characteristics (ROC) useful graph for visualizing classifier is performance and organizing it [107]. An ROC curve illustrates tradeoff between TP rate (benefits) and FP rate (costs). ROC space is two dimensional which TP rate is on the Y-axis and FP rate is on Xaxis. Figure 2 depicts as example of the ROC for Yeast 6 dataset with ratio 41.40 in 100% SMOTE. Calculating the Area under this graph shows Area Under Curve (AUC). Equation 9 indicates AUC based on TP and FP rates. Area Under ROC Curve is one of the fundamental metric tools in imbalanced and biological domain [107-114]. Researchers argued that the AUC has effective advantages rather than accuracy [115, 116]. Because based on Equation 9, AUC is in direct relation between TP and FP.

$$AUC = \frac{1 + TP - FP}{2}$$
(9)

4.5 Kappa Statistic

The Kappa statistic or Cohen's Kappa coefficient (CKC) was proposed by [117] as a statistical measure and it is used to evaluate measurement agreement [118-122], intera rater reliability [123-125], reliability of disease classifications [126], and measurements in medical research [127]. Equation 10 gives a simple representation of the Kappa statistic.

$$\kappa = \frac{\text{observed agreement} - \text{chance agreement}}{1 - \text{chance agreement}}$$
(10)

In medical research, if metrics are in agreement purely by chance, there is no real agreement at all. Only agreement that is beyond that expected by chance is deemed to be a true agreement. The Kappa statistic is a measure of true agreement. For every observed and chance agreement, there is a proportion of any possible beyond chance agreement that is an achieved beyond chance agreement [125]. The value of the Kappa statistic normally ranges from 0 and 1, with 1 being an indication of perfect agreement, with the raters agreeing on their classification of every case;

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and with 0 being an indication that th	e agreement is	the	SMOTE-RotBoost.	These	datasets	were
not hotton then what was averaged by	ahamaa Thasa	.1	ified into ton datagata	with wa		lamaad

not better than what was expected by chance. These values very seldom range from -1 to 1 in clinical and medical cases. A negative value is obtained if two raters are under consideration, although if there are more than two raters being considered, then the possible minimum value will be raised [128].

4.6 Mean Absolute Error (MAE) and Root Mean Absolute Error (RMSE)

The MAE, which is the average of absolute errors, is used to measure the trade-offs between predictors (unknown outputs) and outcomes (known outputs) regardless of their direction. This means that the MAE is a measure of the difference between the predicted results and observed results. Although some researchers [129, 130] are in favour of using the MAE to evaluate the average performance of a model, others [131-133] prefer to use the RMSE as a standard measure of model error. The RMSE is almost the same measure as the MAE, but it is more beneficial when it comes to huge errors. The RMSE has a powerful effect on huge errors (penalizes huge errors). Both the MAE and RMSE have values that range from 0 to infinity. A value which is closer to 0 indicates a perfect value. The MAE and RMSE were employed in this study to measure the performance of various classifiers. These metrics are calculated using Equations 11 and 12, with e being the error rate and *n* the number of samples.

$$MAE = \frac{1}{n} \sum_{i=1}^{n} |e_i|$$
(11)
$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^{n} e_i^2}$$
(12)

5 RESULTS AND DISCUSSION

The SMOTE-RotBoost was introduced as a novel experimental ensemble method and its own base classifier was shown to be useful for imbalanced biomedical dataset classifications. Therefore, various classifiers were combined in a multiple classifier system. Evaluation metrics were employed to test the advantages of this method, and this is described in the Evaluation Metrics section.

Three actual imbalanced biomedical datasets retrieved from the KEEL datasets repository were used to assess the performance of

the SMOTE-RotBoost. These datasets were classified into ten datasets with various imbalanced ratios ranging from 1.86 to 41.40. While the data was being processed, all the missing values were removed. The datasets with their relevant ratios are shown in Table 4. The SMOTE-RotBoost was employed for data at 100%, 200%, 300%, 400%, and 500% of its initial size. Attribute selection was used to prevent the occurrence of bias before SMOTE. Both the imbalanced classes were altered into negative and positive classes from 0 and 1. The performance of the SMOTE-RotBoost was compared to that of three popular ensemble methods, namely the SMOTE-Boost [134], SMOTE-Bagging [135] and SMOTE-Random Subspace [136].

From Figure 3 it can be seen that on the whole the new ensemble method, which was applied at 100%, 200%, 300%, 400%, and 500% of the initial dataset size, produced more accurate results than the other three ensembles in average. Figure 4 presents the average values of precision, recall, and F-scores for ten datasets. The magnitudes of these three metrics produced by the SMOTE-RotBoost method were nearer to 1.

The overall magnitudes presented were the same for the different percentages of SMOTE. Figure 5 shows that the SMOTE-RotBoost obtained a lower False Negative rate in average (which is described in the related section) compared to the other ensemble methods, thus indicating that the classifiers, which were used in this method, were more efficient than the others were.

Figure 6 shows that similar results were obtained for the average of AUC (Area Under Curve) and Kappa statistic. The average value of the AUC using the SMOTE-RotBoost ensemble method was higher than that of the others, thus indicating that the randomly selected positive samples probably ranked higher than the negative samples. The same results were obtained for the AUC using different percentages of SMOTE. Figure 6 also indicates the significant agreement of the rates, which were classified in every case. The Kappa statistic in the figure is translated as an applicable measure of reliability

Figures 3 to 6 show that there was an acceptable conformity between the overall accuracy and the AUC for ranking the classification performance of the SMOTE-RotBoost. Significant

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results were obtained for	r all the datasets in the provided a significa	nt approach for the assessment

results were obtained for all the datasets in the 100% SMOTE compared with the results of the other percentages of the applied SMOTE.

. From the results in Figure 7, it can be seen that compared to the other ensemble methods, the SMOTE-Rot Boost method produced the lowest MAE and RMSE. Figure 7 also shows that the RMSE was either larger or equal to the MAE for all the ensemble methods, and that for the SMOTE-RotBoost method the RMSE was equal to the MAE (close to 0), thus indicating that all the error rates possessed the same magnitude. The great difference between the MAE and the RMSE for the SMOTE-Boost method indicated that there was a greater variance of individual errors in the samples (there was a variation in the errors).

6 LIMITATION

The proposed ensemble method has limitations because it employs the AdaBoostM1 ensemble, which is susceptible to outliers and noisy datasets.

7 CONCLUSIONS

Compared to the other ensemble methods, namely the SMOTE-Boost, SMOTE-Bagging and SMOTE-Random Subspace, the SMOTE-RotBoost gives better performance and more benefits when it comes to the classification of imbalanced biomedical data. From the results given in Figures 1 to 6 it can be seen that the difference between the datasets which had imbalanced ratios with the performances of the SMOTE-RotBoost was insignificant. This method performed well with imbalanced biomedical datasets having the same ratios. The performance of this new method was measured with regard to eight metrics: Precision, Recall, F-score, FN rate, AUC, CKC, MAE, and RMSE. In practical terms, when the SMOTE-RotBoost was used for the classification of biological datasets, a low mean absolute error rate, and high accuracy and precision were reported. The Kappa Coefficient (CKC) values, which were close to 1, showed that all the rates in the classification of every case were in perfect agreement despite the False Negative rates which, being close to 0, denoted that the measurements were reliable. Unlike the other classifiers, the SMOTE-RotBoost enhanced the AUC-ROC outputs, which were represented by the larger area under the curve, and

provided a significant approach for the assessment of diagnostic tests. The magnitudes of the MAE and RMSE were closer to 0 in the SMOTE-RotBoost method compared to the three other ensemble methods.

