Breast Cancer Classification

Ssu-Ting Hung
Dept of Computer Science
Thompson Rivers University
T00632546@mytru.ca

Chonnikan Viriyakulpat
Dept of Computer Science
Thompson Rivers University
cviriyakulpat16@mytru.ca

Zhenyu Guan
Dept of Computer Science
Thompson Rivers University
guanz18@mytru.ca

Leng Yu
Dept of Computer Science
Thompson Rivers University
lengy16@mytru.ca

***Abstract*—In the world of medicine, breast cancer has long been a pressing concern for doctors in all countries. Thanks to the introduction of artificial intelligence models and optimization algorithms, the feasibility of early cancer diagnosis has greatly improved the success rate of diagnosis. We first used a total of 20 optimization algorithms to test and find the answers of 23 mathematical bench tests from IEEE in different dimensions to create Friedman Tests for these algorithms to rank their performance. We shorten the running time of each algorithm by adding stopping criteria. Afterward, we put in and tested machine learning classifiers such as KNN on 18 different datasets and similarly ranked the top five optimization algorithms under the standard of the Friedman Test. The use of 8 other classifiers to test datasets containing both binary class and multi-class is also significant in this project.**

***Index Terms*—Classification problem, Friedman Test, Machine Learning classifier, Optimization algorithm**

I. INTRODUCTION

Swarm Intelligence (SI) studies and imitates the behavior of creatures that live as a group such as decentralized and self-organized systems. [10] Optimization theory is one of the study fields in Swarm Intelligence that is inspired by nature or animal behavior. For instance, RSA (Reptile Search Algorithm) is one of the optimization algorithms used in this paper, which is implemented by the hunting behavior of crocodiles such as encircling, walking, or hunting coordination. [9] Optimization algorithm is used to solve optimization problems, which is the process to find the input values in restricted conditions or constraint sets that can produce the maximum or minimum results for the function. [5] The optimization algorithm will generate effective solutions by balancing exploration and exploitation. Exploration is the process of exploring all potential solutions within a specific range of input parameters while exploitation is to find the best solution (maximum or minimum) among the potential solutions.

performance by Friedman Test to see how well they performed in different environments. Bench test problems are used to test the algorithms in different conditions such as range of input parameters, minimum values, or problem dimension. SI helps in accelerating the ML process because the ML model itself will be slow when used with large data sets. Therefore, to build a breast cancer classification model, 9 Machine Learning classifiers were merged to evaluate algorithms with 18 UCI data sets.

II. CONTENT

A. Continuous Algorithms

We are using a total of 20 meta-heuristic optimization algorithms. Although the logic of each algorithm is not quite the same, the process of finding the best fitness value is similar. First of all, 30 solutions were created at the beginning of the loop. Then, one of the fitness values is then filtered out and subtracted from the actual answer to check that the stopping criteria for each algorithm are met (the absolute value of (the minimum value of the problem minus the output) is less than 10e-6 or the total number of iterations does not exceed 30,000). If it is not met, the whole iteration will continue and a new number of 30 solutions would be generated. The results are not limited to 0 and 1, but in each bench test problem, it indicated that there is a minimum value of the output for the answer taken for each problem. The dimension of each question is different. This is why each bench test has detailed range and dimension information. There is also the fact that the dimensions of some problems can conflict with our algorithm. For example, the dimension of the twenty-first problem will generate a run-time error in the algorithm where the algorithm dimension does not match the problem dimension. Speaking of tasks that are more time-consuming, the composition function causes the disadvantage of a long runtime for the optimization algorithm in all bench tests because of the mix of multi-nominal and unimodal functions. Moreover, some errors caused by the incompatibility of some functions make us cross out functions 14, 16, 17, 21, 22, and 23 as necessary.

B. Bench Test Problems

TABLE I: Evaluation Criteria in Bench Test Problems.

Parameter	Value
Independent Runs	25
Maximum Iteration	1000
Population Size	30
Stopping Criteria	10e-6

The Upper bound, lower bound, dimension, and minimum value is the environment setting algorithms evaluation, which is different in each bench test function. The upper bound and lower bound indicate the range of the input parameters that

are used to find the optimal output for the function. The input parameters are represented as agents' position, which has 30 population. While the input parameters denote solutions that can provide the ideal value for the function, the population is the total number of agents seeking the best solution. The maximum number of iterations in this method assessment is 1000, and each iteration yields 30 potential solutions. The optimal fitness value for that iteration will be the least output out of 30, which is closest to the minimum value from the bench test problem. The stopping criteria were created to assess how quickly the algorithm can discover the answer to generate the ideal value by preventing the loop from running up to the maximum number of iterations. The optimal output will be regarded as a prospective result, and the loop will be stopped if the output is equal to or less than the stopping criteria.

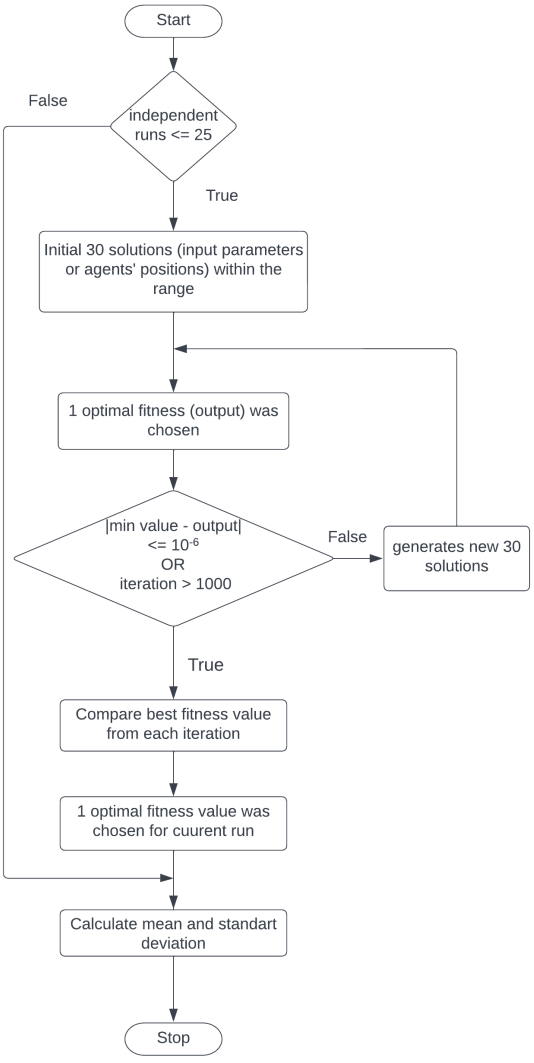

Fig. 1: Algorithm Evaluation with Bench Test Problems Process

The optimization process starts searching for solutions within the solution range (upper bound and lower bound), then iteratively compares several positions around the current position until the optimum solution is discovered. As an illustration, the starting input parameters for the first research (the locations of the agents or solutions) will be chosen at random within the range. And the algorithm will find and compare a smaller input value close to the agents' existing locations in each iteration. This guarantees that each repetition will produce improved results. One independent run will have 1000 optimum outputs in total since each iteration has the best fitness value. One ideal output will be selected once again from a pool of 1000 outputs after the algorithms were evaluated in 25 independent runs. As a result, it will have 25 ideal values to compute the mean and standard deviation for 25 independent runs. See figure 1.

C. Machine Learning Classifiers

To improve the meta-heuristics algorithms, nine Machine learning classifiers were used to convert to binary including KNN, Naive Bayes, Decision Tree, Logistic, linear, Adaboost, bagging, Support Vector Machine and Neural Network, including variants on binary classification, and multi-classification, 80 percent of the data is defined as the training set and 20 percent as the validation set(80-20 training validation). To demonstrate the combination of machine learning and classifier, 18 machine-learning databases from the UCI were introduced as test subjects in this phase of the experiment, performing a total of 3240 operations. Among the 18 tested machine learning datasets, there are both binary and multivariate classification datasets. However, all the nine classification methods tested have different performance and classification methods, some of them are compatible with binary and multivariate classification but some including Logistic regression, Linear regression, Adaboost, and Support Vector Machine need to be adjusted for the dataset to fit the multivariate classification dataset.

1) Feature Selection: Optimization algorithms are slow when working on the datasets since there's a large number of features, instances, and classes. To speed up the process, Machine Learning has a huge when working on large data sets by selecting the most powerful set of features for building a model. However, in the classification approach, the common problem to build an ML model is how to choose the proper features for classification or what features are the best for a problem. There are many features in the large data sets, which means when building an ML model, the machine needs to fit a model compared to all features. In order to choose the finest characteristics for creating ML models, feature selection was introduced. One popular feature selection method that is used in this paper is Wrapper. The wrapper method has three techniques, which are Forward selection, Backward elimination, and Bi-directional elimination. The forward selection method starts with an ML model with no features and attempts to fit the model with each feature one at a time, then in every iteration, it combines two features from earlier selected features. [12] After comparing ML performance in

each feature, the unnecessary features will be eliminated in the backward elimination method while the Bi-directional elimination is finding the optimal characteristics for the ML model by repeatedly removing unneeded features. [12]

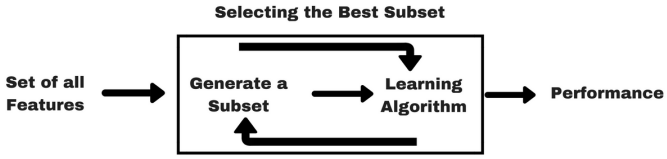

Fig. 2: Wrapper Process [8]

2) Binary Version: As the optimization algorithm is finding the best input parameters that can make the algorithm output the optimal value for the problem. In the binary version of optimization algorithms, the solution will be dealing with 0 to 1. Unlike the continuous version that the input will be within the large range between the upper bound and lower bound. Therefore, in this binary version, the result will be restricted from 0 to 1. Since some classifiers had a hard time working on large datasets such as decision tree and neural network, which is caused by the number of decision tree levels and hidden layers on the network it has to create depending on the number of features in each data. The evaluation criteria on data sets are slightly different from bench test functions.

TABLE II: Evaluation Criteria in Datasets.

Parameter	Value
Independent Runs	10
Maximum Iteration	1000
Population Size	Numbers of features
Stopping Criteria	10e-6
Upper bound	1
Lower bound	0
Testing / Training size	20% / 80%

Each independent run has 1000 iterations, with several features looking for the best solution to the problem in each iteration. So, the total solution in each iteration depends on the number of features from the datasets. Each run will randomly divide the data sets into a training set and a testing set, with the training set comprising 80% of the size and the testing set 20%. This is to avoid variance and bias from using the same set of training and testing data. Each run's optimal result will be recorded in order to determine the mean and standard deviation. For the purpose of comparing the performance of the algorithms, the halted round and model accuracy will also be recorded. This assessment procedure will repeat in nine ML classifiers which are KNN, Naive Bayes, Decision Tree, Logistic, Linear, Adaboost, Bagging, Support Vector Machine, and Neural Network. Therefore, 20 optimization algorithms will be tested in 18 data sets in each classifier to see the overlap performance and rank the best top 5 algorithms' performance in both bench test problems and data sets evaluation.

TABLE III: UCI datasets.

Datasets	Number of features	Number of instances	Number of classes
Breast-cancer	9	699	2
Breast	30	569	2
Congress	16	435	2
Exactly	13	1000	2
Exactly2	13	1000	2
Heart	13	270	2
Ionosphere	34	351	2
Krvskp	36	3196	2
Lymphography	18	148	4
M-of-n	13	1000	2
Penglung	325	73	7
Sonar	60	208	2
Spect	22	267	2
Tic-tac-toe	9	958	2
Vote	16	300	2
Waveform	40	5000	3
Wine	13	178	3
Zoo	16	101	7

D. Friedman Test

The Friedman Test is a non-parametric statistical test developed by Milton Friedman. In our project, it is used to determine the difference in algorithms with multiple datasets, and to verify whether any algorithm's performance changed in different datasets. Moreover, it can evaluate if there are any algorithms constantly ranked higher or lower than others. The performance is evaluated by the mean and standard deviation of the optimal values and stopped iteration.

III. Computational Experiment

A. Comparison of classification accuracy

The 18 datasets from the UCI machine learning repository were used to test the continuous algorithms with classifiers (80-20 training validation)rent algorithms by using the wrapper approach, which contains different sizes and dimensions, see table XV for the test results. Among the datasets tested in table XX (including Binary and Multi-class), we can roughly understand that some of the algorithms have similar results in their performance for specific datasets, with little difference. But one point has to be mentioned that in the test dataset CongressEW_data and the classifier KNN, the computational accuracy of KMA [11] (76.32%) is significantly lower than the average of the accuracy results of this series of algorithms ($\sim$95%), while in the other datasets the result is normal, therefor we considered that this is because the algorithms have different logic and approach cause positive or negative

effects when dealing with particular datasets and classifiers, and after several tests, we ruled out the possibility of Abnormal values. In different databases, the situation is more complex and the results of each algorithm are different. To better visualize the results of the algorithms, we use the Friedman test to sort and compare them, see Table VII. Considering that the tested datasets are divided into binary classification and multi-classification, we divide them into two groups for analysis and testing. Although in the experiment each time the calculation result is different and there will be small differences, after testing each calculation result will be listed to a certain paragraph range, and we take the median to refer to as the standard value. We create three sets of comprehensive ranking tables of the Friedman test for accuracy, namely 'Mean Accuracy', 'Mean Accuracy in Binary Classes' and 'Mean Accuracy in Multi-Classes' in the Table VII series. In the 'Mean Accuracy' table, we can see that the top five algorithms are ESOA [4], DMOA [7], Crystal [2], TSO [13] and RUN [6]. In the 'BInary Classes', the top five algorithms are(in order) DMOA [7], ESOA [4], Crystal [2], RUN [6] and AHA. In Multi-classes Among the Multi-classes(in order): ESOA [4], Crystal [2], DMOA [7], RUN [6], TSO [13] (5.5) [13], and FHO (5.5) [1] (5.5-both share the fifth place). Although the combination of complex datasets, algorithms and classifiers can have some additional effects, either negative or positive, after comparing the combined data, we can still see that the top five algorithms can be basically restricted to a range namely ESOA [4], DMOA [7], RUN [6], TSO [13] and Crystal [2](in no particular order). On the opposite, some of the five algorithms have even better accuracy than others. For example, the ESOA [4] and Neural Network have higher accuracy (80.56%) compared to the other algorithms' average accuracy (75%) in the HeartEW dataset. Based on the analysis and feedback of the individual phenomena of KMA [11] and ESOA [4] and the description of the Friedman test, we can consider that these five algorithms have no 'Abnormal values' in each test, which proves that these five algorithms would keep good performance in the face of different classifiers and data sets. The range is reduced to 5, but however, due to the complexity of the algorithm, we still need to consider other attributes to make new judgments, such as mean value, best fitness value and stand deviation values. While we have clear results, we must consider the limitations of this experiment, as mentioned above the hypothesis that the accuracy seems to be influenced by the logic of the algorithm, the classifier and the database with different positive and negative effects. The accuracy rate can only be used as reference information and not as an absolute comparison value. Moving to narrow the range of the algorithms, a clear comparison is described in Tables V, and VI about the Friedman test of STD fitness values and Mean fitness Values. With the table, we can see that DMOA [7] meets the requirements which is also the one in the list of initial top 5 accuracy algorithms in the previous paragraph.

B. Overall Performance

20 algorithms mentioned above are converted to a binary with multiple classifiers and the Wrapper approach. In addition, we use 9 classifiers, including KNN, Naive Bayes, Decision Tree, Logistic Regression, Linear Classifier, Artificial Neural Networks/Deep Learning, Support Vector Machine, AdaBoost and Bagging. In Tables VIII, IX, X, and XI, the results of datasets display the 20 algorithms' overall performances such as mean, standard deviation, mean stopping rounds and mean classification accuracy of the results. In each run, we are following the parameters settings as in Table II. We can verify that the classifiers impact a lot during mean, standard deviation of the best fitness, mean of stopping rounds that obtain the best fitness and mean classification accuracy of the results in Tables VIII, IX, X, and XI. However, we are still able to evaluate the five classifiers which are constantly performing better than others.

We gain the average of the best fitness from running our 20 optimization algorithms for 10 independent runs. According to the statistical results in Table IV , DMOA [7] generally provides better mean fitness value results in the 18 UCI datasets, and DMOA is ranked as the top in 80-20 training validation with 5 out of 9 classifiers (KNN, Decision Tree, Linear Classifier, Neural Networks, and Neural Network). Moreover, DMOA [7] also provides the minimum standard deviation of the best fitness and the fastest average of stopping rounds to overcome the other competitive algorithms. Crystal [2], RUN [6], ESOA [4], and WSO [3] are ranked second to fourth in the mean fitness value. By contrast, SHO [14] is the worst algorithm for obtaining mean best fitness values. We are using 13 binary-classes datasets and 5 muti-classes datasets for our testing. According to Table IV, DMOA [7] is ranked as the highest in the mean of best fitness values with binary-classes classification, and Crystal [2] has the best performance in the mean fitness values with multi-classes classification. For the standard deviation of the best fitness in Table V, we obtained the lowest standard deviation in binary classes by using DMOA [7] but SO performs best in the muti classes. DMOA [7] is working well for the mean of the accuracy and the mean of the stopping rounds with binary-classes classification. In short, DMOA [7] is ranked the best with binary-classes classification for 4 different categories results.

In summary, DMOA [7] has the best performance compared with other algorithms, and Crystal [2] is the second one. Except for DMOA [7] and Crystal, ESOA is another algorithm performing well overall. It provides the 4th best mean and std of the best fitnesses, the highest accuracy, and the 3rd lowest mean of stopping rounds. In 80–20 training-validation test, ESOA achieves 100% mean accuracy with at least one classifier in the Exactly, M-of-n, PenglungEW, Tic-tac-toe, Wine, and Zoo datasets.

C. Statistical analysis

We implemented one of the well-known statistical tests, the Friedman test, to analyze the results of our experiments. By

ranking the average of the accuracy rates, we can figure out which algorithm is more accurate for each classifier. It is also possible to figure out the accuracy difference produced between each classifier. We have used a five percent significance level and the Friedman test results for our algorithm using 18 datasets and 9 ML classifiers, as Tables 5 and 6. This means that in most cases the machine learning classifier used by DMOA [7] achieves an accuracy of over 90%. However, ESOA's overall accuracy was first after the Friedman test and its ranking was also very stable regardless of the classifier used. Using only the binary dataset, the top five ranking changes slightly, with TSO in fourth place becoming sixth and AHA moving up to fifth place. In the case of the multiclass dataset, TSO and FHO are actually tied for fifth place, which means that there are more options for classifying multiple classes. Overall, however, the ESOA, DMOA [7], Crystal, TSO [13], and RUN [6] algorithms outperformed the other algorithms, although some of them took longer to run, but will certainly be more optimized with future improvements.

IV. CONCLUSIONS

The purpose of this experiment is to optimize feature selection using a meta-heuristic algorithm in which all features are used to obtain better classification accuracy and combine a bit of machine learning to construct an optimization algorithm integrating meta-heuristic algorithm-binary-machine learning for breast cancer diagnosis and early-decision making. This experiment is a reformulation of the algorithm in a way that is based on the wrapper approach to solving the optimization problem of feature selection with functions targeting the segment the action accuracy and the selected features. This experiment introduced a combination of 20 algorithms and 8 classifiers to compare and use evaluation metrics on 18 different datasets drawn from the UCI machine learning repository. A total of 3240 operations (20 metaheuristics, 9 classifiers, and 18 test datasets) were evaluated using Friedman Tests including the mean and STD fitness value and stopping criteria to prove the most efficient combination. After several experiments and tests on the dataset, we describe and compare the DMOA [7] algorithm based on the test results including 'Mean value', 'best fitness value', 'stander deviation' and 'accuracy value' using the Friedman test to find the optimal algorithm. The results of the current stage of testing on the example database are sufficient to demonstrate the effectiveness of the algorithm and classifier combinations, and the most efficient combination is compared using the Friedman Test. In addition, during our experiments, we obtained some values that differed significantly from the average value in the course of testing the algorithm. If our conjecture of algorithm compatibility is proven in subsequent experiments, then we will need to continue research and modification of the known optimization algorithm to obtain a new version with both compatibility and performance. For future work, it is still necessary to bring it to real databases for testing, which will face more complex situations and challenges, and there is still much room for tuning. However, the data set used for breast cancer diagnosis has some different features(positive or negative), and we can properly adjust the algorithm according to these features to adapt to the operation under different conditions.

REFERENCES

[1] Azizi, M., Talatahari, S., Gandomi, A. H. . Fire Hawk Optimizer: a novel metaheuristic algorithm . Online, 2022.

[2] Azizi, M., Talatahari, S. A., Tolouei, M., Talatahari, B., Sareh, P. . Crystal Structure Algorithm (CryStAl): A Metaheuristic Optimization Method . Online, 2022.

[3] Braik, M., Hammouri, A., Atwan, J., Al-Betar, M. A., Awadallah, M. A. . White Shark Optimizer: A novel bio-inspired meta-heuristic algorithm for global optimization problems . Online, 2021.

[4] Chen, Z., Francis, A., Li, S., Liao, B., Xiao, D., Ha, T. T., Li, J., Ding, L., Cao, X. . Egret Swarm Optimization Algorithm: An Evolutionary Computation Approach for Model Free Optimization . Online, 2022.

[5] A. P. Engelbrecht. Optimization theory. Online, 2007.

[6] Iman Ahmadianfar, Ali Asghar Heidari, Amir H. Gandomi, Xuefeng Chu, Huiling Chen. RUN beyond the metaphor: An efficient optimization algorithm based on Runge Kutta method. Online, 2021.

[7] Jeffrey O. Agushaka, Absalom E. Ezugwu, Laith Abualigah. Dwarf Mongoose Optimization Algorithm. Online, 2022.

[8] S. Kaushik. Introduction to feature selection methods with an example (or how to select the right variables?). Online, 2020.

[9] P. Sumari Z. W. Geem A. H. Gandomi L. Abualigah, M. A. Elaziz. Reptile search algorithm (rsa): A nature-inspired meta-heuristic optimizer. In *Expert Systems with Applications*, volume 191, 2022.

[10] B. Pati B. K. Pattanayak C. R. Panigrahi M. Rath, A. Darwish. *Swarm intelligence as a solution for technological problems associated with Internet of Things*. 2020.

[11] Suyanto, S., Ariyanto, A. A., Ariyanto, A. F. . Komodo Mlipir Algorithm . Online, 2021.

[12] V. Verma. A comprehensive guide to feature selection using wrapper methods in python. Online, 2022.

[13] Xie, L., Han, T., Zhou, H., Zhang, Z. R., Bo Han, B., Tang, A. . Tuna Swarm Optimization: A Novel Swarm-Based Metaheuristic Algorithm for Global Optimization . Online, 2021.

[14] Zhao, S., Zhang, T., Ma, S., Wang, M. . Sea-horse optimizer: a novel nature-inspired meta-heuristic for global optimization problems. Online, 2022.

TABLE IV: Friedman Test - Mean fitness

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	14	17	13	17	12	12	16	14	7	15.5
WSO	7	3	14	10.5	5	11	4	2	6	**5**
ARO	20	19	20	19	20	18	19	20	8.5	19
SAO	17	16	16	6	11	10	15	11	4	13
KMA	15	18	15	9	17	16	11	16	5	15.5
SHO	19	20	19	20	18	19	20	19	14	20
AFT	16	13	18	18	19	17	18	17	8.5	18
CSA	11	8	9	10.5	13.5	20	14	13	20	14
ESOA	5	2	6	7	7	15	5	5	3	**4**
FHO	12	15	11	8	15	4	13	10	2	9
BWO	9	12	8	12.5	9	14	9	8	19	11
DMOA	**1**	11	**1**	4	**1**	**1**	2	**1**	10	**1**
DO	18	14	10	12.5	16	13	17	15	11	17
CapSA	13	9	12	14	8	7	7	9	18	10
RUN	2	**1**	7	3	3	3	8	4	12	**3**
TSO	8	7	3	**1**	6	9	12	6	16	7
AHA	6	6	5	16	10	8	10	7	**1**	8
HBA	10	10	17	15	13.5	6	**1**	12	17	12
Crystal	3	4	2	2	2	2	3	3	13	**2**
SO	4	5	4	5	4	5	6	18	15	6

TABLE IV: Friedman Test - Mean fitness in Binary Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	13	16	14	16	11.5	12	17	14	9	16
WSO	8	**1**	16	8	3	11	4	2	7	**4.5**
ARO	20	19	20	19	20	18	19	20	6	19
SAO	15	15	13	9	10	10	13	10	4	11
KMA	16	18	15	14.5	18	16	9	15	5	17
SHO	19	20	19	20	17	20	20	18	15	20
AFT	18	13	18	11	19	17	18	16	11	18
CSA	9	6	9	14.5	13	19	15.5	12	20	15
ESOA	7	3	6	7	9	15	5	5	3	**4.5**
FHO	14	14	11	12	15	5	10	9	2	10
BWO	10	10	8	18	11.5	14	11	11	17	13
DMOA	**1**	17	**1**	**1**	**1**	2	2	**1**	10	**1**
DO	17	12	10	5	16	13	15.5	17	8	14
CapSA	12	8	12	10	6	6	8	7	19	9
RUN	2	2	7	4	4	3	3	4	12	**2**
TSO	5	7	3	3	7	8	14	6	13	7
AHA	6	9	2	13	5	9	12	8	**1**	6
HBA	11	11	17	17	14	7	**1**	13	18	12
Crystal	4	5	4	2	2	**1**	7	3	14	**3**
SO	3	4	5	6	8	4	6	19	16	8

TABLE IV: Friedman Test - Mean fitness in Multi-Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	12	17	11	15	16	13	11	15	3	15
WSO	5	14.5	9	14	7	8	5	7	6	6
ARO	20	20	20	20	20	17	20	20	10	20
SAO	17	14.5	17	5	10.5	16	12	11	8	14
KMA	11	18	16	6	9	11.5	14.5	17	7	12
SHO	19	19	19	19	18.5	19	19	19	14	19
AFT	14.5	11	18	18	18.5	18	18	18	5	18
CSA	13	9	7	8	15	20	6.5	16	19	16
ESOA	4	3.5	4	10	5	14	8	6	2	**5**
FHO	9	12	12	9	14	2	14.5	12	4	10
BWO	8	16	8	4	8	10	4	3	20	9
DMOA	2	1.5	**1**	11	2	**1**	**1**	**1**	12.5	**2**
DO	18	13	10	17	13	15	16	13	18	17
CapSA	16	10	14.5	13	12	9	10	10	16	13
RUN	3	1.5	3	2	3	6	17	5	12.5	**3**
TSO	14.5	7.5	5	**1**	6	11.5	6.5	8.5	17	8
AHA	6	5	13	16	17	7	3	8.5	**1**	7
HBA	10	7.5	14.5	12	10.5	3	13	14	15	11
Crystal	**1**	3.5	2	3	4	5	2	2	9	**1**
SO	7	6	6	7	**1**	4	9	4	11	**4**

TABLE V: Friedman Test - STD fitness

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	13	17	10	10	15	11	15	13	3	14.5
WSO	10	7	18	5.5	8	9	6	7	7	7
ARO	20	20	20	19	20	17	17	19	11.5	19
SAO	12	15	8	13.5	6	7	12	6	4	9
KMA	18	18	15	5.5	12	14	13	16	5	17
SHO	19	19	19	20	19	18	20	20	17	20
AFT	17	11	17	12	18	19	19	18	6	18
CSA	15	12	2	9	10	20	4	15	20	14.5
ESOA	6	6	5	11	4	15	10	9	**1**	**4**
FHO	11	14	3	17	14	4	5	11	9	10
BWO	7	8	13	**1**	11	10	7	4	19	8
DMOA	**1**	13	**1**	13.5	**1**	3	**1**	**1**	8	**1**
DO	4	2	16	7	17	16	18	17	15	16
CapSA	16	16	11	15	3	5	3	12	16	12
RUN	2	**1**	7	2	5	6	14	2	10	**3**
TSO	9	9	12	3	7	12.5	16	8	18	11
AHA	8	3	14	16	13	8	8	5	2	6
HBA	14	10	9	18	16	12.5	2	10	14	13
Crystal	3	4	6	4	2	**1**	9	3	13	**2**
SO	5	5	4	8	9	2	11	14	11.5	**5**

TABLE V: Friedman Test - STD fitness in Binary Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	13	16	14	16	11.5	12	17	14	9	16
WSO	8	**1**	16	8	3	11	4	2	7	**4.5**
ARO	20	19	20	19	20	18	19	20	6	19
SAO	15	15	13	9	10	10	13	10	4	11
KMA	16	18	15	14.5	18	16	9	15	5	17
SHO	19	20	19	20	17	20	20	18	15	20
AFT	18	13	18	11	19	17	18	16	11	18
CSA	9	6	9	14.5	13	19	15.5	12	20	15
ESOA	7	3	6	7	9	15	5	5	3	**4.5**
FHO	14	14	11	12	15	5	10	9	2	10
BWO	10	10	8	18	11.5	14	11	11	17	13
DMOA	**1**	17	**1**	**1**	**1**	2	2	**1**	10	**1**
DO	17	12	10	5	16	13	15.5	17	8	14
CapSA	12	8	12	10	6	6	8	7	19	9
RUN	2	2	7	4	4	3	3	4	12	**2**
TSO	5	7	3	3	7	8	14	6	13	7
AHA	6	9	2	13	5	9	12	8	**1**	6
HBA	11	11	17	17	14	7	**1**	13	18	12
Crystal	4	5	4	2	2	**1**	7	3	14	**3**
SO	3	4	5	6	8	4	6	19	16	8

TABLE V: Friedman Test - STD fitness in Multi-Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	10	18	13	8.5	15	8	9	14	4	9.5
WSO	17	12	9.5	11	2	7	13	10	5	9.5
ARO	20	10	16	8.5	20	12	18	20	11	19
SAO	14	11	12	10	13.5	14	15	9	7	13
KMA	16	14.5	19	12	13.5	17	11	13	8.5	16
SHO	19	20	20	20	17	18	20	19	14	20
AFT	15	13	15	16	16	19	19	18	3	18
CSA	11	14.5	18	4	7	20	2	16	20	12
ESOA	**1**	16	3.5	13	4	15	5	11	**1**	**5.5**
FHO	5.5	19	3.5	6	11	3	10	12	10	8
BWO	7	6	6.5	1.5	12	4	7	5	15.5	**5.5**
DMOA	3	8	**1**	18	4	2	4	**1**	13	**2**
DO	8	4.5	14	19	18	13	16	17	18	17
CapSA	13	17	2	17	10	11	**1**	15	12	15
RUN	4	3	8	1.5	4	10	17	4	8.5	**3**
TSO	12	**1**	5	5	6	16	12	7	19	11
AHA	2	4.5	17	15	19	5.5	6	6	2	7
HBA	18	9	9.5	14	9	9	14	8	15.5	14
Crystal	9	2	11	3	8	5.5	3	3	17	**4**
SO	5.5	7	6.5	7	**1**	**1**	8	2	6	**1**

TABLE VI: Friedman Test - Mean accuracy

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	12	11	12	13.5	10	6.5	11	12	8	11.5
WSO	16	14	17	17	16	13	16	15	7	16
ARO	19	16	19	18	18	19	17	19	11	18
SAO	20	20	20	20	20	20	20	20	12	20
KMA	15	17	15	16	15	16	14	16	5	15
SHO	17	19	16	15	19	14	19	17	9	17
AFT	13	8.5	14	13.5	14	15	15	14	6	14
CSA	9	4	9	7.5	9	9	9	11	3	7.5
ESOA	4	**1**	5.5	5	4	4	3	4	4	**1**
FHO	11	10	10	7.5	12	**1**	8	9	2	7.5
BWO	7	12	7	11	7	6.5	6	8	16	10
DMOA	**1**	13	**1**	3	**1**	3	**1**	**1**	15	**2**
DO	14	8.5	8	6	13	10	12	13	13	13
CapSA	10	6	11	10	6	2	4	7	18	9
RUN	3	15	4	2	3	5	10	3	14	**5**
TSO	6	5	3	4	5	12	7	5	10	**4**
AHA	5	3	5.5	12	8	18	5	6	**1**	6
HBA	8	7	13	9	11	8	13	10	17	11.5
Crystal	2	2	2	**1**	2	11	2	2	19	**3**
SO	18	18	18	19	17	17	18	18	20	19

TABLE VI: Friedman Test - Mean accuracy in Binary Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	11	11	12	13	8	7.5	11	12	8	11
WSO	15	13	18	16	16	16	17	15	6	16
ARO	18.5	16	19	17	17	19	16	19	15	18
SAO	20	20	20	20	20	20	20	20	16	20
KMA	16	14	15	15	15	18	13	16	5	15
SHO	17	17	16	18	19	13	19	17	9	17
AFT	14	9	14	10	14	14	15	13	7	14
CSA	7	3	8	12	10	7.5	10	9	3	9
ESOA	6	**1**	6	6	6	5	3	4	4	**2**
FHO	12	10	10	11	11	**1**	6	8	**1**	8
BWO	8	12	7	14	9	4	8	10	13	10
DMOA	**1**	15	**1**	2	**1**	3	**1**	**1**	14	**1**
DO	13	8	9	5	12	10	12	14	12	12
CapSA	10	5.5	11	8	3	2	5	6	18	7
RUN	2	19	5	3	5	6	2	3	11	**4**
TSO	4	4	3	4	7	12	9	5	10	6
AHA	5	5.5	2	7	4	17	7	7	2	**5**
HBA	9	7	13	9	13	9	14	11	17	13
Crystal	3	2	4	**1**	2	11	4	2	19	**3**
SO	18.5	18	17	19	18	15	18	18	20	19