8 AVAILABILITY OF SUPPORTING DATA

The datasets supporting the results of this paper are available in the KEEL repository, <u>http://sci2s.ugr.es/keel/imbalanced</u>.

9 LIST OF ABBREVIATION USED

SMOTE: Synthetic Minority Oversampling Technique; AdaBoostM1: Adapted Boosting Algorithm; Bagging: Bootstrap aggregating; PCA: Principle Component Analysis; ROC: Receiver Operating Characteristic; K-NN: K Nearest Neighbor classifier; AUC: Area Under ROC Curve; FN: False Negative rate; CKC: Cohen's Kappa Coefficient; MAE: Mean Absolute Error; RMSE: Root Mean Square Error; KEEL: Knowledge Extraction based on Evolutionary Learning; WEKA: Waikato Environment for Knowledge Analysis.



Figure 1: Framework of SMOTE-RotBoost. Ensemble method which consists of SMOTE, Rotation Forest and AdaBoostM1 classifier



Figure 2: ROC for Yeast 6 dataset with ratio 41.40 in 100% SMOTE

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			Table 4: 4 Results	for different	ensemble me	ethods. The	e best result	t for each d	lataset is n	narked in l	bold	
Datasets	IR	SMOTE %	Methods	Accuracy %	Precision	Recall	F-Score	FN rate	AUC	СКС	MAE	RMSE
-			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
			SMOTE-Boost	96.4208	0.9640	0.9640	0.9640	0.0400	0.9950	0.9283	0.0456	0.1602
		10	SMOTE-Bagging	98.3731	0.9840	0.9835	0.9835	0.0060	0.9980	0.9674	0.0433	0.1243
			SMOTE-RS	97.7223	0.9775	0.9765	0.9775	0.0130	0.9970	0.9544	0.0548	0.1362
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		00	SMOTE-Boost	98.0189	0.9805	0.9725	0.9790	0.0280	0.9999	0.9418	0.0423	0.1485
		7	SMOTE-RS	98.6219	0.9875	0.9835	0.9855	0.0040	0.9950	0.9707	0.0441	0.1198
Icer			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
Car	20	0	SMOTE-Boost	97.9286	0.9750	0.9770	0.9760	0.0170	0.9970	0.9523	0.0286	0.1247
ast		3(SMOTE-Bagging	98.2143	0.9810	0.9775	0.9795	0.0090	0.9999	0.9586	0.0271	0.0995
3re:			SMOTE-RS SMOTE-RotBoost	98.6429 99.9999	0.9885	0.9800	0.9840	0.0020	0.9980	0.9684	0.0330	0.1016
			SMOTE-Boost	97.1934	0.9600	0.9700	0.9650	0.0260	0.9970	0.9297	0.0308	0.1342
		400	SMOTE-Bagging	99.0238	0.9915	0.9830	0.9875	0.0020	0.9999	0.9751	0.0228	0.0892
			SMOTE-RS	99.1458	0.9935	0.9850	0.9890	0.0010	0.9999	0.9782	0.0300	0.0899
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		00	SMOTE Pagging	97.9766	0.9/00	0.9/45	0.9745	0.0150	0.9970	0.9442	0.0230	0.1200
		5	SMOTE-RS	99.0948	0.9873	0.9830	0.9830	0.0030	0.9999	0.9704	0.0219	0.0843
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		_	SMOTE-Boost	99.6633	0.9965	0.9970	0.9970	0.0000	0.9999	0.9933	0.0071	0.0508
		100	SMOTE-Bagging	98.9899	0.9895	0.9905	0.9900	0.0000	0.9900	0.9798	0.0179	0.0999
			SMOTE-RS	98.9899	0.9895	0.9905	0.9900	0.0000	0.9970	0.9798	0.2009	0.2282
			SMOTE-RotBoost	99,9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		00	SMOTE-Bagging	98.6631	0.9845	0.9880	0.9950	0.0070	0.9999	0.9718	0.0299	0.0051
		7	SMOTE-RS	98.6631	0.9830	0.9830	0.9860	0.0000	0.9970	0.9719	0.1806	0.2184
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
111	36	9	SMOTE-Boost	99.5565	0.9930	0.9970	0.9950	0.0000	0.9999	0.9898	0.0102	0.0633
Ecc	3.	3(SMOTE-Bagging	98.6696	0.9800	0.9905	0.9845	0.0000	0.997/0	0.9696	0.0284	0.1093
			SMOTE-RS SMOTE-RotBoost	98.0090 99.9999	0.9800	0.9903	0.9843	0.0000	0.9980	0.9696	0.1695	0.2081
		_	SMOTE-Boost	99.6212	0.9930	0.9975	0.9950	0.0000	0.9999	0.9905	0.0080	0.0509
		400	SMOTE-Bagging	98.4848	0.9735	0.9895	0.9815	0.0000	0.9999	0.9623	0.0251	0.0943
			SMOTE-RS	99.0530	0.9830	0.9935	0.9880	0.0000	0.9999	0.9763	0.1033	0.1554
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		00	SMOTE-Boost SMOTE-Bagging	99.0777	0.9733	0.9890	0.9820	0.0070	0.9999	0.9639	0.0124	0.0818
		ŝ	SMOTE-RS	98.5124	0.9745	0.9855	0.9795	0.0140	0.9999	0.9593	0.1297	0.1835
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		0	SMOTE-Boost	90.4639	0.8710	0.8985	0.8830	0.1150	0.9450	0.7662	0.1431	0.2734
		10	SMOTE-Bagging	93.0412	0.9105	0.9090	0.9115	0.1250	0.9680	0.8232	0.1119	0.2171
			SMOTE PotPoost	92.0103	0.9010	0.8940	0.8985	0.1630	0.9740	0.7945	0.1477	0.2389
			SMOTE-Boost	90.0000	0.8890	0.8950	0.8920	0.1220	0.9510	0.7834	0.1479	0.2831
		200	SMOTE-Bagging	93.8636	0.9335	0.9320	0.9315	0.0900	0.9860	0.8657	0.1159	0.2155
			SMOTE-RS	93.1818	0.9245	0.9270	0.9255	0.0900	0.9750	0.8515	0.1580	0.2471
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
oli2	46	00	SMOTE Boost	90.4472	0.9020	0.9030	0.9025	0.1060	0.9470	0.8046	0.1427	0.2803
Ec	ý.	3	SMOTE-Bagging	91.6667	0.9230	0.9230	0.9250	0.0870	0.9800	0.8300	0.1144	0.2209
1	1		SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
1	1	0	SMOTE-Boost	90.4412	0.9040	0.9045	0.9045	0.0850	0.9620	0.8087	0.1416	0.2737
1	1	40	SMOTE-Bagging	93.0147	0.9305	0.9295	0.9300	0.0810	0.9880	0.8599	0.1111	0.2138
1	1	\vdash	SMOTE-RS	93.3824	0.9335	0.9340	0.9335	0.9335	0.9810	0.8674	0.1428	0.2296
1	1		SMOTE-Rotboost	90 2685	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
1	1	500	SMOTE-Bagging	94.9664	0.9510	0.9490	0.9495	0.0320	0.9890	0.8989	0.1065	0.2029
1	U.S.	1	SMOTE-RS	94.1275	0.9415	0.9410	0.9410	0.0510	0.9860	0.8822	0.1283	0.2125



	IS	SN:	1992-8645		WV	vw.jatit.org	g		E-ISSN: 1817-3195			
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
			SMOTE-Boost	94.9605	0.9220	0.9190	0.9205	0.1320	0.9720	0.8407	0.0953	0.2053
		10	SMOTE-Bagging	96.7820	0.9445	0.9560	0.9500	0.0640	0.9940	0.8999	0.0593	0.1577
			SMOTE-RS	88.2210	0.9360	0.7025	0.7540	0.5950	0.9790	0.5219	0.2116	0.2834
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		0	SMOTE-Boost	94.6409	0.9255	0.9425	0.9335	0.0670	0.9730	0.8668	0.0959	0.2146
		2(SMOTE-Bagging	97.0166	0.9580	0.9675	0.9625	0.0390	0.9950	0.9251	0.0577	0.1539
			SMOTE-RS	97.1271	0.9645	0.9630	0.9635	0.0550	0.9930	0.9271	0.1383	0.2007
~			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
ast	10	00	SMOTE Deserver	94.3234	0.9335	0.9390	0.9360	0.0740	0.9690	0.8725	0.1145	0.2321
Ye:	8.	3	SMOTE BS	96.4521	0.9560	0.9645	0.9600	0.0350	0.9950	0.9206	0.0632	0.1602
			SMULE-RS	93.7423	0.9670	0.9373	0.9303	0.1210	0.9970	0.9009	0.1081	0.2180
			SMOTE Poort	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.2215
		00	SMOTE Bagging	94.4200	0.9370	0.9493	0.9420	0.0280	0.9780	0.0039	0.0989	0.2213
		4	SMOTE-RS	96.4888	0.9710	0.9703	0.9620	0.0200	0.9980	0.9244	0.1550	0.2032
			SMOTE-RotBoost	99,9999	0.9999	0.9999	0.9020	0.0000	0.9999	0.9244	0.1550	0.2052
			SMOTE-Boost	94 4759	0.9415	0.9475	0.9440	0.0320	0.9780	0.8880	0.0985	0.2244
		500	SMOTE-Bagging	96.9552	0.9675	0.9715	0.9690	0.0170	0.9970	0.9380	0.0559	0.1493
		4.	SMOTE-RS	94.9978	0.9595	0.9410	0.9480	0.1160	0.8961	0.1638	0.1638	0.2226
			SMOTE-RotBoost	99,9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
1			SMOTE-Boost	90.5930	0.7900	0.7385	0.7605	0.4830	0.9120	0.5219	0.1378	0.2637
		10(SMOTE-Bagging	94.0695	0.9420	0.7725	0.8310	0.4500	0.9770	0.6644	0.1146	0.2057
			SMOTE-RS	91.4110	0.9555	0.6500	0.7075	0.7000	0.9370	0.4292	0.1587	0.2572
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
		0	SMOTE-Boost	96.6942	0.9605	0.9505	0.9550	0.0830	0.9950	0.9104	0.0433	0.1577
		20	SMOTE-Bagging	96.6942	0.9605	0.9505	0.9550	0.0830	0.9960	0.9104	0.0683	0.1529
S 5			SMOTE-RS	96.2810	0.9695	0.9310	0.9480	0.1330	0.9940	0.8962	0.1203	0.1938
4			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
β	0	0	SMOTE-Boost	98.8550	0.9920	0.9815	0.9865	0.0380	0.9999	0.9727	0.0226	0.0965
2	9.1	30	SMOTE-Bagging	95.8015	0.9470	0.9560	0.9515	0.0500	0.9960	0.9021	0.0728	0.1595
li 0			SMOTE-RS	95.8015	0.9670	0.9350	0.9490	0.1250	0.9970	0.8978	0.0942	0.1587
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000
EC			CLOTE D	00.00(0	0.0070	0.0005	0.0005	0.0100	0.0000	0.07(0	0.0051	0.1046
Eco		00	SMOTE-Boost	98.9362	0.9870	0.9895	0.9885	0.0100	0.9999	0.9768	0.0251	0.1046
Ecc		400	SMOTE-Boost SMOTE-Bagging	98.9362 97.8723	0.9870	0.9895	0.9885	0.0100	0.9999	0.9768	0.0251	0.1046
Ecc		400	SMOTE-Boost SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355	0.9870 0.9750 0.9610	0.9895 0.9790 0.9325	0.9885 0.9765 0.9445	0.0100 0.0200 0.1300	0.9999 0.9999 0.9970	0.9768 0.9537 0.8885	0.0251 0.0571 0.1120	0.1046 0.1255 0.1719
Eco		400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199	0.9870 0.9750 0.9610 0.9999 0.9670	0.9895 0.9790 0.9325 0.9999 0.9710	0.9885 0.9765 0.9445 0.9999 0.9690	0.0100 0.0200 0.1300 0.0000 0.0250	0.9999 0.9999 0.9970 0.9999 0.9970	0.9768 0.9537 0.8885 0.9999 0.9380	0.0251 0.0571 0.1120 0.0000 0.0437	0.1046 0.1255 0.1719 0.0000 0.1502
Eco		500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620	0.0100 0.0200 0.1300 0.0000 0.0250 0.0500	0.9999 0.9999 0.9970 0.9999 0.9970 0.9980	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474
Eco		500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-BAgging	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110	0.0100 0.0200 0.1300 0.0000 0.0250 0.0500 0.1830	0.9999 0.9999 0.9970 0.9999 0.9970 0.9980 0.9980	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032
Eco		500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RotBoost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999	0.0100 0.0200 0.1300 0.0250 0.0250 0.0500 0.1830 0.0000	0.9999 0.9999 0.9970 0.9970 0.9970 0.9980 0.9950 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000
Ecc		500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RotBoost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750	0.9999 0.9999 0.9970 0.9970 0.9970 0.9980 0.9950 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873
Ecc		100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9305 0.9800 0.9880	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385	0.0100 0.0200 0.1300 0.0000 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500	0.9999 0.9999 0.9970 0.9997 0.9970 0.9980 0.9950 0.9999 0.9999 0.9980	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252
Ecc		100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500	0.9999 0.9999 0.9970 0.9997 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302
Ecc		100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RotBoost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9999	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9905 0.9999 0.9600 0.9205 0.9935 0.9999	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0000	0.9999 0.9999 0.9970 0.9999 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0. 9999 0. 9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9999	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000
Ecc		0 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RotBoost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9999 0.9690	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9795	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0000 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9999 0.9586	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808
Ecc		200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Boost SMOTE-Bagging	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9999 0.9690 0.9760	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9775 0.9845	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0000 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9999 0.9586 0.9588	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121