TABLE VI: Friedman Test - Mean accuracy in Multi-Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	10	13	9	12	14	9.5	11	12	5	12
WSO	17	16	17	19	18	4	13	17	6	16
ARO	19	17	19	18	19	20	17	19	10	19
SAO	20	20	20	20	20	18	19	20	11	20
KMA	15	19	15	17	17	**1**	18	18	9	17
SHO	16	18	16	**1**	15.5	11	16	16	8	15
AFT	12	10	14	15	15.5	13	14	15	4	14
CSA	9	8	13	5.5	9	16	7	13	3	9
ESOA	3.5	3	4	8	4	6	4.5	5	2	**1**
FHO	7	12	8	7	10	2.5	10	9	7	**5.5**
BWO	6	14	6	5.5	4	15	4.5	3	20	8
DMOA	3.5	**1**	**1**	9	2	7	**1**	**1**	18	**3**
DO	14	11	7	13	11	12	12	10	13	13
CapSA	13	9	10	11	8	2.5	8	8	16	10
RUN	2	2	3	2.5	**1**	5	20	4	15	**4**
TSO	11	7	5	2.5	6	17	6	6	12	**5.5**
AHA	5	4.5	12	14	13	14	3	7	**1**	7
HBA	8	6	11	10	7	8	9	11	17	11
Crystal	**1**	4.5	2	4	4	9.5	2	2	14	**2**
SO	18	15	18	16	12	19	15	14	19	18

TABLE VII: Friedman Test - Mean Stopping Round

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	16	15	10	10	12	14	11	14	12	14.5
WSO	6	8	18	16	4	12	9	6	4	9
ARO	20	19	20	19	20	17	20	20	6	19.5
SAO	15	13	8	14	14	10	13	9	10	13
KMA	12	11	15	4	13	13	14	12	9	12
SHO	18	17	19	17	11	19	19	19	15	18
AFT	14	10	17	18	15.5	18	17	17	8	16
CSA	11	5	2	7	10	3	12	8	7	6
ESOA	3	2	5	6	7.5	11	4	7	3	**3**
FHO	10	16	3	2	9	**1**	6.5	4	2	**5**
BWO	7	12	13	15	6	15	15	13	18	14.5
DMOA	2	6	**1**	3	**1**	4	2	2	5	**1**
DO	19	20	16	20	19	16	16	15	20	19.5
CapSA	13	4	11	13	15.5	8	9	5	14	11
RUN	**1**	**1**	7	8	2	5	6.5	3	16	**4**
TSO	17	18	12	9	18	20	18	16	19	17
AHA	9	3	14	12	17	6	5	10	**1**	8
HBA	8	14	9	11	7.5	9	**1**	11	17	10
Crystal	5	7	6	**1**	3	2	3	**1**	13	**2**
SO	4	9	4	5	5	7	9	18	11	7

TABLE VII: Friedman Test - Mean Stopping Round in Binary Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	17	13	15	6	11	12	9	11	20	14
WSO	5	4	18	10	3	13	10	7	5	7
ARO	20	18	20	19	20	18	20	19	4	20
SAO	16	17	6	15	12	9	7	9	10	13
KMA	10	3	13	7	10	11	13	8	11	11
SHO	18.5	15	19	16.5	14	20	19	18	8	19
AFT	18.5	5	17	16.5	17	17	16.5	17	7	16
CSA	11	10	2	8	13	3	15	6	9	8
ESOA	4	6	9	9	15	15	5.5	10	6	9
FHO	12	19	3	5	7	2	5.5	5	**1**	**4**
BWO	9	9	14	14	6	14	18	14	18	15
DMOA	3	12	**1**	3.5	**1**	6	3	4	3	**1**
DO	15	20	16	20	19	16	14	15	12	18
CapSA	13	**1**	8	11	16	4	11	3	16	10
RUN	**1**	2	12	12	4	5	2	2	13	**3**
TSO	14	14	10.5	13	18	19	16.5	16	19	17
AHA	7	8	7	2	8	7	12	13	2	**5**
HBA	8	16	10.5	18	9	10	**1**	12	14	12
Crystal	6	11	5	**1**	2	**1**	4	**1**	17	**2**
SO	2	7	4	3.5	5	8	8	20	15	6

TABLE VII: Friedman Test - Mean Stopping Round in Multi-Classes

	KNN	Naive Bayes	Dec. Tree	LR	LC	Neural Networks	SVM	AdaBoost	Bagging	Overall
RSA	13	15	5.5	14	13	11.5	8	17	4	12
WSO	8.5	11	15	15	8	10	7	8	7	10
ARO	20	18	20	18	19	15	20	20	13.5	20
SAO	15.5	7	11	10	18	14	14	9.5	12	14
KMA	15.5	17	18	4.5	16.5	13	10.5	15	6	15
SHO	17	16	17	16	10	16	17	19	18	17
AFT	10.5	14	15	17	15	19	15	16	8.5	16
CSA	12	**1**	4	8	9	8	5	12	5	6
ESOA	6	2	2	1.5	3	4.5	3	4	2	**1**
FHO	5	10	8	6.5	11	**1**	9	6	3	**4**
BWO	2	13	10	11	7	18	10.5	11	17	11
DMOA	4	4	**1**	9	**1**	2	**1**	2	13.5	**2**
DO	19	20	12	19	12	17	16	13	20	19
CapSA	14	12	13	12	16.5	11.5	6	14	11	13
RUN	3	6	3	1.5	2	7	19	7	15	**5**
TSO	18	19	15	6.5	14	20	18	18	19	18
AHA	10.5	3	19	20	20	3	2	5	**1**	9
HBA	7	9	9	4.5	5	6	13	9.5	16	8
Crystal	**1**	5	7	3	4	9	4	**1**	10	**3**
SO	8.5	8	5.5	13	6	4.5	12	3	8.5	7

TABLE VIII: Mean fitness function values obtained 10 runs for different algorithms by using wrapper approach

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
BreastCan	KNN	0.016	0.013	0.020	0.020	0.022	0.025	0.018	0.017	0.017	0.019
	Naive Bayes	0.022	0.022	0.023	0.019	0.025	0.037	0.024	0.024	0.019	0.029
	Decision Tree	0.026	0.027	0.028	0.022	0.030	0.032	0.022	0.022	0.023	0.027
	Logistic Regression	0.030	0.024	0.024	0.027	0.024	0.031	0.025	0.019	0.022	0.027
	Linear Classifier	0.022	0.021	0.021	0.019	0.024	0.031	0.022	0.021	0.018	0.022
	Artificial Neural Networks/Deep Learning	0.010	0.014	0.012	0.007	0.015	0.016	0.018	0.039	0.011	0.004
	Support Vector Machine	0.022	0.018	0.022	0.022	0.024	0.029	0.015	0.025	0.014	0.017
	AdaBoost	0.024	0.015	0.020	0.014	0.015	0.024	0.014	0.017	0.013	0.016
	Bagging	0.023	0.019	0.016	0.024	0.021	0.018	0.015	0.027	0.014	0.017
BreastEW	KNN	0.040	0.041	0.044	0.040	0.038	0.046	0.042	0.039	0.038	0.043
	Naive Bayes	0.021	0.013	0.042	0.024	0.012	0.024	0.022	0.020	0.011	0.019
	Decision Tree	0.021	0.029	0.041	0.027	0.025	0.031	0.032	0.024	0.022	0.027
	Logistic Regression	0.034	0.025	0.038	0.030	0.023	0.037	0.028	0.019	0.024	0.027
	Linear Classifier	0.025	0.025	0.039	0.023	0.026	0.029	0.028	0.022	0.018	0.017
	Artificial Neural Networks/Deep Learning	0.012	0.004	0.009	0.008	0.013	0.011	0.008	0.089	0.007	0.004
	Support Vector Machine	0.021	0.013	0.027	0.020	0.021	0.023	0.017	0.015	0.009	0.017
	AdaBoost	0.007	0.005	0.019	0.014	0.012	0.012	0.017	0.011	0.011	0.009
	Bagging	0.025	0.021	0.025	0.023	0.025	0.019	0.027	0.042	0.018	0.020
CongressEW	KNN	0.026	0.019	0.038	0.024	0.143	0.033	0.030	0.024	0.024	0.019
	Naive Bayes	0.034	0.019	0.049	0.033	0.027	0.045	0.027	0.036	0.022	0.037
	Decision Tree	0.023	0.028	0.034	0.022	0.027	0.030	0.027	0.021	0.024	0.018
	Logistic Regression	0.019	0.027	0.035	0.024	0.020	0.038	0.015	0.027	0.026	0.020
	Linear Classifier	0.029	0.028	0.044	0.035	0.033	0.040	0.047	0.034	0.034	0.032
	Artificial Neural Networks/Deep Learning	0.019	0.013	0.014	0.012	0.012	0.040	0.014	0.043	0.017	0.013
	Support Vector Machine	0.037	0.028	0.040	0.035	0.022	0.049	0.036	0.035	0.029	0.036
	AdaBoost	0.020	0.013	0.031	0.021	0.023	0.036	0.020	0.016	0.014	0.019
	Bagging	0.041	0.020	0.022	0.040	0.030	0.071	0.045	0.045	0.026	0.029
Exactly	KNN	0.087	0.018	0.265	0.156	0.133	0.298	0.099	0.052	0.071	0.095
	Naive Bayes	0.317	0.313	0.308	0.301	0.309	0.326	0.296	0.292	0.295	0.309
	Decision Tree	0.021	0.044	0.263	0.075	0.079	0.292	0.095	0.023	0.029	0.023
	Logistic Regression	0.303	0.299	0.307	0.296	0.324	0.307	0.299	0.297	0.311	0.312
	Linear Classifier	0.299	0.306	0.305	0.317	0.298	0.274	0.314	0.314	0.312	0.316
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.076	0.000	0.000	0.257	0.045	0.007	0.051	0.000
	Support Vector Machine	0.308	0.307	0.303	0.315	0.293	0.316	0.316	0.290	0.322	0.300
	AdaBoost	0.002	0.000	0.134	0.001	0.018	0.280	0.053	0.001	0.000	0.001
	Bagging	0.315	0.329	0.313	0.323	0.293	0.297	0.313	0.306	0.324	0.304
Exactly2	KNN	0.213	0.217	0.232	0.230	0.229	0.238	0.229	0.225	0.228	0.224
	Naive Bayes	0.231	0.232	0.236	0.233	0.250	0.254	0.233	0.241	0.244	0.246
	Decision Tree	0.231	0.227	0.241	0.220	0.249	0.243	0.230	0.224	0.228	0.224
	Logistic Regression	0.248	0.242	0.236	0.226	0.257	0.248	0.232	0.246	0.241	0.242
	Linear Classifier	0.240	0.242	0.249	0.243	0.237	0.240	0.242	0.236	0.239	0.242
	Artificial Neural Networks/Deep Learning	0.000	0.146	0.211	0.000	0.000	0.227	0.162	0.003	0.199	0.019
	Support Vector Machine	0.238	0.237	0.236	0.245	0.246	0.238	0.249	0.249	0.238	0.249
	AdaBoost	0.204	0.206	0.229	0.205	0.236	0.247	0.221	0.212	0.223	0.208
	Bagging	0.253	0.253	0.239	0.239	0.237	0.257	0.253	0.242	0.251	0.246

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
BreastCan	KNN	0.016	0.014	0.021	0.015	0.016	0.015	0.024	0.016	0.015	0.018
	Naive Bayes	0.019	0.025	0.025	0.020	0.020	0.019	0.023	0.019	0.022	0.022
	Decision Tree	0.019	0.020	0.019	0.037	0.029	0.017	0.019	0.033	0.020	0.023
	Logistic Regression	0.019	0.019	0.023	0.016	0.027	0.019	0.245	0.023	0.020	0.019
	Linear Classifier	0.018	0.016	0.024	0.021	0.025	0.017	0.017	0.019	0.011	0.019
	Artificial Neural Networks/Deep Learning	0.014	0.007	0.012	0.010	0.008	0.011	0.007	0.012	0.006	0.007
	Support Vector Machine	0.014	0.022	0.018	0.014	0.019	0.019	0.017	0.012	0.020	0.019
	AdaBoost	0.022	0.012	0.030	0.019	0.024	0.016	0.012	0.022	0.020	0.019
	Bagging	0.026	0.006	0.027	0.026	0.025	0.026	0.015	0.026	0.022	0.026
BreastEW	KNN	0.036	0.036	0.044	0.038	0.034	0.038	0.025	0.042	0.028	0.035
	Naive Bayes	0.019	0.026	0.020	0.011	0.033	0.014	0.017	0.019	0.014	0.014
	Decision Tree	0.024	0.014	0.020	0.024	0.025	0.020	0.019	0.021	0.019	0.017
	Logistic Regression	0.026	0.024	0.021	0.016	0.018	0.019	0.159	0.212	0.017	0.019
	Linear Classifier	0.015	0.012	0.019	0.026	0.015	0.016	0.018	0.028	0.016	0.017
	Artificial Neural Networks/Deep Learning	0.009	0.004	0.005	0.006	0.006	0.006	0.006	0.006	0.004	0.008
	Support Vector Machine	0.014	0.012	0.019	0.019	0.013	0.022	0.014	0.006	0.013	0.018
	AdaBoost	0.008	0.004	0.009	0.009	0.012	0.011	0.013	0.010	0.006	0.019
	Bagging	0.035	0.028	0.012	0.039	0.059	0.032	0.019	0.031	0.027	0.027
CongressEW	KNN	0.022	0.018	0.026	0.026	0.023	0.017	0.020	0.025	0.022	0.020
	Naive Bayes	0.045	0.045	0.033	0.032	0.026	0.031	0.028	0.026	0.027	0.024
	Decision Tree	0.024	0.024	0.028	0.026	0.026	0.020	0.019	0.023	0.033	0.021
	Logistic Regression	0.023	0.023	0.026	0.028	0.023	0.021	0.020	0.034	0.020	0.023
	Linear Classifier	0.028	0.028	0.052	0.028	0.030	0.029	0.037	0.027	0.022	0.043
	Artificial Neural Networks/Deep Learning	0.022	0.022	0.007	0.017	0.012	0.013	0.012	0.013	0.009	0.006
	Support Vector Machine	0.040	0.040	0.028	0.031	0.030	0.026	0.038	0.013	0.027	0.038
	AdaBoost	0.021	0.021	0.023	0.015	0.015	0.014	0.022	0.016	0.013	0.026
	Bagging	0.049	0.049	0.022	0.024	0.029	0.027	0.024	0.041	0.031	0.036
Exactly	KNN	0.000	0.000	0.056	0.057	0.001	0.010	0.020	0.052	0.003	0.001
	Naive Bayes	0.315	0.314	0.319	0.321	0.002	0.321	0.310	0.311	0.313	0.311
	Decision Tree	0.000	0.000	0.105	0.036	0.000	0.006	0.017	0.047	0.002	0.000
	Logistic Regression	0.307	0.306	0.306	0.304	0.309	0.304	0.310	0.305	0.302	0.308
	Linear Classifier	0.330	0.336	0.293	0.302	0.308	0.325	0.316	0.311	0.308	0.309
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Support Vector Machine	0.312	0.311	0.316	0.303	0.303	0.316	0.305	0.000	0.282	0.302
	AdaBoost	0.000	0.000	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.311
	Bagging	0.314	0.317	0.295	0.339	0.316	0.312	0.124	0.317	0.308	0.303
Exactly2	KNN	0.217	0.210	0.236	0.215	0.215	0.215	0.210	0.229	0.215	0.214
	Naive Bayes	0.236	0.225	0.247	0.238	0.213	0.235	0.239	0.252	0.244	0.243
	Decision Tree	0.225	0.205	0.220	0.239	0.222	0.223	0.214	0.239	0.200	0.216
	Logistic Regression	0.245	0.235	0.234	0.242	0.240	0.235	0.245	0.236	0.239	0.245
	Linear Classifier	0.238	0.252	0.249	0.237	0.252	0.238	0.234	0.252	0.249	0.255
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.128	0.000	0.000	0.000	0.208	0.000	0.000	0.000
	Support Vector Machine	0.251	0.241	0.246	0.229	0.237	0.246	0.243	0.000	0.243	0.237
	AdaBoost	0.194	0.187	0.224	0.207	0.199	0.201	0.203	0.208	0.205	0.252
	Bagging	0.225	0.246	0.231	0.245	0.229	0.243	0.238	0.243	0.241	0.253