Ecc		200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9775 0.9845 0.9895	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000	0.9999 0.9999 0.9970 0.9990 0.9970 0.9980 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9999 0.9586 0.9588 0.9688 0.9790	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987
/s 5 Ecc		200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9775 0.9845 0.9895 0.9999	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9688 0.9790 0.9999	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000
_1 vs 5 Ecc		00 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-RS SMOTE-ROSS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667	0.9870 0.9750 0.9610 0.9670 0.9625 0.9305 0.9800 0.9585 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999 0.9790	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9775 0.9845 0.9895 0.9999 0.9830	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9588 0.9688 0.9790 0.9999 0.9662	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0997
li0_1 vs 5 Ecc	11	300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-ROTE-RS SMOTE-ROTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Bagging	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000	0.9870 0.9750 0.9610 0.9670 0.9625 0.9305 0.9800 0.9585 0.9935 0.9935 0.9935 0.9690 0.9760 0.9760 0.9840 0.9999 0.9790 0.9790	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9930	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9999 0.9775 0.9845 0.9895 0.9895 0.9895 0.9899 0.9830 0.9875	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9588 0.9790 0.9662 0.9747	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0997 0.0000 0.0914 0.1063
Coli0_1 vs 5 Ecc	11	300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9393	0.9870 0.9750 0.9610 0.9670 0.9625 0.9305 0.9800 0.9585 0.9935 0.9935 0.9935 0.9690 0.9760 0.9760 0.9840 0.9790 0.9790 0.9820 0.9915	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9930	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9999 0.9795 0.9845 0.9895 0.9895 0.9895 0.9830 0.9875 0.9915	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9568 0.9688 0.9790 0.9662 0.9747 0.9830	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.00485 0.00485 0.0209 0.0435 0.0484	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0997 0.0000 0.0914 0.1063 0.1017
Ecoli0_1 vs 5 Eco	11	300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-ROTE-RS SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999 0.9790 0.9820 0.9915 0.9999	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9930 0.9915 0.9999	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9895 0.9895 0.9895 0.9830 0.9875 0.9915 0.9915	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0188 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0484 0.0000	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000
Ecoli0_1 vs 5 Eco	11	00 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125	0.9870 0.9750 0.9610 0.9670 0.9625 0.9305 0.9800 0.9585 0.9935 0.9935 0.9939 0.9690 0.9760 0.9760 0.9840 0.9790 0.9820 0.9915 0.9999 0.9845	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9915 0.9999 0.9650 0.9915 0.9999	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9895 0.9895 0.9895 0.9895 0.9830 0.9875 0.9915 0.9915 0.9999 0.9740	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9588 0.9790 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0188 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0484 0.0029	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091
Ecoli0_1 vs 5 Eco	11	400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625	0.9870 0.9750 0.9610 0.9625 0.9305 0.9800 0.9585 0.9935 0.9935 0.9935 0.9939 0.9690 0.9760 0.9760 0.9840 0.9790 0.9820 0.9915 0.9995 0.9845 0.9905	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9915 0.9999 0.9650 0.9875	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9845 0.9895 0.9895 0.9830 0.9875 0.9915 0.9915 0.9740 0.9740 0.9890	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0700 0.0200	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781 0.9781	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0484 0.00209 0.0435 0.0484 0.00274 0.0521	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119
Ecoli0_1 vs 5 Eco	11	400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999 0.9790 0.9820 0.9915 0.9999 0.9845 0.9905 0.9860 0.9905	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9915 0.9999 0.9650 0.9875 0.9875 0.9875	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9845 0.9895 0.9895 0.9845 0.9895 0.9845 0.9895 0.9845 0.9999 0.9830 0.9875 0.9915 0.9915 0.9999 0.9740 0.9820 0.9820	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 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0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9586 0.9588 0.9790 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781 0.9633 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9033 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9035 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 0.9055 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0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000
Ecoli0_1 vs 5 Eco	11	400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-RotBoost SMOTE-Bagging SMOTE-RotBoost SMOTE-RotBoost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.9999	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9935 0.99690 0.9760 0.9760 0.9840 0.9790 0.9820 0.9915 0.9820 0.9845 0.9905 0.9860 0.9999 0.9880	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9915 0.9999 0.9650 0.9875 0.99999 0.9915	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9845 0.9895 0.9895 0.9845 0.9895 0.9999 0.9740 0.9820 0.9820 0.9899 0.9820	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0200 0.0200 0.0400 0.0000 0.0000 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9586 0.9588 0.9790 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781 0.9633 0.9999 0.9633 0.9999	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0484 0.00209 0.0435 0.0484 0.00274 0.0521 0.0745 0.0000 0.0161	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000