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
HeartEW	KNN	0.136	0.119	0.181	0.150	0.131	0.155	0.129	0.121	0.116	0.120
	Naive Bayes	0.117	0.100	0.154	0.143	0.115	0.146	0.130	0.102	0.111	0.146
	Decision Tree	0.126	0.113	0.159	0.124	0.135	0.145	0.121	0.117	0.110	0.126
	Logistic Regression	0.100	0.085	0.119	0.081	0.087	0.111	0.119	0.102	0.082	0.093
	Linear Classifier	0.106	0.093	0.141	0.080	0.124	0.144	0.111	0.111	0.101	0.097
	Artificial Neural Networks/Deep Learning	0.111	0.102	0.100	0.100	0.124	0.124	0.093	0.330	0.081	0.096
	Support Vector Machine	0.130	0.096	0.119	0.106	0.094	0.150	0.098	0.111	0.083	0.100
	AdaBoost	0.096	0.104	0.172	0.133	0.135	0.167	0.144	0.119	0.119	0.133
	Bagging	0.104	0.085	0.106	0.087	0.074	0.120	0.102	0.167	0.093	0.070
ionosphere	KNN	0.062	0.072	0.106	0.066	0.048	0.056	0.068	0.046	0.036	0.046
	Naive Bayes	0.041	0.024	0.064	0.044	0.046	0.047	0.039	0.034	0.030	0.043
	Decision Tree	0.037	0.031	0.049	0.034	0.029	0.042	0.047	0.038	0.019	0.039
	Logistic Regression	0.056	0.054	0.101	0.070	0.086	0.099	0.074	0.071	0.060	0.070
	Linear Classifier	0.073	0.037	0.100	0.066	0.071	0.037	0.064	0.054	0.052	0.058
	Artificial Neural Networks/Deep Learning	0.023	0.011	0.024	0.011	0.023	0.019	0.021	0.079	0.016	0.009
	Support Vector Machine	0.063	0.061	0.082	0.053	0.070	0.070	0.083	0.060	0.053	0.039
	AdaBoost	0.027	0.010	0.044	0.024	0.017	0.034	0.024	0.024	0.026	0.029
	Bagging	0.040	0.041	0.047	0.031	0.034	0.054	0.031	0.066	0.034	0.034
KrVsKpEW	KNN	0.026	0.018	0.060	0.024	0.031	0.125	0.030	0.025	0.024	0.026
	Naive Bayes	0.187	0.171	0.211	0.202	0.233	0.210	0.185	0.177	0.173	0.170
	Decision Tree	0.005	0.007	0.034	0.005	0.007	0.096	0.011	0.007	0.010	0.005
	Logistic Regression	0.040	0.041	0.051	0.038	0.037	0.141	0.043	0.040	0.042	0.040
	Linear Classifier	0.042	0.040	0.055	0.039	0.042	0.106	0.048	0.045	0.040	0.043
	Artificial Neural Networks/Deep Learning	0.004	0.011	0.034	0.005	0.006	0.112	0.022	0.033	0.013	0.003
	Support Vector Machine	0.043	0.040	0.055	0.035	0.038	0.145	0.048	0.043	0.043	0.046
	AdaBoost	0.002	0.007	0.032	0.001	0.002	0.130	0.012	0.003	0.009	0.002
	Bagging	0.051	0.057	0.057	0.050	0.054	0.153	0.051	0.086	0.053	0.044
Lymphography	KNN	0.088	0.070	0.142	0.094	0.106	0.117	0.108	0.110	0.070	0.081
	Naive Bayes	0.169	0.183	0.197	0.131	0.186	0.159	0.097	0.076	0.079	0.100
	Decision Tree	0.090	0.079	0.141	0.107	0.086	0.114	0.108	0.070	0.076	0.114
	Logistic Regression	0.103	0.072	0.138	0.076	0.110	0.148	0.124	0.083	0.079	0.097
	Linear Classifier	0.083	0.069	0.124	0.072	0.069	0.107	0.076	0.083	0.069	0.086
	Artificial Neural Networks/Deep Learning	0.059	0.028	0.066	0.045	0.059	0.103	0.066	0.138	0.045	0.034
	Support Vector Machine	0.065	0.054	0.110	0.081	0.081	0.114	0.097	0.062	0.055	0.062
	AdaBoost	0.069	0.045	0.093	0.041	0.066	0.100	0.066	0.062	0.038	0.079
	Bagging	0.072	0.097	0.103	0.090	0.121	0.103	0.076	0.138	0.048	0.072
M-of-n	KNN	0.021	0.003	0.135	0.038	0.024	0.171	0.012	0.013	0.000	0.013
	Naive Bayes	0.134	0.128	0.170	0.156	0.153	0.201	0.145	0.145	0.133	0.150
	Decision Tree	0.000	0.000	0.103	0.000	0.000	0.163	0.016	0.000	0.000	0.000
	Logistic Regression	0.000	0.000	0.117	0.000	0.000	0.168	0.015	0.000	0.000	0.000
	Linear Classifier	0.000	0.000	0.083	0.000	0.000	0.162	0.022	0.000	0.000	0.000
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.063	0.000	0.000	0.158	0.012	0.000	0.000	0.000
	Support Vector Machine	0.000	0.000	0.080	0.000	0.000	0.169	0.079	0.000	0.000	0.000
	AdaBoost	0.000	0.000	0.082	0.000	0.000	0.134	0.011	0.000	0.000	0.000
	Bagging	0.122	0.124	0.141	0.118	0.143	0.185	0.123	0.169	0.110	0.116

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
HeartEW	KNN	0.141	0.112	0.137	0.127	0.107	0.115	0.107	0.120	0.119	0.110
	Naive Bayes	0.093	0.113	0.119	0.121	0.130	0.102	0.120	0.109	0.106	0.107
	Decision Tree	0.117	0.111	0.122	0.115	0.124	0.117	0.089	0.135	0.104	0.111
	Logistic Regression	0.106	0.096	0.096	0.120	0.078	0.083	0.074	0.107	0.093	0.091
	Linear Classifier	0.096	0.083	0.091	0.098	0.083	0.113	0.100	0.109	0.098	0.083
	Artificial Neural Networks/Deep Learning	0.085	0.080	0.093	0.087	0.083	0.065	0.074	0.080	0.098	0.087
	Support Vector Machine	0.083	0.018	0.091	0.102	0.098	0.122	0.111	0.080	0.083	0.102
	AdaBoost	0.135	0.100	0.156	0.207	0.111	0.124	0.111	0.128	0.119	0.109
	Bagging	0.113	0.087	0.111	0.087	0.098	0.109	0.072	0.109	0.111	0.104
ionosphere	KNN	0.060	0.049	0.072	0.059	0.038	0.043	0.055	0.048	0.035	0.039
	Naive Bayes	0.041	0.093	0.033	0.037	0.051	0.046	0.030	0.039	0.024	0.024
	Decision Tree	0.037	0.017	0.037	0.034	0.029	0.026	0.031	0.031	0.020	0.024
	Logistic Regression	0.086	0.037	0.063	0.060	0.060	0.066	0.054	0.066	0.054	0.064
	Linear Classifier	0.053	0.043	0.073	0.053	0.040	0.057	0.050	0.059	0.060	0.051
	Artificial Neural Networks/Deep Learning	0.020	0.010	0.006	0.011	0.011	0.014	0.006	0.013	0.007	0.007
	Support Vector Machine	0.064	0.030	0.061	0.053	0.046	0.064	0.071	0.013	0.050	0.057
	AdaBoost	0.036	0.020	0.023	0.027	0.016	0.009	0.021	0.031	0.023	0.039
	Bagging	0.093	0.049	0.049	0.089	0.056	0.087	0.019	0.106	0.080	0.063
KrVsKpEW	KNN	0.028	0.010	0.024	0.023	0.014	0.021	0.026	0.025	0.021	0.016
	Naive Bayes	0.052	0.054	0.093	0.184	0.015	0.171	0.171	0.174	0.165	0.168
	Decision Tree	0.005	0.004	0.013	0.005	0.003	0.003	0.012	0.008	0.005	0.004
	Logistic Regression	0.038	0.033	0.038	0.039	0.036	0.036	0.042	0.040	0.036	0.036
	Linear Classifier	0.040	0.033	0.039	0.042	0.033	0.039	0.044	0.045	0.036	0.041
	Artificial Neural Networks/Deep Learning	0.003	0.006	0.016	0.003	0.003	0.007	0.015	0.009	0.003	0.006
	Support Vector Machine	0.044	0.032	0.043	0.039	0.039	0.036	0.045	0.009	0.042	0.042
	AdaBoost	0.002	0.001	0.011	0.001	0.002	0.003	0.010	0.003	0.002	0.174
	Bagging	0.054	0.049	0.178	0.053	0.047	0.063	0.024	0.050	0.050	0.053
Lymphography	KNN	0.091	0.072	0.091	0.081	0.079	0.090	0.074	0.088	0.062	0.083
	Naive Bayes	0.128	0.034	0.182	0.090	0.152	0.097	0.069	0.086	0.052	0.059
	Decision Tree	0.069	0.069	0.086	0.100	0.083	0.069	0.086	0.121	0.066	0.076
	Logistic Regression	0.069	0.076	0.093	0.107	0.090	0.069	0.117	0.086	0.069	0.083
	Linear Classifier	0.076	0.024	0.083	0.066	0.045	0.062	0.093	0.076	0.072	0.055
	Artificial Neural Networks/Deep Learning	0.059	0.031	0.038	0.034	0.038	0.041	0.034	0.038	0.045	0.038
	Support Vector Machine	0.072	0.028	0.072	0.019	0.097	0.066	0.052	0.083	0.076	0.066
	AdaBoost	0.034	0.024	0.072	0.069	0.066	0.038	0.041	0.072	0.048	0.052
	Bagging	0.124	0.131	0.134	0.120	0.134	0.093	0.059	0.117	0.093	0.097
M-of-n	KNN	0.000	0.000	0.000	0.009	0.000	0.002	0.000	0.011	0.001	0.002
	Naive Bayes	0.218	0.189	0.241	0.139	0.000	0.134	0.119	0.158	0.142	0.136
	Decision Tree	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Logistic Regression	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Linear Classifier	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Support Vector Machine	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	AdaBoost	0.000	0.000	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.158
	Bagging	0.189	0.176	0.148	0.196	0.177	0.198	0.000	0.182	0.199	0.201

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
PenglungEW	KNN	0.066	0.074	0.143	0.094	0.020	0.037	0.086	0.069	0.023	0.049
	Naive Bayes	0.050	0.071	0.071	0.029	0.071	0.050	0.114	0.050	0.036	0.114
	Decision Tree	0.107	0.164	0.264	0.179	0.114	0.111	0.186	0.149	0.034	0.103
	Logistic Regression	0.057	0.193	0.114	0.093	0.021	0.021	0.079	0.050	0.000	0.000
	Linear Classifier	0.050	0.086	0.086	0.071	0.036	0.007	0.071	0.093	0.007	0.021
	Artificial Neural Networks/Deep Learning	0.021	0.036	0.021	0.029	0.036	0.000	0.057	0.429	0.036	0.014
	Support Vector Machine	0.051	0.086	0.103	0.040	0.020	0.050	0.093	0.036	0.014	0.057
	AdaBoost	0.021	0.007	0.100	0.029	0.021	0.021	0.036	0.050	0.007	0.007
	Bagging	0.193	0.193	0.264	0.179	0.200	0.200	0.214	0.321	0.114	0.193
Sonar	KNN	0.090	0.040	0.128	0.077	0.061	0.083	0.088	0.067	0.033	0.062
	Naive Bayes	0.105	0.056	0.161	0.127	0.095	0.093	0.098	0.061	0.068	0.080
	Decision Tree	0.117	0.085	0.212	0.117	0.076	0.094	0.113	0.085	0.063	0.097
	Logistic Regression	0.127	0.107	0.176	0.110	0.124	0.124	0.141	0.132	0.100	0.120
	Linear Classifier	0.107	0.107	0.154	0.122	0.115	0.089	0.124	0.109	0.089	0.125
	Artificial Neural Networks/Deep Learning	0.073	0.054	0.051	0.041	0.076	0.059	0.078	0.210	0.044	0.041
	Support Vector Machine	0.112	0.095	0.168	0.141	0.110	0.137	0.122	0.122	0.078	0.102
	AdaBoost	0.039	0.024	0.090	0.037	0.051	0.034	0.029	0.041	0.032	0.029
	Bagging	0.110	0.088	0.110	0.110	0.088	0.102	0.110	0.163	0.049	0.078
SpectEW	KNN	0.117	0.112	0.162	0.113	0.123	0.143	0.121	0.106	0.104	0.109
	Naive Bayes	0.168	0.140	0.204	0.168	0.149	0.177	0.187	0.125	0.175	0.134
	Decision Tree	0.109	0.108	0.121	0.115	0.109	0.109	0.100	0.093	0.100	0.086
	Logistic Regression	0.128	0.094	0.153	0.119	0.109	0.123	0.096	0.109	0.092	0.098
	Linear Classifier	0.125	0.108	0.145	0.108	0.117	0.116	0.111	0.097	0.118	0.106
	Artificial Neural Networks/Deep Learning	0.092	0.096	0.113	0.089	0.104	0.113	0.096	0.130	0.096	0.066
	Support Vector Machine	0.128	0.110	0.121	0.104	0.100	0.215	0.130	0.121	0.102	0.109
	AdaBoost	0.104	0.074	0.138	0.096	0.125	0.130	0.096	0.094	0.079	0.092
	Bagging	0.175	0.215	0.206	0.194	0.234	0.221	0.226	0.208	0.196	0.189
Tic-tac-toe	KNN	0.156	0.162	0.208	0.162	0.164	0.223	0.172	0.160	0.163	0.167
	Naive Bayes	0.276	0.252	0.282	0.267	0.294	0.291	0.293	0.268	0.272	0.271
	Decision Tree	0.134	0.140	0.164	0.135	0.128	0.225	0.136	0.129	0.123	0.130
	Logistic Regression	0.304	0.316	0.316	0.302	0.303	0.336	0.298	0.329	0.308	0.281
	Linear Classifier	0.327	0.350	0.350	0.345	0.371	0.203	0.345	0.346	0.341	0.355
	Artificial Neural Networks/Deep Learning	0.012	0.045	0.134	0.023	0.045	0.202	0.060	0.197	0.050	0.006
	Support Vector Machine	0.337	0.339	0.320	0.346	0.329	0.335	0.336	0.352	0.343	0.351
	AdaBoost	0.000	0.000	0.098	0.000	0.000	0.191	0.014	0.000	0.000	0.000
	Bagging	0.217	0.240	0.240	0.240	0.247	0.259	0.215	0.287	0.237	0.242
Vote	KNN	0.027	0.021	0.043	0.032	0.030	0.035	0.027	0.019	0.021	0.095
	Naive Bayes	0.040	0.022	0.063	0.045	0.042	0.035	0.028	0.035	0.027	0.033
	Decision Tree	0.027	0.032	0.042	0.028	0.023	0.037	0.032	0.030	0.024	0.029
	Logistic Regression	0.023	0.020	0.047	0.033	0.028	0.042	0.028	0.027	0.017	0.030
	Linear Classifier	0.010	0.022	0.047	0.025	0.027	0.033	0.033	0.033	0.033	0.033
	Artificial Neural Networks/Deep Learning	0.013	0.010	0.022	0.018	0.023	0.027	0.013	0.052	0.017	0.020
	Support Vector Machine	0.030	0.027	0.047	0.032	0.048	0.052	0.035	0.027	0.033	0.033
	AdaBoost	0.033	0.015	0.047	0.022	0.028	0.030	0.028	0.020	0.010	0.018
	Bagging	0.030	0.015	0.025	0.025	0.027	0.028	0.032	0.053	0.020	0.015