Ecoli0_1 vs 5 Eco	11	500 400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-RotBoost SMOTE-RotBoost SMOTE-RotBoost SMOTE-RotBoost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.9999 99.1176 99.1176	0.9870 0.9750 0.9610 0.9625 0.9305 0.9999 0.9625 0.9305 0.9999 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9935 0.9690 0.9760 0.9760 0.9840 0.9790 0.9820 0.9915 0.9820 0.9845 0.9905 0.9845 0.9905 0.9860 0.9890 0.9890 0.9890	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9935 0.9999 0.9870 0.9915 0.9999 0.9650 0.9875 0.9999 0.9650 0.9875 0.9999 0.9915 0.9995	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9845 0.9895 0.9845 0.9895 0.9845 0.9895 0.9915 0.9915 0.9915 0.9999 0.9740 0.9820 0.9820 0.9820 0.9820 0.9820 0.9820	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0200 0.0200 0.0400 0.0080 0.0080 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9543 0.9586 0.9588 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781 0.9633 0.9999 0.9807 0.9807 0.9872	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0188 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0484 0.00209 0.0435 0.0484 0.00274 0.0521 0.0745 0.0000 0.0161 0.0525	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000 0.0796 0.0796 0.0088
Ecoli0_1 vs 5 Eco	11	500 400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-ROTE-RS SMOTE-ROTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 98. 4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.9999 99.1176 99.4118 98.2353	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999 0.9820 0.9915 0.9999 0.9845 0.9905 0.9845 0.9905 0.9880 0.9999 0.9890 0.9920 0.9970	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9930 0.9930 0.9930 0.9930 0.9930 0.9930 0.9930 0.9930 0.9935 0.9999 0.9875 0.9775 0.9999 0.9915 0.9955 0.9825	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.910 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9895 0.9875 0.9895 0.9875 0.9999 0.9830 0.9875 0.9999 0.9740 0.9820 0.9820 0.9820 0.9995 0.9935 0.9935	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0000 0.0750 0.1500 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0200 0.0200 0.0400 0.0080 0.0000	0.9999 0.9999 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9781 0.9633 0.9999 0.9807 0.9807 0.9872 0.9615	0.0251 0.0571 0.1120 0.0000 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.00489 0.0685 0.00489 0.0685 0.00489 0.0685 0.00489 0.0543 0.0465 0.00485 0.00465 0.0209 0.0435 0.0484 0.00209 0.0274 0.0521 0.0745 0.0000 0.0161 0.0525 0.0545	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000 0.0796 0.1088 0.1089
Ecoli0_1 vs 5 Eco	11	500 400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.0625 98.4375 99.9999 99.1176 99.1176 99.4118 98.2353 99.7955	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9999 0.9820 0.9915 0.9999 0.9845 0.9905 0.9860 0.9999 0.9890 0.9920 0.9790 0.9790 0.9790	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9930 0.9955 0.9999 0.9870 0.9930 0.9915 0.9999 0.9875 0.9975 0.9999 0.9875 0.9975 0.9999 0.9875 0.9975 0.99915	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.910 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9895 0.9875 0.9999 0.9875 0.9999 0.9875 0.9999 0.9740 0.9820 0.9820 0.9820 0.9935 0.9935 0.9955	0.0100 0.0200 0.1300 0.0250 0.0500 0.0500 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0200 0.0200 0.0400 0.0200 0.0400 0.0080 0.0080 0.0080 0.0070 0.0170 0.0170 0.0170	0.9999 0.9999 0.9970 0.9970 0.9970 0.9970 0.9980 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9481 0.9633 0.9999 0.9633 0.9999 0.9615 0.9872 0.9615 0.904	0.0251 0.0571 0.1120 0.0437 0.0618 0.0291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0465 0.0000 0.0209 0.0435 0.0484 0.00209 0.0435 0.0745 0.0021	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0981 0.1063 0.1017 0.0000 0.1091 0.1091 0.1292 0.0000 0.1091 0.1292 0.0000 0.1091 0.1292 0.0000 0.1091 0.1088 0.1088 0.1088 0.1089 0.0320
7 Ecoli0_1 vs 5 Eco	11	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-ROST SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 98. 4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.0176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176 99.1176	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9999 0.9760 0.9840 0.9999 0.9820 0.9915 0.9845 0.9905 0.9845 0.9905 0.9860 0.9999 0.9890 0.9790 0.9790 0.9790 0.9790	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9930 0.9955 0.9999 0.9870 0.9930 0.9915 0.9999 0.9875 0.9975 0.9999 0.9875 0.9975 0.9999 0.9875 0.9975 0.9999 0.9875 0.9955 0.9955 0.9825 0.9915	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.910 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9830 0.9830 0.9830 0.9815 0.9999 0.9740 0.9820 0.9820 0.9820 0.9905 0.9935 0.9935 0.9955 0.7605	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0750 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0200 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0170 0.0200 0.0170 0.0170 0.0170 0.4830	0.9999 0.9999 0.9970 0.9970 0.9970 0.9970 0.9980 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.99120	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9999 0.9397 0.8768 0.9543 0.9543 0.9543 0.9599 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9663 0.9781 0.9633 0.9999 0.9633 0.9999 0.9615 0.9904 0.5219	0.0251 0.0571 0.1120 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0465 0.0000 0.0209 0.0435 0.0484 0.00209 0.0435 0.0484 0.0521 0.0745 0.0021 0.0545 0.0545 0.0545	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0987 0.0000 0.0914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000 0.1091 0.1119 0.1292 0.0000 0.0796 0.1088 0.1089 0.0320 0.2637