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
PenglungEW	KNN	0.034	0.080	0.107	0.083	0.023	0.077	0.049	0.037	0.037	0.057
	Naive Bayes	0.023	0.036	0.063	0.079	0.014	0.097	0.021	0.021	0.021	0.036
	Decision Tree	0.114	0.071	0.157	0.164	0.079	0.114	0.079	0.100	0.079	0.143
	Logistic Regression	0.007	0.136	0.143	0.079	0.000	0.000	0.062	0.043	0.007	0.043
	Linear Classifier	0.043	0.043	0.079	0.086	0.007	0.043	0.059	0.050	0.000	0.007
	Artificial Neural Networks/Deep Learning	0.021	0.014	0.029	0.029	0.014	0.021	0.014	0.014	0.014	0.007
	Support Vector Machine	0.029	0.029	0.057	0.064	0.371	0.014	0.036	0.036	0.014	0.036
	AdaBoost	0.021	0.000	0.021	0.021	0.029	0.029	0.014	0.029	0.000	0.007
	Bagging	0.329	0.279	0.343	0.374	0.314	0.364	0.064	0.357	0.293	0.314
Sonar	KNN	0.058	0.025	0.077	0.076	0.039	0.052	0.060	0.042	0.031	0.040
	Naive Bayes	0.148	0.139	0.097	0.068	0.024	0.068	0.095	0.080	0.068	0.054
	Decision Tree	0.095	0.059	0.059	0.102	0.056	0.066	0.076	0.078	0.063	0.044
	Logistic Regression	0.149	0.095	0.112	0.107	0.088	0.117	0.105	0.088	0.112	0.080
	Linear Classifier	0.117	0.063	0.105	0.098	0.093	0.098	0.102	0.102	0.080	0.080
	Artificial Neural Networks/Deep Learning	0.080	0.041	0.046	0.039	0.034	0.044	0.027	0.034	0.037	0.041
	Support Vector Machine	0.098	0.061	0.102	0.105	0.080	0.122	0.117	0.034	0.085	0.085
	AdaBoost	0.037	0.005	0.029	0.020	0.010	0.027	0.039	0.017	0.012	0.080
	Bagging	0.139	0.112	0.080	0.127	0.090	0.110	0.049	0.127	0.144	0.115
SpectEW	KNN	0.124	0.081	0.134	0.122	0.094	0.105	0.102	0.097	0.090	0.090
	Naive Bayes	0.198	0.200	0.164	0.113	0.100	0.143	0.177	0.162	0.145	0.113
	Decision Tree	0.102	0.081	0.091	0.092	0.096	0.111	0.079	0.111	0.092	0.087
	Logistic Regression	0.125	0.091	0.085	0.121	0.098	0.089	0.111	0.108	0.106	0.077
	Linear Classifier	0.121	0.094	0.109	0.108	0.108	0.096	0.102	0.104	0.119	0.108
	Artificial Neural Networks/Deep Learning	0.119	0.074	0.104	0.077	0.091	0.100	0.094	0.083	0.075	0.085
	Support Vector Machine	0.106	0.081	0.119	0.111	0.111	0.115	0.106	0.083	0.108	0.094
	AdaBoost	0.092	0.068	0.102	0.083	0.098	0.102	0.087	0.087	0.085	0.162
	Bagging	0.200	0.208	0.140	0.217	0.198	0.183	0.096	0.211	0.211	0.208
Tic-tac-toe	KNN	0.165	0.154	0.184	0.164	0.160	0.163	0.160	0.166	0.160	0.155
	Naive Bayes	0.268	0.347	0.266	0.274	0.155	0.293	0.273	0.299	0.270	0.287
	Decision Tree	0.123	0.129	0.128	0.130	0.124	0.119	0.126	0.133	0.129	0.134
	Logistic Regression	0.306	0.311	0.300	0.303	0.287	0.310	0.308	0.316	0.302	0.312
	Linear Classifier	0.366	0.352	0.339	0.358	0.365	0.360	0.339	0.364	0.345	0.346
	Artificial Neural Networks/Deep Learning	0.026	0.020	0.069	0.013	0.012	0.013	0.075	0.039	0.006	0.027
	Support Vector Machine	0.352	0.351	0.345	0.347	0.341	0.350	0.343	0.039	0.351	0.339
	AdaBoost	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.299
	Bagging	0.347	0.351	0.297	0.366	0.347	0.338	0.117	0.357	0.359	0.336
Vote	KNN	0.026	0.010	0.033	0.027	0.019	0.027	0.017	0.026	0.022	0.015
	Naive Bayes	0.035	0.028	0.023	0.037	0.012	0.035	0.037	0.033	0.030	0.042
	Decision Tree	0.037	0.022	0.032	0.028	0.033	0.025	0.027	0.037	0.025	0.038
	Logistic Regression	0.022	0.010	0.035	0.030	0.027	0.012	0.028	0.028	0.025	0.032
	Linear Classifier	0.030	0.022	0.037	0.023	0.023	0.030	0.032	0.030	0.025	0.027
	Artificial Neural Networks/Deep Learning	0.017	0.005	0.013	0.007	0.012	0.012	0.015	0.013	0.013	0.008
	Support Vector Machine	0.032	0.020	0.055	0.032	0.018	0.017	0.030	0.013	0.043	0.018
	AdaBoost	0.030	0.012	0.010	0.025	0.012	0.030	0.020	0.035	0.018	0.033
	Bagging	0.028	0.020	0.045	0.043	0.040	0.025	0.022	0.027	0.025	0.033

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
WaveformEW	KNN	0.163	0.156	0.194	0.160	0.152	0.201	0.165	0.156	0.158	0.157
	Naive Bayes	0.175	0.165	0.182	0.178	0.172	0.203	0.171	0.174	0.163	0.171
	Decision Tree	0.227	0.214	0.250	0.227	0.218	0.260	0.227	0.155	0.222	0.220
	Logistic Regression	0.128	0.131	0.155	0.125	0.125	0.161	0.133	0.127	0.130	0.125
	Linear Classifier	0.128	0.125	0.149	0.123	0.124	0.157	0.139	0.124	0.129	0.130
	Artificial Neural Networks/Deep Learning	0.126	0.128	0.149	0.149	0.126	0.168	0.132	0.156	0.133	0.126
	Support Vector Machine	0.128	0.122	0.151	0.123	0.129	0.170	0.131	0.128	0.131	0.127
	AdaBoost	0.157	0.150	0.175	0.152	0.156	0.211	0.166	0.157	0.151	0.153
	Bagging	0.181	0.183	0.204	0.190	0.186	0.238	0.186	0.224	0.189	0.177
Wine	KNN	0.016	0.017	0.054	0.021	0.040	0.038	0.014	0.021	0.017	0.021
	Naive Bayes	0.003	0.003	0.003	0.000	0.006	0.006	0.000	0.000	0.000	0.000
	Decision Tree	0.014	0.009	0.043	0.020	0.023	0.024	0.014	0.014	0.009	0.017
	Logistic Regression	0.014	0.014	0.029	0.006	0.003	0.031	0.014	0.003	0.006	0.011
	Linear Classifier	0.017	0.000	0.031	0.009	0.031	0.029	0.020	0.009	0.006	0.003
	Artificial Neural Networks/Deep Learning	0.006	0.000	0.000	0.003	0.000	0.009	0.000	0.354	0.000	0.000
	Support Vector Machine	0.000	0.000	0.011	0.003	0.005	0.016	0.006	0.003	0.003	0.007
	AdaBoost	0.006	0.006	0.023	0.011	0.023	0.023	0.011	0.009	0.006	0.006
	Bagging	0.000	0.000	0.003	0.003	0.000	0.006	0.000	0.020	0.000	0.003
Zoo_data	KNN	0.040	0.024	0.070	0.040	0.036	0.052	0.030	0.036	0.018	0.028
	Naive Bayes	0.070	0.040	0.100	0.070	0.070	0.225	0.055	0.065	0.050	0.055
	Decision Tree	0.010	0.020	0.065	0.015	0.035	0.026	0.028	0.014	0.010	0.010
	Logistic Regression	0.055	0.045	0.050	0.025	0.030	0.085	0.040	0.030	0.045	0.030
	Linear Classifier	0.010	0.000	0.015	0.010	0.010	0.035	0.030	0.010	0.000	0.025
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.005	0.000	0.000	0.010	0.005	0.060	0.000	0.000
	Support Vector Machine	0.020	0.004	0.024	0.005	0.004	0.040	0.020	0.000	0.000	0.002
	AdaBoost	0.015	0.005	0.020	0.000	0.035	0.025	0.010	0.005	0.005	0.005
	Bagging	0.070	0.090	0.060	0.060	0.045	0.125	0.055	0.160	0.085	0.055

TABLE VIII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
WaveformEW	KNN	0.175	0.147	0.162	0.163	0.154	0.157	0.166	0.159	0.156	0.144
	Naive Bayes	0.226	0.163	0.153	0.167	0.159	0.164	0.167	0.172	0.165	0.159
	Decision Tree	0.230	0.208	0.215	0.221	0.210	0.219	0.093	0.223	0.213	0.204
	Logistic Regression	0.129	0.121	0.128	0.126	0.126	0.129	0.062	0.131	0.126	0.121
	Linear Classifier	0.126	0.119	0.125	0.126	0.119	0.123	0.059	0.127	0.121	0.117
	Artificial Neural Networks/Deep Learning	0.130	0.121	0.140	0.128	0.129	0.128	0.138	0.125	0.124	0.127
	Support Vector Machine	0.122	0.119	0.125	0.128	0.207	0.123	0.131	0.126	0.122	0.121
	AdaBoost	0.151	0.150	0.153	0.150	0.148	0.151	0.159	0.153	0.153	0.154
	Bagging	0.231	0.208	0.220	0.210	0.199	0.216	0.156	0.210	0.207	0.207
Wine	KNN	0.015	0.010	0.028	0.022	0.016	0.018	0.016	0.017	0.010	0.021
	Naive Bayes	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Decision Tree	0.009	0.003	0.014	0.011	0.009	0.009	0.069	0.023	0.006	0.017
	Logistic Regression	0.011	0.006	0.014	0.014	0.003	0.006	0.097	0.011	0.009	0.011
	Linear Classifier	0.003	0.003	0.009	0.017	0.009	0.009	0.045	0.014	0.006	0.000
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
	Support Vector Machine	0.003	0.000	0.006	0.003	0.000	0.003	0.000	0.003	0.000	0.003
	AdaBoost	0.003	0.000	0.006	0.006	0.000	0.006	0.003	0.014	0.000	0.000
	Bagging	0.006	0.000	0.009	0.001	0.000	0.003	0.000	0.003	0.000	0.000
Zoo	KNN	0.018	0.018	0.039	0.038	0.026	0.042	0.018	0.036	0.020	0.026
	Naive Bayes	0.066	0.055	0.075	0.065	0.030	0.055	0.055	0.070	0.060	0.065
	Decision Tree	0.010	0.000	0.010	0.010	0.010	0.010	0.072	0.005	0.025	0.005
	Logistic Regression	0.025	0.050	0.060	0.050	0.025	0.005	0.066	0.035	0.030	0.030
	Linear Classifier	0.000	0.000	0.005	0.005	0.000	0.005	0.069	0.000	0.010	0.005
	Artificial Neural Networks/Deep Learning	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000
	Support Vector Machine	0.000	0.005	0.010	0.000	0.180	0.005	0.000	0.005	0.000	0.005
	AdaBoost	0.000	0.000	0.010	0.005	0.000	0.000	0.000	0.000	0.000	0.000
	Bagging	0.180	0.165	0.130	0.140	0.165	0.175	0.000	0.140	0.160	0.170

TABLE IX: Standard deviation of the best fitness function values obtained 10 runs for different algorithms by using wrapper approach

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
BreastCancer_data	KNN	0.008	0.009	0.009	0.010	0.013	0.013	0.008	0.012	0.013	0.014
	Naive Bayes	0.006	0.007	0.014	0.012	0.012	0.008	0.010	0.011	0.011	0.012
	Decision Tree	0.009	0.010	0.014	0.010	0.014	0.012	0.013	0.012	0.009	0.012
	Logistic Regression	0.007	0.007	0.014	0.015	0.010	0.011	0.006	0.008	0.013	0.013
	Linear Classifier	0.009	0.009	0.009	0.012	0.014	0.012	0.012	0.009	0.008	0.014
	Artificial Neural Networks/Deep Learning	0.009	0.012	0.010	0.005	0.010	0.006	0.011	0.024	0.011	0.003
	Support Vector Machine	0.011	0.009	0.009	0.009	0.011	0.012	0.007	0.011	0.008	0.007
	Adaboost	0.008	0.011	0.011	0.007	0.011	0.009	0.009	0.012	0.008	0.008
	Bagging	0.012	0.015	0.015	0.006	0.011	0.015	0.009	0.019	0.011	0.008
BreastEW_data	KNN	0.017	0.014	0.017	0.013	0.015	0.014	0.019	0.015	0.011	0.013
	Naive Bayes	0.015	0.009	0.020	0.010	0.010	0.019	0.013	0.013	0.007	0.010
	Decision Tree	0.012	0.009	0.014	0.013	0.010	0.016	0.009	0.011	0.012	0.017
	Logistic Regression	0.008	0.009	0.014	0.013	0.015	0.025	0.015	0.013	0.013	0.016
	Linear Classifier	0.012	0.015	0.016	0.013	0.014	0.016	0.015	0.012	0.009	0.010
	Artificial Neural Networks/Deep Learning	0.009	0.005	0.0059	0.006	0.013	0.007	0.007	0.14	0.003	0.004
	Support Vector Machine	0.013	0.009	0.010	0.016	0.012	0.015	0.013	0.007	0.0059	0.012
	Adaboost	0.006	0.006	0.009	0.011	0.010	0.010	0.012	0.009	0.008	0.008
	Bagging	0.011	0.009	0.015	0.013	0.009	0.013	0.013	0.021	0.010	0.010
CongressEW_data	KNN	0.015	0.017	0.018	0.014	0.107	0.023	0.018	0.014	0.016	0.012
	Naive Bayes	0.008	0.015	0.021	0.027	0.017	0.018	0.015	0.020	0.011	0.019
	Decision Tree	0.012	0.017	0.010	0.014	0.012	0.022	0.015	0.014	0.019	0.013
	Logistic Regression	0.013	0.014	0.015	0.013	0.012	0.024	0.009	0.019	0.013	0.012
	Linear Classifier	0.009	0.020	0.022	0.010	0.014	0.017	0.021	0.018	0.016	0.016
	Artificial Neural Networks/Deep Learning	0.014	0.010	0.009	0.013	0.012	0.024	0.019	0.023	0.013	0.010
	Support Vector Machine	0.018	0.021	0.021	0.017	0.014	0.022	0.025	0.012	0.009	0.024
	Adaboost	0.013	0.010	0.015	0.016	0.015	0.027	0.012	0.012	0.010	0.015
	Bagging	0.015	0.020	0.013	0.013	0.014	0.048	0.023	0.021	0.016	0.014
Exactly_data	KNN	0.092	0.055	0.069	0.073	0.105	0.026	0.116	0.085	0.112	0.079
	Naive Bayes	0.047	0.037	0.039	0.039	0.029	0.0305	0.026	0.025	0.033	0.026
	Decision Tree	0.041	0.086	0.052	0.049	0.101	0.030	0.120	0.049	0.057	0.034
	Logistic Regression	0.028	0.017	0.040	0.021	0.023	0.020	0.021	0.031	0.030	0.038
	Linear Classifier	0.029	0.017	0.030	0.019	0.027	0.061	0.032	0.037	0.034	0.027
	Artificial Neural Networks/Deep Learning	0	0	0.119	0	0	0.095	0.094	0.013	0.107	0
	Support Vector Machine	0.026	0.030	0.029	0.025	0.026	0.024	0.036	0.027	0.038	0.023
	Adaboost	0.003	0	0.129	0.001	0.021	0.104	0.104	0.001	0	0.001
	Bagging	0.027	0.031	0.029	0.031	0.021	0.020	0.035	0.018	0.027	0.017
Exactly2_data	KNN	0.018	0.021	0.028	0.018	0.027	0.029	0.027	0.027	0.021	0.026
	Naive Bayes	0.026	0.024	0.031	0.017	0.029	0.031	0.030	0.034	0.018	0.029
	Decision Tree	0.033	0.030	0.022	0.014	0.023	0.024	0.021	0.019	0.019	0.021
	Logistic Regression	0.022	0.031	0.031	0.024	0.016	0.039	0.022	0.028	0.019	0.026
	Linear Classifier	0.029	0.033	0.026	0.023	0.031	0.025	0.029	0.029	0.026	0.032
	Artificial Neural Networks/Deep Learning	0	0.104	0.020	0	0	0.018	0.086	0.006	0.071	0.060
	Support Vector Machine	0.027	0.021	0.025	0.026	0.031	0.030	0.022	0.025	0.030	0.025
	Adaboost	0.015	0.023	0.025	0.020	0.027	0.020	0.032	0.029	0.017	0.027
	Bagging	0.022	0.025	0.023	0.017	0.024	0.025	0.023	0.030	0.022	0.029