vs 7 Ecoli0_1 vs 5 Eco	11 11	$100 \qquad 500 \qquad 400 \qquad 300 \qquad 200 \qquad 100 \qquad 500 \qquad 400$	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 99.9999 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.2857 99.3333 99.9999 97.8125 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.0176 99.1176 99.1176 99.1176 99.1176 99.1176 99.4118 98.2353 99.7955 90.5930 94.0695	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9909 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9760 0.9840 0.9790 0.9820 0.9915 0.9845 0.9905 0.9860 0.9905 0.9860 0.9999 0.9890 0.9920 0.9790 0.9790 0.9790 0.9790 0.9790 0.9990 0.7900 0.9420	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9930 0.9915 0.9999 0.9875 0.9999 0.9650 0.9875 0.9975 0.9975 0.9975 0.9975 0.9975 0.9915 0.9915 0.9825 0.9825 0.9825	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9830 0.9830 0.9830 0.9830 0.9830 0.9915 0.9915 0.9999 0.9740 0.9820 0.9820 0.9820 0.9820 0.9905 0.9905 0.9905 0.9905 0.9805 0.9805 0.7605 0.8310	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0200 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0750 0.0750 0.0750 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0130 0.0130 0.0000 0.0130 0.0130 0.0000 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0130 0.0100 0.0130 0.0100 0.0130 0.0100 0.0130 0.0100 0.0130 0.0100 0.0100 0.0100 0.0130 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0100 0.0000 0.0100 0.0000 0.0100 0.0000 0.0000 0.0100 0.0000 0.0000 0.0100 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000000	0.9999 0.9999 0.9970 0.9970 0.9970 0.9980 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9663 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9633 0.9999 0.9663 0.9999 0.9662 0.9747 0.9633 0.9999 0.9663 0.9999 0.9662 0.9747 0.9653 0.9999 0.9662 0.9747 0.9653 0.9999 0.9664 0.92519 0.6644	0.0251 0.0571 0.1120 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0465 0.00209 0.0435 0.0484 0.00209 0.0435 0.0484 0.00209 0.0435 0.0484 0.00209 0.0435 0.0484 0.0521 0.0745 0.0021 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0545 0.0021 0.1378 0.1146	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.00914 0.1063 0.1017 0.00914 0.1063 0.1017 0.0000 0.1091 0.1119 0.1292 0.0000 0.0796 0.1088 0.1089 0.0320 0.2637 0.2057
st 1 vs 7 Ecoli0_1 vs 5 Eco	4.30 11	$100 \qquad 500 \qquad 400 \qquad 300 \qquad 200 \qquad 100 \qquad 500 \qquad 400$	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Boost	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 98.4615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.2857 99.2857 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.91176 99.1176 99.1176 99.4118 98.2353 99.7955 90.5930 94.0695 91.4110	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9790 0.9820 0.9915 0.9999 0.9845 0.9905 0.9860 0.9905 0.9860 0.9999 0.9890 0.9920 0.97900 0.97900 0.97900 0.97900 0.9920 0.97900 0.97900 0.9920 0.97900	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9937 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9975 0.9915 0.9955 0.9955 0.9915 0.9955 0.9915 0.7385 0.7725 0.6500	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.9110 0.9999 0.9700 0.9385 0.9770 0.9845 0.9895 0.9845 0.9895 0.9885 0.9999 0.9830 0.9830 0.9875 0.9915 0.9915 0.9915 0.9915 0.9999 0.9740 0.9820 0.9820 0.9820 0.9905 0.9905 0.9935 0.9955 0.7605 0.8310 0.7075	0.0100 0.0200 0.1300 0.0250 0.0500 0.1830 0.0500 0.0750 0.1500 0.0750 0.0750 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0200 0.0200 0.0200 0.0400 0.0200 0.0400 0.0200 0.0400 0.0200 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0170 0.0000 0.0000 0.0000 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0130 0.0000 0.0000 0.0130 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.000000 0.00000000	0.9999 0.9999 0.9970 0.9970 0.9970 0.9980 0.9950 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9999 0.9970	0.9768 0.9537 0.8885 0.9999 0.9380 0.9238 0.8224 0.9397 0.8768 0.9543 0.9543 0.9543 0.9543 0.9586 0.9688 0.9790 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9623 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9747 0.9830 0.9999 0.9662 0.9751 0.9662 0.9751 0.9662 0.9752 0.9662 0.9683 0.9999 0.9662 0.9752 0.9664 0.9218 0.9904 0.5219 0.66644 0.4292	0.0251 0.0571 0.1120 0.0437 0.0618 0.1291 0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.0465 0.00209 0.0435 0.0465 0.0209 0.0435 0.0484 0.0209 0.0435 0.0484 0.0209 0.0435 0.0485 0.0209 0.0435 0.0484 0.0521 0.0745 0.0021 0.0545 0.0545 0.0545 0.0021 0.1378 0.1146 0.1587	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.09914 0.1063 0.1007 0.0000 0.1091 0.1119 0.1292 0.0000 0.1091 0.1119 0.1292 0.0000 0.0796 0.1088 0.1089 0.0320 0.2637 0.2057 0.2572
(east 1 vs 7 Ecoli0_1 vs 5 Eco	14.30 11	0 100 500 400 300 200 100 500 400	SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Boost SMOTE-Bagging SMOTE-RS	98.9362 97.8723 95.0355 99.9999 97.0199 96.3576 91.7219 98.84615 96.9231 98.8462 99.9999 98.5714 98.9286 99.2857 99.2857 99.2857 99.0000 99.3333 99.9999 98.6667 99.0000 99.3333 99.9999 97.8125 99.0625 98.4375 99.0625 98.4375 99.0625 98.4375 99.9999 99.1176 99.1176 99.4118 98.2353 99.7955 90.5930 94.0695 91.4110 99.8073	0.9870 0.9750 0.9610 0.9999 0.9670 0.9625 0.9305 0.9999 0.9800 0.9585 0.9935 0.9935 0.9935 0.9935 0.9999 0.9690 0.9760 0.9840 0.9790 0.9820 0.9915 0.9999 0.9845 0.9905 0.9860 0.9905 0.9860 0.9999 0.9880 0.9999 0.9890 0.9990 0.97900 0.97900 0.9420 0.9420 0.9945 0.9945	0.9895 0.9790 0.9325 0.9999 0.9710 0.9615 0.9005 0.9999 0.9600 0.9205 0.9935 0.9999 0.9910 0.9930 0.9955 0.9999 0.9870 0.9915 0.9999 0.9870 0.9915 0.9999 0.9650 0.9915 0.9999 0.9650 0.9915 0.9999 0.9650 0.9915 0.9999 0.9915 0.9915 0.9955 0.9915 0.9955 0.9915 0.9955 0.9915 0.9955 0.9915 0.7385 0.7725 0.6500 0.9940	0.9885 0.9765 0.9445 0.9999 0.9690 0.9620 0.910 0.9700 0.9385 0.9770 0.9385 0.9770 0.9845 0.9895 0.9895 0.9830 0.9875 0.9830 0.9875 0.9915 0.9999 0.9740 0.9890 0.9820 0.9820 0.9820 0.9820 0.9905 0.9905 0.9905 0.9905 0.9905 0.9905 0.9905 0.98310 0.9835 0.9805 0.9805 0.9835 0.9805 0.9835 0.9805 0.9835 0.9805 0.9835 0.9805 0.9835 0.9805 0.9835 0.9805 0.9835 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805 0.9805	0.0100 0.0200 0.1300 0.0250 0.0500 0.0500 0.1830 0.0750 0.0750 0.0750 0.0000 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0.0000 0.0186 0.0489 0.0685 0.0000 0.0188 0.0543 0.0465 0.0000 0.0209 0.0435 0.00435 0.00435 0.0465 0.00435 0.04484 0.0209 0.0435 0.04484 0.0209 0.0435 0.04484 0.0209 0.0435 0.04484 0.0209 0.0435 0.0484 0.0209 0.0435 0.0484 0.0209 0.0435 0.0485 0.0000 0.0274 0.0521 0.0525 0.0545 0.0021 0.1378 0.1146 0.1587 0.0021	0.1046 0.1255 0.1719 0.0000 0.1502 0.1474 0.2032 0.0000 0.0873 0.1252 0.1302 0.0000 0.0808 0.1121 0.0987 0.0000 0.0914 0.1063 0.1091 0.1063 0.1091 0.1091 0.1119 0.1292 0.0000 0.0796 0.1088 0.1089 0.0320 0.2637 0.2057 0.2572 0.0310