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
BreastCancer_data	KNN	0.010	0.011	0.008	0.008	0.009	0.009	0.016	0.008	0.010	0.010
	Naive Bayes	0.011	0.011	0.009	0.012	0.007	0.011	0.009	0.006	0.009	0.011
	Decision Tree	0.011	0.011	0.010	0.018	0.013	0.011	0.010	0.014	0.012	0.011
	Logistic Regression	0.006	0.010	0.011	0.009	0.009	0.010	0.009	0.012	0.010	0.009
	Linear Classifier	0.011	0.009	0.009	0.012	0.013	0.013	0.012	0.007	0.006	0.015
	Artificial Neural Networks/Deep Learning	0.003	0.008	0.011	0.012	0.008	0.006	0.007	0.009	0.005	0.006
	Support Vector Machine	0.008	0.012	0.008	0.010	0.011	0.016	0.012	0.009	0.010	0.014
	Adaboost	0.011	0.007	0.017	0.011	0.012	0.013	0.010	0.010	0.010	0.006
	Bagging	0.012	0.007	0.007	0.012	0.008	0.014	0.012	0.009	0.010	0.010
BreastEW_data	KNN	0.012	0.013	0.010	0.018	0.013	0.015	0.023	0.013	0.015	0.016
	Naive Bayes	0.012	0.011	0.011	0.008	0.014	0.010	0.006	0.011	0.011	0.010
	Decision Tree	0.014	0.009	0.009	0.017	0.005	0.009	0.011	0.010	0.009	0.012
	Logistic Regression	0.009	0.009	0.010	0.012	0.013	0.012	0.137	0.012	0.010	0.007
	Linear Classifier	0.012	0.011	0.009	0.008	0.008	0.016	0.009	0.013	0.010	0.012
	Artificial Neural Networks/Deep Learning	0.007	0.006	0.006	0.004	0.007	0.005	0.007	0.004	0.006	0.008
	Support Vector Machine	0.012	0.009	0.010	0.016	0.010	0.015	0.012	0.004	0.012	0.010
	Adaboost	0.010	0.006	0.007	0.013	0.010	0.008	0.011	0.011	0.005	0.012
	Bagging	0.015	0.016	0.011	0.020	0.009	0.015	0.010	0.019	0.014	0.019
CongressEW_data	KNN	0.010	0.011	0.008	0.008	0.009	0.009	0.016	0.008	0.010	0.010
	Naive Bayes	0.011	0.011	0.009	0.012	0.007	0.011	0.009	0.006	0.009	0.011
	Decision Tree	0.011	0.011	0.010	0.018	0.013	0.011	0.010	0.014	0.012	0.011
	Logistic Regression	0.006	0.010	0.011	0.009	0.009	0.010	0.009	0.012	0.010	0.009
	Linear Classifier	0.011	0.009	0.009	0.012	0.013	0.013	0.012	0.007	0.006	0.015
	Artificial Neural Networks/Deep Learning	0.003	0.008	0.011	0.012	0.008	0.006	0.007	0.009	0.005	0.006
	Support Vector Machine	0.008	0.012	0.008	0.010	0.011	0.016	0.012	0.009	0.010	0.014
	Adaboost	0.011	0.007	0.017	0.011	0.012	0.013	0.010	0.010	0.010	0.006
	Bagging	0.012	0.007	0.007	0.012	0.008	0.014	0.012	0.009	0.010	0.010
Exactly_data	KNN	0.012	0.013	0.010	0.018	0.013	0.015	0.023	0.013	0.015	0.016
	Naive Bayes	0.012	0.011	0.011	0.008	0.014	0.010	0.006	0.011	0.011	0.010
	Decision Tree	0.014	0.009	0.009	0.017	0.005	0.009	0.011	0.010	0.009	0.012
	Logistic Regression	0.009	0.009	0.010	0.012	0.013	0.012	0.137	0.012	0.010	0.007
	Linear Classifier	0.012	0.011	0.009	0.008	0.008	0.016	0.009	0.013	0.010	0.012
	Artificial Neural Networks/Deep Learning	0.007	0.006	0.006	0.004	0.007	0.005	0.007	0.004	0.006	0.008
	Support Vector Machine	0.012	0.009	0.010	0.016	0.010	0.015	0.012	0.004	0.012	0.010
	Adaboost	0.010	0.006	0.007	0.013	0.010	0.008	0.011	0.011	0.005	0.012
	Bagging	0.015	0.016	0.011	0.020	0.009	0.015	0.010	0.019	0.014	0.019
Exactly2_data	KNN	0.022	0.020	0.018	0.027	0.029	0.019	0.020	0.022	0.018	0.023
	Naive Bayes	0.021	0.027	0.022	0.026	0.030	0.035	0.015	0.026	0.026	0.024
	Decision Tree	0.022	0.021	0.032	0.026	0.026	0.022	0.017	0.028	0.022	0.026
	Logistic Regression	0.018	0.020	0.017	0.036	0.030	0.033	0.035	0.019	0.029	0.024
	Linear Classifier	0.022	0.021	0.027	0.019	0.023	0.020	0.021	0.026	0.026	0.029
	Artificial Neural Networks/Deep Learning	0	0	0.111	0	0	0	0.016	0	0	0
	Support Vector Machine	0.036	0.012	0.019	0.018	0.030	0.036	0.018	0	0.027	0.029
	Adaboost	0.017	0.019	0.030	0.026	0.023	0.023	0.021	0.018	0.034	0.026
	Bagging	0.027	0.024	0.032	0.026	0.028	0.026	0.020	0.032	0.019	0.033

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
HeartEW_data	KNN	0.035	0.031	0.044	0.043	0.046	0.048	0.034	0.040	0.028	0.034
	Naive Bayes	0.029	0.030	0.062	0.045	0.047	0.039	0.028	0.035	0.023	0.027
	Decision Tree	0.035	0.043	0.040	0.029	0.028	0.054	0.033	0.039	0.024	0.032
	Logistic Regression	0.039	0.040	0.044	0.028	0.037	0.041	0.029	0.049	0.037	0.019
	Linear Classifier	0.026	0.036	0.029	0.037	0.033	0.044	0.034	0.032	0.033	0.031
	Artificial Neural Networks/Deep Learning	0.034	0.035	0.027	0.018	0.042	0.025	0.036	0.168	0.029	0.029
	Support Vector Machine	0.045	0.033	0.032	0.043	0.028	0.044	0.038	0.039	0.046	0.032
	Adaboost	0.026	0.028	0.039	0.023	0.035	0.038	0.026	0.035	0.044	0.036
	Bagging	0.033	0.029	0.036	0.032	0.030	0.028	0.037	0.055	0.026	0.034
ionosphere	KNN	0.027	0.026	0.036	0.027	0.023	0.027	0.029	0.022	0.020	0.017
	Naive Bayes	0.033	0.013	0.026	0.019	0.025	0.015	0.023	0.017	0.017	0.023
	Decision Tree	0.015	0.019	0.020	0.015	0.015	0.027	0.026	0.021	0.012	0.018
	Logistic Regression	0.031	0.024	0.029	0.029	0.024	0.042	0.028	0.022	0.023	0.036
	Linear Classifier	0.029	0.023	0.020	0.018	0.021	0.018	0.029	0.025	0.023	0.030
	Artificial Neural Networks/Deep Learning	0.014	0.011	0.015	0.013	0.009	0.012	0.010	0.030	0.014	0.009
	Support Vector Machine	0.032	0.025	0.017	0.024	0.027	0.023	0.023	0.024	0.023	0.023
	Adaboost	0.022	0.009	0.025	0.025	0.018	0.024	0.016	0.019	0.023	0.013
	Bagging	0.018	0.025	0.027	0.021	0.023	0.019	0.021	0.029	0.015	0.024
KrVsKpEW_data	KNN	0.005	0.006	0.016	0.005	0.007	0.064	0.011	0.007	0.005	0.009
	Naive Bayes	0.012	0.014	0.018	0.009	0.048	0.032	0.015	0.014	0.016	0.017
	Decision Tree	0.003	0.004	0.009	0.003	0.003	0.059	0.003	0.003	0.005	0.003
	Logistic Regression	0.007	0.003	0.005	0.008	0.007	0.073	0.008	0.006	0.007	0.006
	Linear Classifier	0.011	0.007	0.010	0.004	0.006	0.055	0.010	0.007	0.008	0.008
	Artificial Neural Networks/Deep Learning	0.003	0.005	0.012	0.003	0.003	0.064	0.009	0.012	0.006	0.002
	Support Vector Machine	0.008	0.009	0.008	0.005	0.008	0.069	0.010	0.011	0.009	0.014
	Adaboost	0.002	0.008	0.008	0.002	0.002	0.052	0.008	0.002	0.006	0.002
	Bagging	0.006	0.008	0.009	0.007	0.007	0.066	0.008	0.029	0.007	0.008
Lymphography_data	KNN	0.037	0.045	0.050	0.048	0.051	0.051	0.051	0.051	0.050	0.036
	Naive Bayes	0.064	0.054	0.061	0.064	0.063	0.078	0.045	0.045	0.049	0.066
	Decision Tree	0.052	0.043	0.038	0.038	0.052	0.045	0.049	0.045	0.043	0.028
	Logistic Regression	0.033	0.047	0.036	0.051	0.056	0.059	0.067	0.046	0.058	0.027
	Linear Classifier	0.037	0.033	0.061	0.038	0.036	0.075	0.039	0.037	0.044	0.044
	Artificial Neural Networks/Deep Learning	0.028	0.027	0.030	0.039	0.037	0.046	0.044	0.059	0.039	0.033
	Support Vector Machine	0.040	0.046	0.049	0.041	0.043	0.052	0.056	0.036	0.040	0.036
	Adaboost	0.043	0.028	0.046	0.036	0.037	0.037	0.044	0.042	0.030	0.037
	Bagging	0.049	0.051	0.051	0.049	0.059	0.028	0.045	0.067	0.033	0.059615
M-of-n_data	KNN	0.027	0.010	0.046	0.019	0.035	0.055	0.024	0.022	0	0.026
	Naive Bayes	0.025	0.017	0.042	0.028	0.024	0.038	0.021	0.018	0.011	0.022
	Decision Tree	0	0	0.073	0	0	0.034	0.043	0	0	0
	Logistic Regression	0	0	0.062	0	0	0.047	0.046	0	0	0
	Linear Classifier	0	0	0.074	0	0	0.056	0.052	0	0	0
	Artificial Neural Networks/Deep Learning	0	0	0.067	0	0	0.042	0.038	0	0	0
	Support Vector Machine	0	0	0.068	0	0	0.024	0.069	0	0	0
	Adaboost	0	0	0.071	0	0	0.055	0.033	0	0	0
	Bagging	0.030	0.022	0.024	0.019	0.030	0.047	0.027	0.038	0.013	0.025

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
HeartEW_data	KNN	0.038	0.032	0.032	0.037	0.032	0.037	0.037	0.038	0.036	0.036
	Naive Bayes	0.042	0.043	0.028	0.034	0.034	0.043	0.025	0.036	0.043	0.029
	Decision Tree	0.021	0.026	0.029	0.038	0.041	0.039	0.037	0.021	0.029	0.029
	Logistic Regression	0.028	0.034	0.027	0.040	0.037	0.034	0.026	0.042	0.035	0.025
	Linear Classifier	0.035	0.029	0.036	0.029	0.020	0.046	0.019	0.039	0.033	0.038
	Artificial Neural Networks/Deep Learning	0.032	0.026	0.039	0.033	0.036	0.040	0.033	0.033	0.023	0.033
	Support Vector Machine	0.038	0.009	0.053	0.034	0.028	0.038	0.041	0.033	0.048	0.041
	Adaboost	0.038	0.019	0.030	0.027	0.038	0.041	0.023	0.024	0.035	0.036
	Bagging	0.043	0.026	0.045	0.037	0.035	0.022	0.032	0.039	0.028	0.032
ionosphere	KNN	0.023	0.021	0.025	0.022	0.023	0.016	0.021	0.021	0.018	0.023
	Naive Bayes	0.023	0.039	0.016	0.022	0.026	0.019	0.017	0.023	0.018	0.017
	Decision Tree	0.009	0.013	0.029	0.015	0.016	0.019	0.028	0.026	0.012	0.012
	Logistic Regression	0.020	0.023	0.024	0.022	0.022	0.015	0.023	0.028	0.024	0.038
	Linear Classifier	0.019	0.015	0.019	0.014	0.013	0.022	0.026	0.025	0.016	0.029
	Artificial Neural Networks/Deep Learning	0.017	0.009	0.009	0.009	0.015	0.016	0.009	0.014	0.008	0.010
	Support Vector Machine	0.031	0.019	0.031	0.020	0.033	0.020	0.022	0.014	0.028	0.026
	Adaboost	0.013	0.012	0.015	0.016	0.018	0.007	0.015	0.018	0.017	0.022
	Bagging	0.039	0.030	0.019	0.026	0.021	0.038	0.013	0.022	0.033	0.024
KrVsKpEW_data	KNN	0.005	0.004	0.008	0.007	0.004	0.006	0.005	0.013	0.004	0.005
	Naive Bayes	0.008	0.009	0.017	0.019	0.004	0.015	0.019	0.019	0.013	0.018
	Decision Tree	0.002	0.003	0.006	0.003	0.002	0.002	0.004	0.003	0.003	0.003
	Logistic Regression	0.004	0.011	0.006	0.006	0.007	0.008	0.008	0.007	0.007	0.005
	Linear Classifier	0.008	0.006	0.012	0.005	0.007	0.007	0.005	0.011	0.007	0.005
	Artificial Neural Networks/Deep Learning	0.003	0.003	0.008	0.002	0.002	0.003	0.006	0.007	0.002	0.002
	Support Vector Machine	0.006	0.006	0.010	0.005	0.006	0.006	0.008	0.007	0.007	0.009
	Adaboost	0.001	0.001	0.009	0.001	0.001	0.001	0.005	0.002	0.002	0.019
	Bagging	0.009	0.009	0.011	0.007	0.008	0.014	0.004	0.010	0.006	0.009
Lymphography_data	KNN	0.045	0.049	0.040	0.041	0.045	0.054	0.041	0.053	0.039	0.042
	Naive Bayes	0.046	0.028	0.074	0.052	0.061	0.045	0.036	0.037	0.029	0.063
	Decision Tree	0.051	0.023	0.029	0.025	0.037	0.033	0.037	0.049	0.030	0.042
	Logistic Regression	0.036	0.053	0.043	0.053	0.037	0.046	0.037	0.057	0.046	0.047
	Linear Classifier	0.045	0.023	0.061	0.038	0.033	0.036	0.046	0.042	0.047	0.018
	Artificial Neural Networks/Deep Learning	0.023	0.030	0.025	0.023	0.030	0.036	0.054	0.034	0.033	0.030
	Support Vector Machine	0.044	0.036	0.038	0.019	0.039	0.047	0.037	0.044	0.048	0.038
	Adaboost	0.023	0.017	0.044	0.049	0.034	0.034	0.027	0.025	0.044	0.037
	Bagging	0.052	0.063	0.038	0.058	0.053	0.059	0.052	0.044	0.067	0.048
M-of-n_data	KNN	0	0	0	0.018	0	0.005	0.001	0.028	0.004	0.009
	Naive Bayes	0.026	0.034	0.021	0.017	0	0.025	0.029	0.017	0.015	0.032
	Decision Tree	0	0	0.043	0	0	0	0	0	0	0
	Logistic Regression	0	0	0	0	0	0	0	0	0	0
	Linear Classifier	0	0	0.067	0	0	0	0	0	0	0
	Artificial Neural Networks/Deep Learning	0	0	0.038	0	0	0	0	0	0	0
	Support Vector Machine	0	0	0.037	0	0	0	0	0	0	0
	Adaboost	0	0	0.065	0	0	0	0	0	0	0.017
	Bagging	0.034	0.022	0.021	0.023	0.031	0.018	0	0.029	0.019	0.014

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
PenglungEW_data	KNN	0.065	0.076	0.079	0.092	0.039	0.042	0.079	0.076	0.034	0.057
	Naive Bayes	0.048	0.067	0.048	0.049	0.067	0.059	0.069	0.048	0.069	0.069
	Decision Tree	0.061	0.048	0.083	0.061	0.077	0.072	0.071	0.087	0.047	0.051
	Logistic Regression	0.074	0.035	0.077	0.068	0.035	0.035	0.086	0.048	0	0
	Linear Classifier	0.076	0.074	0.081	0.048	0.051	0.023	0.089	0.048	0.023	0.035
	Artificial Neural Networks/Deep Learning	0.035	0.038	0.048	0.037	0.069	0	0.056	0.187	0.113	0.030
	Support Vector Machine	0.067	0.103	0.075	0.055	0.033	0.068	0.083	0.038	0.045	0.066
	Adaboost	0.035	0.023	0.049	0.049	0.035	0.035	0.051	0.076	0.023	0.023
	Bagging	0.143	0.096	0.112	0.108	0.134	0.138	0.1468	0.118	0.077	0.107
Sonar_data	KNN	0.034	0.029	0.039	0.041	0.035	0.034	0.029	0.028	0.027	0.032
	Naive Bayes	0.046	0.028	0.057	0.034	0.042	0.044	0.028	0.033	0.044	0.031
	Decision Tree	0.029	0.029	0.033	0.044	0.031	0.039	0.047	0.033	0.025	0.033
	Logistic Regression	0.041	0.050	0.047	0.037	0.031	0.049	0.052	0.040	0.043	0.042
	Linear Classifier	0.045	0.042	0.034	0.045	0.031	0.029	0.036	0.046	0.035	0.042
	Artificial Neural Networks/Deep Learning	0.033	0.025	0.021	0.026	0.031	0.029	0.025	0.062	0.028	0.039
	Support Vector Machine	0.037	0.032	0.044	0.044	0.035	0.026	0.039	0.033	0.049	0.028
	Adaboost	0.017	0.019	0.035	0.021	0.039	0.031	0.022	0.026	0.016	0.019
	Bagging	0.039	0.031	0.045	0.031	0.046	0.039	0.033	0.058	0.016	0.054
SpectEW_data	KNN	0.028	0.028	0.045	0.026	0.032	0.046	0.036	0.039	0.038	0.036
	Naive Bayes	0.067	0.054	0.038	0.074	0.073	0.054	0.042	0.051	0.081	0.042
	Decision Tree	0.034	0.033	0.034	0.029	0.054	0.042	0.034	0.038	0.033	0.035
	Logistic Regression	0.049	0.036	0.046	0.032	0.042	0.029	0.023	0.044	0.035	0.052
	Linear Classifier	0.044	0.039	0.049	0.049	0.035	0.039	0.042	0.025	0.040	0.029
	Artificial Neural Networks/Deep Learning	0.026	0.023	0.039	0.022	0.036	0.029	0.043	0.063	0.026	0.034
	Support Vector Machine	0.029	0.035	0.037	0.032	0.035	0.069	0.036	0.037	0.046	0.029
	Adaboost	0.049	0.034	0.033	0.030	0.047	0.051	0.036	0.027	0.025	0.034
	Bagging	0.036	0.060	0.042	0.050	0.044	0.049	0.043	0.041	0.029	0.053
Tic-tac-toe_data	KNN	0.023	0.016	0.034	0.019	0.022	0.042	0.024	0.021	0.026	0.019
	Naive Bayes	0.031	0.040	0.041	0.029	0.038	0.021	0.032	0.038	0.028	0.039
	Decision Tree	0.019	0.024	0.028	0.020	0.032	0.039	0.028	0.020	0.020	0.026
	Logistic Regression	0.031	0.043	0.036	0.037	0.025	0.034	0.021	0.044	0.031	0.031
	Linear Classifier	0.030	0.029	0.033	0.022	0.036	0.047	0.028	0.024	0.028	0.029
	Artificial Neural Networks/Deep Learning	0.004	0.041	0.033	0.012	0.026	0.033	0.044	0.041	0.026	0.005
	Support Vector Machine	0.029	0.026	0.018	0.034	0.034	0.039	0.027	0.024	0.029	0.011
	Adaboost	0	0	0.053	0	0	0.066	0.043	0	0	0
	Bagging	0.028	0.026	0.027	0.043	0.027	0.043	0.017	0.029	0.019	0.038

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
PenglungEW_data	KNN	0.042	0.063	0.078	0.079	0.039	0.058	0.049	0.042	0.077	0.055
	Naive Bayes	0.034	0.051	0.043	0.071	0.030	0.045	0.048	0.048	0.035	0.038
	Decision Tree	0.037	0.048	0.116	0.068	0.086	0.069	0.056	0.049	0.086	0.101
	Logistic Regression	0.023	0.079	0.067	0.109	0	0	0.039	0.049	0.023	0.060
	Linear Classifier	0.069	0.060	0.071	0.066	0.023	0.049	0.039	0.059	0	0.023
	Artificial Neural Networks/Deep Learning	0.035	0.045	0.049	0.049	0.030	0.035	0.030	0.045	0.030	0.023
	Support Vector Machine	0.037	0.049	0.056	0.053	0.111	0.030	0.077	0.038	0.030	0.038
	Adaboost	0.035	0	0.035	0.035	0.049	0.037	0.030	0.049	0	0.023
	Bagging	0.108	0.114	0.149	0.131	0.139	0.137	0.098	0.158	0.098	0.172
Sonar_data	KNN	0.028	0.027	0.036	0.043	0.025	0.034	0.032	0.025	0.021	0.026
	Naive Bayes	0.042	0.053	0.045	0.036	0.023	0.044	0.041	0.031	0.038	0.034
	Decision Tree	0.035	0.026	0.033	0.034	0.035	0.020	0.031	0.022	0.017	0.032
	Logistic Regression	0.035	0.035	0.043	0.052	0.054	0.041	0.020	0.043	0.040	0.055
	Linear Classifier	0.041	0.037	0.038	0.043	0.054	0.038	0.038	0.036	0.026	0.038
	Artificial Neural Networks/Deep Learning	0.033	0.035	0.021	0.024	0.021	0.022	0.018	0.035	0.013	0.020
	Support Vector Machine	0.028	0.024	0.034	0.023	0.031	0.043	0.057	0.035	0.040	0.037
	Adaboost	0.023	0.010	0.025	0.015	0.013	0.029	0.033	0.020	0.017	0.031
	Bagging	0.053	0.031	0.042	0.041	0.042	0.055	0.028	0.046	0.060	0.043
SpectEW_data	KNN	0.028	0.034	0.033	0.034	0.030	0.038	0.032	0.029	0.029	0.027
	Naive Bayes	0.053	0.044	0.057	0.029	0.029	0.070	0.068	0.049	0.062	0.058
	Decision Tree	0.037	0.031	0.033	0.034	0.035	0.026	0.025	0.021	0.038	0.028
	Logistic Regression	0.043	0.036	0.028	0.029	0.028	0.028	0.043	0.039	0.048	0.018
	Linear Classifier	0.028	0.018	0.043	0.027	0.048	0.029	0.038	0.029	0.031	0.026
	Artificial Neural Networks/Deep Learning	0.029	0.019	0.029	0.038	0.025	0.029	0.029	0.048	0.031	0.037
	Support Vector Machine	0.036	0.028	0.028	0.034	0.026	0.045	0.039	0.048	0.046	0.033
	Adaboost	0.030	0.022	0.034	0.028	0.017	0.029	0.032	0.032	0.028	0.049
	Bagging	0.044	0.032	0.078	0.046	0.047	0.041	0.026	0.038	0.057	0.049
Tic-tac-toe_data	KNN	0.021	0.022	0.018	0.026	0.017	0.019	0.017	0.025	0.192	0.018
	Naive Bayes	0.031	0.028	0.026	0.045	0.013	0.017	0.030	0.040	0.026	0.024
	Decision Tree	0.019	0.021	0.017	0.018	0.017	0.017	0.022	0.015	0.019	0.016
	Logistic Regression	0.041	0.029	0.020	0.027	0.017	0.032	0.037	0.024	0.039	0.021
	Linear Classifier	0.026	0.028	0.033	0.038	0.028	0.025	0.051	0.035	0.032	0.037
	Artificial Neural Networks/Deep Learning	0.016	0.010	0.047	0.008	0.015	0.009	0.029	0.033	0.007	0.017
	Support Vector Machine	0.025	0.031	0.031	0.025	0.028	0.019	0.028	0.033	0.019	0.030
	Adaboost	0	0	0.024	0	0	0	0	0	0	0.040
	Bagging	0.028	0.024	0.027	0.042	0.029	0.032	0.021	0.021	0.033	0.028

TABLE IX: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
Vote_data	KNN	0.023	0.018	0.019	0.025	0.022	0.027	0.017	0.017	0.016	0.039
	Naive Bayes	0.022	0.024	0.023	0.019	0.029	0.021	0.028	0.018	0.016	0.018
	Decision Tree	0.022	0.027	0.029	0.021	0.018	0.022	0.027	0.027	0.019	0.021
	Logistic Regression	0.019	0.013	0.020	0.017	0.014	0.026	0.019	0.011	0.013	0.025
	Linear Classifier	0.009	0.016	0.025	0.018	0.022	0.025	0.019	0.022	0.022	0.019
	Artificial Neural Networks/Deep Learning	0.013	0.009	0.016	0.017	0.014	0.026	0.011	0.040	0.021	0.025
	Support Vector Machine	0.023	0.019	0.020	0.018	0.024	0.022	0.028	0.018	0.021	0.024
	Adaboost	0.014	0.017	0.030	0.014	0.019	0.025	0.022	0.017	0.012	0.015
	Bagging	0.022	0.012	0.019	0.018	0.019	0.019	0.015	0.019	0.017	0.012
WaveformEW_data	KNN	0.009	0.009	0.012	0.008	0.010	0.019	0.009	0.009	0.008	0.008
	Naive Bayes	0.014	0.011	0.011	0.009	0.008	0.018	0.014	0.014	0.015	0.014
	Decision Tree	0.010	0.012	0.007	0.007	0.009	0.021	0.009	0.013	0.011	0.008
	Logistic Regression	0.007	0.009	0.006	0.009	0.010	0.008	0.006	0.008	0.009	0.012
	Linear Classifier	0.010	0.008	0.012	0.009	0.008	0.013	0.009	0.007	0.008	0.009
	Artificial Neural Networks/Deep Learning	0.007	0.009	0.007	0.007	0.011	0.021	0.012	0.011	0.008	0.007
	Support Vector Machine	0.008	0.009	0.009	0.012	0.009	0.025	0.012	0.008	0.007	0.009
	Adaboost	0.008	0.008	0.014	0.009	0.007	0.020	0.011	0.009	0.011	0.011
	Bagging	0.009	0.009	0.012	0.011	0.012	0.028	0.009	0.011	0.007	0.009
Wine_data	KNN	0.023	0.026	0.029	0.021	0.031	0.035	0.018	0.019	0.018	0.027
	Naive Bayes	0.009	0.009	0.009	0	0.012	0.012	0	0	0	0
	Decision Tree	0.015	0.014	0.039	0.024	0.018	0.024	0.020	0.020	0.014	0.025
	Logistic Regression	0.020	0.020	0.027	0.012	0.009	0.021	0.015	0.009	0.012	0.019
	Linear Classifier	0.019	0	0.025	0.014	0.028	0.019	0.019	0.014	0.012	0.009
	Artificial Neural Networks/Deep Learning	0.012	0	0	0.009	0	0.014	0	0.294	0	0
	Support Vector Machine	0	0	0.014	0.009	0.014	0.022	0.012	0.009	0.009	0.015
	Adaboost	0.012	0.012	0.026	0.024	0.012	0.023	0.015	0.014	0.012	0.012
	Bagging	0	0	0.009	0.009	0	0.018	0	0.024	0	0.009
Zoo_data	KNN	0.052	0.052	0.068	0.056	0.042	0.044	0.05	0.045	0.024	0.041
	Naive Bayes	0.048	0.039	0.041	1	0.042	0.103	0.055	0.078	0.047	0.055
	Decision Tree	0.021	0.026	0.058	0.034	0.047	0.025	0.033	0.023	0.020	0.020
	Logistic Regression	0.049	0.044	0.047	0.035	0.054	0.057	0.045	0.035	0.064	0.035
	Linear Classifier	0.021	0	0.024	0.021	0.021	0.053	0.035	0.021	0	0.035
	Artificial Neural Networks/Deep Learning	0	0	0.016	0	0	0.021	0.016	0.046	0	0
	Support Vector Machine	0.025	0.014	0.033	0.016	0.014	0.052	0.026	0	0	0.01
	Adaboost	0.034	0.016	0.026	0	0.034	0.035	0.021	0.016	0.016	0.016
	Bagging	0.048	0.078	0.057	0.057	0.028	0.054	0.049	0.119	0.063	0.055

TABLE X: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
Vote_data	KNN	0.022	0.014	0.015	0.021	0.016	0.016	0.021	0.019	0.013	0.017
	Naive Bayes	0.018	0.025	0.012	0.032	0.014	0.021	0.022	0.024	0.022	0.023
	Decision Tree	0.020	0.016	0.028	0.025	0.021	0.014	0.018	0.025	0.018	0.022
	Logistic Regression	0.016	0.014	0.015	0.011	0.019	0.014	0.022	0.019	0.016	0.029
	Linear Classifier	0.025	0.016	0.023	0.014	0.016	0.025	0.012	0.026	0.016	0.022
	Artificial Neural Networks/Deep Learning	0.016	0.008	0.013	0.012	0.011	0.014	0.015	0.011	0.013	0.012
	Support Vector Machine	0.015	0.019	0.029	0.021	0.023	0.021	0.022	0.011	0.019	0.015
	Adaboost	0.017	0.011	0.012	0.021	0.016	0.029	0.020	0.029	0.019	0.024
	Bagging	0.024	0.027	0.021	0.024	0.033	0.018	0.011	0.019	0.019	0.022
WaveformEW_data	KNN	0.010	0.008	0.009	0.009	0.009	0.007	0.009	0.009	0.010	0.008
	Naive Bayes	0.009	0.011	0.009	0.009	0.011	0.008	0.006	0.013	0.009	0.007
	Decision Tree	0.009	0.006	0.015	0.008	0.008	0.009	0.023	0.010	0.011	0.007
	Logistic Regression	0.007	0.009	0.009	0.009	0.010	0.010	0.036	0.008	0.008	0.004
	Linear Classifier	0.011	0.009	0.013	0.006	0.010	0.006	0.028	0.009	0.008	0.008
	Artificial Neural Networks/Deep Learning	0.009	0.007	0.009	0.007	0.011	0.011	0.007	0.007	0.008	0.003
	Support Vector Machine	0.009	0.008	0.011	0.007	0.014	0.011	0.010	0.011	0.007	0.009
	Adaboost	0.006	0.006	0.013	0.012	0.007	0.011	0.007	0.010	0.011	0.007
	Bagging	0.011	0.009	0.013	0.007	0.007	0.017	0.008	0.009	0.012	0.004
Wine_data	KNN	0.020	0.018	0.019	0.024	0.020	0.023	0.020	0.022	0.016	0.024
	Naive Bayes	0.008	0	0	0	0	0	0	0	0	0
	Decision Tree	0.014	0.009	0.015	0.015	0.014	0.014	0.056	0.023	0.012	0.015
	Logistic Regression	0.019	0.012	0.015	0.015	0.009	0.012	0.056	0.015	0.014	0.019
	Linear Classifier	0.009	0.009	0.019	0.019	0.014	0.014	0.033	0.015	0.012	0
	Artificial Neural Networks/Deep Learning	0	0	0	0	0	0.009	0	0	0	0
	Support Vector Machine	0.009	0	0.012	0.009	0	0.009	0	0.009	0	0.009
	Adaboost	0.009	0	0.012	0.012	0	0.012	0.009	0.024	0	0
	Bagging	0.012	0	0.014	0.006	0	0.009	0	0.009	0	0
Zoo_data	KNN	0.028	0.032	0.036	0.042	0.041	0.051	0.028	0.053	0.043	0.039
	Naive Bayes	0.051	0.059	0.026	0.067	0.04	0.049	0.064	0.063	0.061	0.063
	Decision Tree	0.021	0	0.021	0.021	0.021	0.021	0.055	0.016	0.026	0.016
	Logistic Regression	0.026	0.053	0.061	0.041	0.026	0.016	0.038	0.053	0.026	0.048
	Linear Classifier	0	0	0.016	0.016	0	0.016	0.039	0	0.021	0.016
	Artificial Neural Networks/Deep Learning	0	0	0.016	0.016	0	0	0	0	0	0
	Support Vector Machine	0	0.016	0.021	0	0.089	0.016	0	0.016	0	0.016
	Adaboost	0	0	0.032	0.016	0	0	0	0	0	0
	Bagging	0.063	0.100	0.067	0.102	0.082	0.072	0	0.078	0.122	0.063

TABLE XI: Mean stopping runs of the best fitness function values obtained 10 runs for different algorithms by using wrapper approach