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	IS	SN:	1992-8645		WV	vw.jatit.org	g		E-ISSN: 1817-3195			
	1		SMOTE-Bagging	92, 2929	0.9090	0.8085	0.8475	0 3670	0.9680	0.6965	0 1 3 8 1	0.2323
			SMOTE-RS	89.0173	0.9275	0.6880	0.7410	0.6220	0.9590	0.4950	0.1945	0.2741
			SMOTE-RotBoost	99.8179	0.9990	0.9960	0.9975	0.0080	0.9999	0.9947	0.0088	0.0352
		_	SMOTE-Boost	88.5246	0.8375	0.8185	0.8270	0.3000	0.9170	0.6547	0.2026	0.3003
		300	SMOTE-Bagging	93.9891	0.9300	0.8895	0.9075	0.2000	0.9860	0.8157	0.1319	0.2160
			SMOTE-RS	93.0783	0.9540	0.8450	0.8855	0.3080	0.9760	0.7728	0.1858	0.2535
			SMOTE-RotBoost	99.8273	0.9990	0.9965	0.9980	0.0070	0.9999	0.9955	0.0021	0.0295
			SMOTE-Boost	84.6287	0.8210	0.7555	0.7785	0.4330	0.9110	0.5605	0.2100	0.3228
		400	SMOTE-Bagging	92.9188	0.9150	0.8980	0.9060	0.1670	0.9800	0.8119	0.1400	0.2328
			SMOTE-RS	92.7461	0.9280	0.8795	0.9000	0.2200	0.9810	0.8007	0.1890	0.2524
			SMOTE-RotBoost	99.8358	0.9970	0.9990	0.9980	0.0000	0.9999	0.9961	0.0069	0.0320
		0	SMOTE-Boost	82.4302	0.7890	0.8155	0.7990	0.2060	0.8880	0.5994	0.2574	0.3412
		50	SMOTE-Bagging	94.0887	0.9280	0.9310	0.9295	0.0940	0.9860	0.8585	0.1414	0.2224
			SMOTE-RS	94.2529	0.9550	0.9075	0.9275	0.1780	0.9910	0.8552	0.1686	0.2266
			SMOTE-RotBoost	99.4788	0.9970	0.9610	0.9780	0.0780	0.9999	0.9564	0.0063	0.0525
		0	SMOTE-Boost	93.3550	0.7320	0.7275	0.7295	0.5100	0.9380	0.4595	0.0797	0.2135
		10	SMOTE-Bagging	96.2215	0.9355	0.7385	0.8040	0.5200	0.9780	0.6103	0.0677	0.1705
			SMOTE-RS	94.5277	0.9725	0.5880	0.6360	0.8240	0.9420	0.2858	0.0929	0.2028
			SMOTE-RotBoost	99.4956	0.9970	0.9740	0.9850	0.0520	0.9999	0.9704	0.0074	0.0520
		9	SMOTE-Boost	91.5511	0.7575	0.7610	0.7590	0.4310	0.9330	0.5181	0.1036	0.2494
		2(SMOTE-Bagging	96.2169	0.5285	0.8475	0.8810	0.2940	0.9840	0.7622	0.0740	0.1755
			SMOTE-RS	93.6318	0.9670	0.6700	0.7365	0.6600	0.9700	0.4820	0.1082	0.2060
4			SMOTE-RotBoost	99.5113	0.9930	0.9850	0.9885	0.0290	0.9999	0.9774	0.0066	0.0509
ast	.10	8	SMOTE Develop	90.6536	0.7885	0.7680	0.7780	0.4170	0.9390	0.5557	0.1147	0.2675
Ye	28	3	SMOTE Bagging	95.2963	0.9050	0.8725	0.8875	0.2350	0.9840	0.77520	0.0852	0.18/6
Ĺ			SMULE-KS	93.2963	0.9460	0.8303	0.8765	0.3330	0.9780	0.7339	0.1115	0.2008
			SMOTE-Boost	99.5201 80.6010	0.9925	0.7685	0.7855	0.0200	0.9999	0.5719	0.0070	0.0502
		00	SMOTE-Bagging	95 1422	0.8075	0.7085	0.7855	0.4100	0.9290	0.3719	0.0857	0.2818
		4	SMOTE-RS	94 1351	0.9675	0.9020	0.9630	0.1550	0.9830	0.7279	0.1172	0.1035
			SMOTE-RotBoost	99 5400	0.9935	0.0000	0.0050	0.0160	0.9090	0.7279	0.0086	0.2004
			SMOTE-Boost	88.8442	0.8230	0.7650	0.7895	0.4250	0.9360	0.5797	0.1394	0.2880
		500	SMOTE-Bagging	95,1696	0.9210	0.9100	0.9155	0.1540	0.9880	0.8313	0.0899	0.1901
			SMOTE-RS	96.0897	0.9690	0.8955	0.9270	0.2060	0.9890	0.8543	0.1020	0.1854
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0041	0.0184
		_	SMOTE-Boost	98.2639	0.8805	0.9570	0.9150	0.0710	0.9970	0.8296	0.0187	0.0976
		10(SMOTE-Bagging	97.5694	0.8770	0.8515	0.8640	0.2860	0.9560	0.7280	0.0368	0.1338
			SMOTE-RS	98.9583	0.9945	0.8930	0.9375	0.2140	0.9950	0.8746	0.0352	0.1109
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0029	0.0126
		0	SMOTE-Boost	98.3051	0.9145	0,9685	0.9400	0.0480	0.9980	0.8798	0.0190	0.0987
9.		20	SMOTE-Bagging	97.2881	0.9120	0.8755	0.8925	0.2380	0.9250	0.7855	0.0457	0.1456
2			SMOTE-RS	97.9661	0.9230	0.9230	0.9230	0.1430	0.9960	0.8462	0.0410	0.1143
Z vs			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0003	0.0009
e,	14	2	SMOTE-Boost	98.0132	0.9300	0.9570	0.9430	0.0710	0.9960	0.8856	0.0247	0.1105
	39	3(SMOTE-Bagging	97.6821	0.9370	0.9230	0.9300	0.14.50	09780	0.8600	0.0399	0.1376
i 0			SMULE-KS	98.6755		0.0005	0.0500	0.1420	0.0000	0.0170	0.0424	0 11 50
Col				00.0000	0.9930	0.9285	0.9580	0.1430	0.9960	0.9159	0.0434	0.1150
			SMOTE Poort	99.9999	0.9930 0.9999 0.9425	0.9285 0.9999	0.9580 0.9999	0.1430 0.0000	0.9960 0.9999	0.9159 0.9999	0.0434 0.0015	0.1150 0.0097
H		00	SMOTE-Boost SMOTE-Bagging	99.9999 98.0583 98.0583	0.9930 0.9999 0.9425 0.9750	0.9285 0.9999 0.9640 0.9265	0.9580 0.9999 0.9530	0.1430 0.0000 0.0570 0.1430	0.9960 0.9990 0.9960 0.9940	0.9159 0.9999 0.9057 0.8983	0.0434 0.0015 0.0242 0.0354	0.1150 0.0097 0.1096 0.1267
H		400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS	99.9999 98.0583 98.0583 97.7346	0.9930 0.9999 0.9425 0.9750 0.9485	0.9285 0.9999 0.9640 0.9265 0.9375	0.9580 0.9999 0.9530 0.9490 0.9430	0.1430 0.0000 0.0570 0.1430 0.1140	0.9960 0.9999 0.9960 0.9940 0.9940	0.9159 0.9999 0.9057 0.8983 0.8858	0.0434 0.0015 0.0242 0.0354 0.0500	0.1150 0.0097 0.1096 0.1267 0.1360
H		400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000	0.9960 0.9999 0.9960 0.9940 0.9940 0.9940	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105
E		400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Roost	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000 0.0480	0.9960 0.9990 0.9960 0.9940 0.9940 0.9999 0.9970	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090
Ŧ		500 400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000 0.0480 0.0950	0.9960 0.9990 0.9960 0.9940 0.9940 0.9940 0.9999 0.9970 0.99500	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442
Ŧ		500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-Roboost SMOTE-Bagging SMOTE-Bagging SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515 0.9515	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000 0.0480 0.0950 0.0950	0.9960 0.9960 0.9999 0.9960 0.9940 0.9940 0.9999 0.9970 0.9500 0.9970	0.9159 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255
H		500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-Roboost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RotBoost	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 99.9999	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9999	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9999	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515 0.9515 0.9999	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000 0.0480 0.0950 0.0950 0.0950	0.9960 0.9960 0.9999 0.9960 0.9940 0.9940 0.9999 0.9970 0.9500 0.9970 0.9999	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000
H		0 500 400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 99.9999 95.8525	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9999 0.6315	0.9580 0.9530 0.9490 0.9430 0.9430 0.9595 0.9515 0.9515 0.9515 0.9515 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575 0.9575	0.1430 0.0000 0.0570 0.1430 0.1140 0.0000 0.0480 0.0950 0.0950 0.0950 0.0000 0.7290	0.9960 0.9999 0.9960 0.9940 0.9940 0.9940 0.9990 0.9970 0.9970 0.9970 0.9970 0.9999 0.9600	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.9999 0.3581	0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000 0.0546	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664
		100 500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Boost SMOTE-Bagging	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9999 0.6315 0.8315	0.9580 0.9530 0.9490 0.9430 0.9490 0.9430 0.9595 0.9515 0.9515 0.9515 0.9515 0.96775 0.8610	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0000 0.7290 0.3290	0.9960 0.9990 0.9960 0.9940 0.9940 0.9940 0.9990 0.9970 0.9970 0.9970 0.9999 0.99600 0.9760	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.3581 0.7228	0.0434 0.02434 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313
		100 500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-ROBOOST SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-ROTBOOST SMOTE-Bagging SMOTE-Bagging SMOTE-BAgging SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617 95.7867	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9999 0.6315 0.8315 0.5430	0.9580 0.9530 0.9490 0.9430 0.9430 0.9595 0.9515 0.9515 0.9515 0.9515 0.96775 0.8610 0.4980	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0950 0.7290 0.3290 0.9140	0.9960 0.9999 0.9960 0.9940 0.9940 0.9940 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9999 0.9600 0.9760 0.9380	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517	0.0434 0.02434 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589
		100 500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617 95.7867 99.9999	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790 0.9790	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9470 0.9999 0.6315 0.8315 0.5430 0.9999	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515 0.9515 0.9515 0.6775 0.8610 0.4980 0.9999	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0000 0.7290 0.3290 0.9140 0.0000	0.9960 0.9999 0.9960 0.9940 0.9940 0.9990 0.9970 0.9500 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9970 0.9980 0.9999 0.9600 0.9380 0.9999	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517 0.9999	0.0434 0.0434 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610 0.0000	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589 0.0000
st 6 E	40	0 100 500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RotBoost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617 95.7867 99.9999 95.8172	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790 0.9790 0.9999 0.8305	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9470 0.9999 0.6315 0.8315 0.5430 0.9999 0.8450	0.9580 0.9999 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515 0.9515 0.9515 0.6775 0.8610 0.4980 0.9999 0.8380	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.7290 0.3290 0.9140 0.08380	0.9960 0.9999 0.9960 0.9940 0.9940 0.9990 0.9970 0.9500 0.9970 0.99500 0.9970 0.99600 0.9760 0.9380 0.9999 0.9680	0.9159 0.9999 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517 0.9999 0.6752	0.0434 0.0434 0.0015 0.0242 0.0354 0.0500 0.0025 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610 0.00600 0.0620	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589 0.0000 0.1756
cast 6 E	41.40	200 100 500 400	SMOTE-Rotboost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617 95.7867 99.9999 95.8172 97.0399	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790 0.9790 0.9999 0.8305 0.8960	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9470 0.9999 0.6315 0.8315 0.5430 0.9999 0.8450 0.8605	0.9580 0.9580 0.9530 0.9490 0.9430 0.9999 0.9595 0.9515 0.9515 0.9515 0.6775 0.8610 0.4980 0.9999 0.8380 0.8320	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0000 0.7290 0.3290 0.9140 0.09140 0.8380 0.2670	0.9960 0.9990 0.9960 0.9940 0.9940 0.9990 0.9970 0.9500 0.9970 0.9500 0.9970 0.9600 0.9760 0.9380 0.9999 0.9680 0.9840	0.9159 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517 0.9999 0.6752 0.7542	0.0434 0.0434 0.0242 0.0354 0.0500 0.0243 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610 0.0610 0.0620 0.0474	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589 0.0000 0.1756 0.1458
Yeast 6 E	41.40	200 100 500 400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 97.7848 99.9999 95.8525 97.7617 95.7867 99.9999 95.8172 97.0399 97.3616	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790 0.9790 0.8305 0.8960 0.9595 0.8955	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9999 0.6315 0.5430 0.5430 0.9999 0.8450 0.8605 0.8225	0.9580 0.9580 0.9530 0.9490 0.9490 0.9430 0.9595 0.9515 0.9515 0.9515 0.9515 0.8610 0.4980 0.4980 0.9999 0.8380 0.8320 0.8770 0.8770	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0950 0.7290 0.3290 0.9140 0.8380 0.2670 0.3520	0.9960 0.9990 0.9960 0.9940 0.9940 0.9940 0.9970 0.9500 0.9970 0.9500 0.9970 0.9600 0.9760 0.9380 0.9380 0.9999 0.9680 0.9840 0.9820	0.9159 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517 0.9999 0.6752 0.7542 0.7542	0.0434 0.0434 0.0242 0.0354 0.0500 0.0243 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610 0.0640 0.0620 0.0474 0.0661	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589 0.0000 0.1756 0.1458 0.1545
Yeast 6 E	41.40	200 100 500 400	SMOTE-RotBoost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Bagging SMOTE-RS SMOTE-RS SMOTE-Boost SMOTE-Boost SMOTE-Bagging SMOTE-Bagging SMOTE-RS SMOTE-RS	99.9999 98.0583 98.0583 97.7346 99.9999 98.1013 97.7848 97.7848 97.7848 97.7848 97.7848 97.7848 97.7848 97.7848 97.7847 95.8525 97.7617 95.7867 99.9999 95.8172 97.0399 97.3616 99.9999 94.0025	0.9930 0.9999 0.9425 0.9750 0.9485 0.9999 0.9510 0.9560 0.9560 0.9560 0.9999 0.7895 0.8970 0.9790 0.9790 0.8305 0.8960 0.9595 0.8960	0.9285 0.9999 0.9640 0.9265 0.9375 0.9999 0.9685 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9470 0.9999 0.6315 0.5430 0.9999 0.8450 0.8605 0.8225 0.99999	0.9580 0.9580 0.9530 0.9490 0.9430 0.9595 0.9515 0.9515 0.9515 0.8610 0.4980 0.9999 0.8380 0.8320 0.8770 0.99999	0.1430 0.0000 0.0570 0.1430 0.0140 0.0480 0.0950 0.0950 0.0950 0.0950 0.7290 0.3290 0.9140 0.8380 0.2670 0.3520 0.0000	0.9960 0.9960 0.9999 0.9940 0.9940 0.9999 0.9970 0.9500 0.9970 0.9970 0.9600 0.9760 0.9380 0.9999 0.9660 0.9380 0.9999 0.9680 0.9840 0.9820 0.9820	0.9159 0.9057 0.8983 0.8858 0.9999 0.9193 0.9029 0.9029 0.9029 0.9029 0.3581 0.7228 0.1517 0.9999 0.6752 0.7542 0.7549 0.9999	0.0434 0.0434 0.0242 0.0354 0.0500 0.0243 0.0243 0.0420 0.0511 0.0000 0.0546 0.0374 0.0610 0.0620 0.0474 0.0661 0.0000	0.1150 0.0097 0.1096 0.1267 0.1360 0.0105 0.1090 0.1442 0.1255 0.0000 0.1664 0.1313 0.1589 0.0000 0.1756 0.1458 0.1545 0.0000
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	400		SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000	
			SMOTE-Boost	95.1355	0.8720	0.8775	0.8745	0.2170	0.9730	0.7489	0.0720	0.1960	
		40(SMOTE-Bagging	96.6749	0.9240	0.8985	0.9105	0.1890	0.9910	0.8217	0.0502	0.1454	
			SMOTE-RS	97.2291	0.9475	0.9040	0.9245	0.1830	0.9800	0.8487	0.0751	0.1667	
			SMOTE-RotBoost	99.9999	0.9999	0.9999	0.9999	0.0000	0.9999	0.9999	0.0000	0.0000	
		0	SMOTE-Boost	94.7559	0.8855	0.8740	0.8795	0.2240	0.9690	0.7594	0.0775	0.2026	
		20	SMOTE-Bagging	96.6847	0.9330	0.9140	0.9235	0.1570	0.9920	0.8466	0.0551	0.1522	
		41	SMOTE-RS	97.3478	0.9700	0.9075	0.9360	0.1810	0.9930	0.8717	0.0807	0.1580	



Figure 3: average of overall accuracy from SMOTE 100% to 500%



Figure 4: average of precision, recall and f-score from SMOTE 100% to 500%

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Figure 5: average of false negative rate



Figure 6: average values of area under curve and kappa statistic



Figure 7: average values of mean absolute error and root mean square error

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