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
BreastCancer_data	KNN	2881.2	2595.6	3000	3000	2885	2803.2	2800.8	2762.4	2649.6	2762
	Navie Bayes	3000	3000	2703	2406	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	2826	3000	3000	2916	2773.2	3000	2881.2
	Logistic Regression	3000	3000	2703	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	2736	3000	2652	2881.2	3000	2764.8
	Artificial Neural Networks/Deep Learning	2157	2625	2292	2430	3000	3000	2763	2121	2754	2115
	Support Vector Machine	2764.8	2839.2	3000	2892	3000	3000	3000	3000	2727	3000
	Adaboost	3000	2709	3000	2595	2706	3000	2529	3000	2718	3000
	Bagging	3000	2475	2634	3000	2724	2970	2703	2571	2649	2703
BreastEW_data	KNN	3000	3000	3000	3000	2926	3000	3000	3000	3000	3000
	Navie Bayes	2781	2412	3000	3000	1908	2706	2703	2760	2496	3000
	Decision Tree	3000	3000	3000	2721	3000	3000	3000	2883.6	2786.4	2772
	Logistic Regression	3000	3000	3000	3000	2790	3000	3000	2709	2786.4	2724
	Linear Classifier	3000	2919	3000	2718	3000	2970	3000	3000	2776.8	2791.2
	Artificial Neural Networks/Deep Learning	2781	1644	2457	2358	2100	2799	2322	1725	2436	1374
	Support Vector Machine	2763.6	2590.8	3000	2427	2881.2	2529	2490	3000	2406	2524.8
	Adaboost	1953	1866	3000	2595	2394	2142	2766	2412	2589	2127
	Bagging	3000	3000	2703	2814	3000	2469	2715	2718	2808	2868
CongressEW_data	KNN	2924.4	2266.8	2881.2	2835.6	2623	2768.4	3000	2881.2	2558.4	2644
	Navie Bayes	3000	2526	3000	3000	2706	3000	3000	3000	2709	3000
	Decision Tree	3000	3000	3000	3000	3000	2763.6	2643.6	2532	2607.6	2524.8
	Logistic Regression	2478	2712	3000	2703	2703	2703	2406	2727	2881.2	2406
	Linear Classifier	3000	2409	3000	3000	3000	3000	3000	2881.2	2881.2	2881.2
	Artificial Neural Networks/Deep Learning	2424	2412	2418	1905	2070	3000	1755	2097	2358	2142
	Support Vector Machine	3000	2786.4	2881.2	3000	2703	3000	3000	3000	3000	3000
	Adaboost	2601	2115	3000	2427	2709	2406	2703	2406	2445	2136
	Bagging	3000	2589	2406	3000	2778	3000	3000	3000	2961	2703
Exactly_data	KNN	2635.2	1942.8	3000	3000	2848	3000	2221.2	1753.2	1827.6	2510
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	1563	1731	3000	3000	2595	3000	2250	1489.2	1640.4	1693.2
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	2883.6	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	30	168	1518	54	30	2778	1089	30	714	42
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Adaboost	1233	726	2703	681	1968	2919	1749	570	360	402
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Exactly2_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	33	2394	3000	84	30	3000	2484	30	2703	666
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Adaboost	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
HeartEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Adaboost	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
ionosphere_data	KNN	3000	3000	3000	3000	2927	3000	3000	3000	2899.2	3000
	Navie Bayes	2703	3000	3000	3000	2706	3000	2703	3000	2835	3000
	Decision Tree	3000	2820	3000	2703	2703	2731.2	2914.8	2894.4	2773.2	2889.6
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	2847	3000	3000	3000	2763.6	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	2763	2355	2712	2283	2760	2898	2937	2034	2340	1647
	Support Vector Machine	3000	3000	3000	2887.2	3000	3000	3000	3000	3000	2703
	Adaboost	2703	1947	3000	2487	2214	3000	2703	2478	2367	3000
	Bagging	3000	3000	3000	2703	2712	3000	2703	3000	3000	2727
KrVsKpEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	2706	3000	3000	2706	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3000	2946	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Adaboost	2166	3000	3000	1830	2703	3000	3000	1959	3000	1611
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Lymphography_data	KNN	3000	2820	3000	2918.4	3000	3000	3000	2883.6	2647.2	2898
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	2472	2541	2733
	Decision Tree	2703	3000	3000	3000	3000	3000	3000	2671.2	2856	3000
	Logistic Regression	3000	2751	3000	3000	3000	3000	3000	3000	2718	3000
	Linear Classifier	3000	3000	3000	3000	3000	2499	2778	3000	2706	3000
	Artificial Neural Networks/Deep Learning	2748	2427	3000	2544	2766	3000	2934	2226	2646	2259
	Support Vector Machine	2644.8	2260.8	3000	2907.6	2781.6	3000	2724	2721	2697	2757
	Adaboost	3000	2448	3000	2478	2730	3000	2766	2424	2229	3000
	Bagging	2724	3000	3000	3000	3000	3000	3000	3000	2724	2721
M-of-n_data	KNN	1962	880.8	3000	2985.6	2334	2904	1806	1471.2	909.6	1448
	Navie Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	105	147	2109	42	30	3000	633.6	40.8	116.4	30
	Logistic Regression	30	159	2406	54	30	3000	615	30	121.2	33
	Linear Classifier	30	54	1812	45	30	2979.6	625.2	30	114	30
	Artificial Neural Networks/Deep Learning	30	84	1623	54	30	3000	495	30	114	30
	Support Vector Machine	30	94.8	1812	48	30	3000	2082	30	60	30
	Adaboost	30	66	1812	51	30	2706	561	30	237	30
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
PenglungEW_data	KNN	2082	2023.2	2881.2	2236.8	1334	1678.8	2301.6	2007.6	1256.4	1655
	Naive Bayes	2109	1866	2406	963	2262	1542	2877	1872	1014	2877
	Decision Tree	2703	3000	3000	3000	2775	2840.4	3000	2703.6	1874.4	2899.2
	Logistic Regression	2211	3000	2709	2457	1416	945	2748	2040	615	261
	Linear Classifier	1341	2109	1812	2451	1488	414	1719	942	576	1029
	Artificial Neural Networks/Deep Learning	993	2022	870	1335	1284	435	2091	825	774	651
	Support Vector Machine	1906.8	1858.8	2524.8	1502.4	1129.2	1353	2316	1689	612	1578
	AdaBoost	1419	642	2703	1257	993	999	1602	1395	426	336
	Bagging	2955	3000	3000	3000	2862	3000	3000	3000	2571	2898
Sonar_data (#12)	KNN	3000	2839.2	3000	2808	3000	3000	3000	3000	2739.6	2896
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	2739	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	2790	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	2904	3000	2778	3000	3000	3000	3000	2805	2310
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	3000	2256	3000	3000	2745	2784	2715	3000	2898	2721
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	2685
SpectEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	2937	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Tic-tac-toe_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3000	3000	3000	3000	3000	2559	3000	2427
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	30	540	2703	60	30	3000	852	30	462	30
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Vote_data	KNN	2430	2394	3000	2532	2524.8	2752.8	2974.8	2252.4	2394	3000
	Naive Bayes	3000	2043	3000	3000	2712	2721	2259	2739	2886	3000
	Decision Tree	2529	2703	2703	3000	2409	2763.6	2602.8	2418	2515.2	2524.8
	Logistic Regression	2487	2703	3000	3000	2718	2703	2832	2724	2088	2406
	Linear Classifier	1812	2460	3000	2703	2499	2763.6	2706	2778	2767.2	2766
	Artificial Neural Networks/Deep Learning	2385	2100	2412	2139	2733	2661	2631	1689	1629	2154
	Support Vector Machine	2409	2810.4	3000	2790	3000	3000	2763	2724	2406	2703
	AdaBoost	3000	2391	2703	2625	2406	2409	2703	2160	1863	2112
	Bagging	2736	2109	2661	2634	2772	2406	3000	2751	2118	2208

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
WaveformEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Wine_data	KNN	1488	1531.2	2762.4	1786.8	2407	2119.2	1413.6	1856.4	1638	1483
	Naive Bayes	471	333	327	138	624	753	162	30	54	162
	Decision Tree	1602	1266	2109	1566	2109	1742.4	1237.2	1147.2	1052.4	1113.6
	Logistic Regression	1227	1245	2109	660	387	2445	1797	348	777	942
	Linear Classifier	1518	258	2406	1161	2115	2496	2175	981	966	366
	Artificial Neural Networks/Deep Learning	756	174	408	504	729	1527	759	384	186	45
	Support Vector Machine	81	114	1218	567	579.6	1404	849	372	531	634.8
	AdaBoost	882	990	1515	855	2454	1839	1482	1002	714	645
	Bagging	99	30	543	336	108	963	30	30	51	477
Zoo_Data	KNN	1736.4	1257.6	1930.8	1588.8	1801.2	2324.4	1231.2	1521.6	1296	1223
	Naive Bayes	2430	1884	3000	2172	2553	3000	2064	1812	2115	2064
	Decision Tree	723	1224	2109	654	1575	1606.8	1576.8	933.6	1027.2	627.6
	Logistic Regression	2109	2208	2109	1299	1311	2679	1608	1557	1593	1515
	Linear Classifier	645	246	921	858	906	1428	1575	633	126	1224
	Artificial Neural Networks/Deep Learning	48	48	327	162	42	879	468	60	30	33
	Support Vector Machine	1296	342	1218	564	309.6	1974	1296	66	51	148.8
	AdaBoost	690	417	1218	144	1824	1581	624	342	375	336
	Bagging	2940	2193	2184	2172	2523	3000	2682	1872	2436	2070

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
BreastCancer_data	KNN	3000	2419.2	3000	3000	2765	2709.6	2721.6	2788.8	2691.6	2774
	Naive Bayes	3000	3000	3000	2709.6	3000	3000	3000	3000	3000	3000
	Decision Tree	2751.3	3000	3000	3000	3000	2775	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	2757	3000	3000	2892	3000
	Linear Classifier	3000	2712	3000	3000	3000	3000	2424	3000	2703	2709
	Artificial Neural Networks/Deep Learning	3000	2109	2373	1590	2316	2994	2031	2409	2292	1845
	Support Vector Machine	3000	2703	3000	3000	2439	2886	2793	2409	2715	2709
	AdaBoost	2752.1	2703	2752.5	2706	3000	2643	2418	3000	2748	3000
	Bagging	3000	1671	3000	2718	3000	3000	2430	3000	3000	2739
BreastEW_data	KNN	3000	3000	3000	3000	3000	3000	2468.4	3000	2881.2	2947
	Naive Bayes	2712.48	3000	2784.96	2512.8	3000	2847	3000	3000	3000	2688
	Decision Tree	3000	2562	3000	3000	3000	3000	2811	3000	2817	2574
	Logistic Regression	3000	3000	3000	2424	2733	2814	2703	3000	2695.2	3000
	Linear Classifier	2724.2	2367	3000	3000	2706	2850	2703	3000	3000	2481
	Artificial Neural Networks/Deep Learning	2327.2	1311	2016.9	2364	1671	2919	1638	2118	1200	2250
	Support Vector Machine	2725.6	2619	2722.2	2136	2454	3000	2550	2118	1884	2871
	AdaBoost	1845.6	1842	2135.4	1815	1824	2946	2310	1842	1890	3000
	Bagging	3000	2781	2140.5	3000	3000	3000	2820	2802	3000	3000
CongressEW_data	KNN	2558.4	2644	3000	2720.4	3000	2637.6	2486.4	2898	2862	2824.
	Naive Bayes	3000	2902.8	3000	2779	3000	2862	2715	3000	3000	3000
	Decision Tree	3000	2109	3000	2505	3000	2517	2535	2706	3000	2718
	Logistic Regression	2984.2	2124	2723.7	2706	2748	2814	2703	3000	2881.2	2682
	Linear Classifier	2722.5	2418	3000	2712	2709	3000	3000	3000	2112	3000
	Artificial Neural Networks/Deep Learning	2779.2	2322	1773.6	2505	2376	2736	1938	2442	2214	1761
	Support Vector Machine	3000	3000	3000	2781	2418	3000	3000	2442	3000	2703
	AdaBoost	3000	2712	2449.8	1857	2580	2547	2427	2709	2418	3000
	Bagging	3000	2703	2722	2796	2481	2775	3000	3000	3000	3000
Exactly_data	KNN	1827.6	2510	138.44	295.2	855.48	2125.2	494	2264.4	2275.2	1374
	Naive Bayes	3000	3000	3000	3000	552	3000	3000	3000	3000	3000
	Decision Tree	116	204	1320.9	2088	255	2040	2556	1458	1173	696
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	63.1	63	1251.3	60	60	693	171	63	30	381
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	63	3000	3000
	AdaBoost	75.3	90	891	531	159	1605	552	171	405	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Exactly2_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	100.3	1257	2174.4	66	87	765	3000	150	30	1371
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	150	3000	3000
	AdaBoost	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000

TABLE XI: Countinued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
HeartEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	2900.16	3000	3000	2782	3000	3000	2703	3000	2706	2703
	Decision Tree	3000	2634	3000	3000	2748	2811	2460	2238	2826	3000
	Logistic Regression	3000	2844	3000	3000	3000	3000	2721	3000	2883.6	2730
	Linear Classifier	3000	3000	3000	3000	3000	3000	2904	3000	3000	3000
	Artificial Neural Networks/Deep Learning	2400.6	2043	1289.1	2448	2151	3000	1623	2238	2076	1890
	Support Vector Machine	3000	2949	3000	3000	2721	3000	3000	2238	2928	3000
	AdaBoost	3000	2853	2778	2715	2073	2673	2577	3000	2460	3000
	Bagging	3000	3000	3000	3000	3000	3000	2619	3000	3000	3000
ionosphere	KNN	3000	3000	3000	3000	2873	3000	3000	2953.2	3000	2909
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	2580	3000	2718	3000	2742	3000	3000	3000	2727
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	2840.5	3000	3017.1	2712	2589	3000	3000	2733	2769	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	2733	3000	3000
	AdaBoost	2277.9	2127	2961	2172	2460	2607	3000	3000	1530	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
KrVsKpEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	2580	3000	2718	3000	2742	3000	3000	3000	2727
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	2840.5	3000	3017.1	2712	2589	3000	3000	2733	2769	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	2733	3000	3000
	AdaBoost	2277.9	2127	2961	2172	2460	2607	3000	3000	1530	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Lymphography_data	KNN	2896.96	2688	3000	2911.2	2694	3000	2931.6	2882.4	2689.2	2788
	Naive Bayes	3000	2487	3000	3000	3000	3000	2811	3000	2808	2562
	Decision Tree	2460.2	3000	3000	3000	3000	2856	3000	3000	3000	2769
	Logistic Regression	2833.2	2412	2724.3	2709	3000	2673	3000	2712	2643	3000
	Linear Classifier	2896.9	2403	2749.5	3000	2412	2880	3000	2718	2763	3000
	Artificial Neural Networks/Deep Learning	3019.4	2193	2522.7	2568	2631	3000	2133	2286	2748	2466
	Support Vector Machine	2772.6	1674	2725.5	2511	3000	2853	2709	3000	2790	2727
	AdaBoost	2521	2301	2457.9	2862	3000	2742	2955	3000	2460	2442
	Bagging	3000	3000	3016.8	2899.2	3000	3000	2520	3000	2742	2718
M-of-n_data	KNN	109.92	180	309.36	1378.8	229	2124	1245.6	972	878.4	528
	Naive Bayes	3000	3000	3000	3000	234	3000	3000	3000	3000	3000
	Decision Tree	62.8	42	651	60	60	576	126	51	30	57
	Logistic Regression	62.7	48	237	63	63	522	39	48	30	51
	Linear Classifier	62	51	1226.4	66	63	576	192	60%	30	384
	Artificial Neural Networks/Deep Learning	66.8	39	660.3	63	60	612	315	39	30	48
	Support Vector Machine	62.1	48	373.5	72	60	462	267	39	30	210
	AdaBoost	62.3	48	984.3	60	60	501	306	39	30	3000
	Bagging	3000	3000	3000	3000	3000	3000	534	3000	3000	3000

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
PenglungEW_data	KNN	1666.88	2516.4	2779.32	2208	1104	2468.4	1888.8	1675.2	1485.6	1964
	Naive Bayes	1290.68	1293	2667.32	2304	837	3000	1173	1173	1464	2211
	Decision Tree	3021.3	2664	2459.4	3000	1950	2859	2769	2817	2355	2703
	Logistic Regression	1129.4	3000	3015	1854	120	1764	2586	1602	729	2241
	Linear Classifier	1032.7	1314	2323.2	2517	459	1905	2745	1731	231	948
	Artificial Neural Networks/Deep Learning	1193.3	657	1101.3	1266	828	3000	819	1035	1035	858
	Support Vector Machine	1753.3	954	1836	2121	3000	2157	1059	1797	768	1965
	AdaBoost	1175	798	1083.3	1182	996	2199	672	978	273	885
	Bagging	3000	3000	3014.4	3000	3000	3000	1428	3000	3000	3000
Sonar_data	KNN	3000	2367.6	3000	2942.4	2701	2872.8	2911.2	2905.2	2821.2	2839
	Naive Bayes	3000	3000	3000	2715	2217	3000	3000	3000	3000	2829
	Decision Tree	3000	3000	2757.6	3000	2844	3000	3000	3000	3000	2751
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	2772
	Linear Classifier	3000	2985	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	2817	3014.4	2601	2979	3000	2721	2640	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	2640	3000	3000
	AdaBoost	2723.9	1047	2237.4	2307	1908	3000	2751	1683	2211	3000
	Bagging	3000	3000	3000	3000	3000	3000	2718	3000	3000	3000
SpectEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	3018.3	3000	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	3000	3000	3019.8	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Tic-tac-toe_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3016.2	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3000	3000	2946.3	2799	2748	3000	3000	3000	2478	3000
	Support Vector Machine	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	65.8	111	905.1	63	63	564	1026	39	30	3000
	Bagging	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Vote_data	KNN	2267.24	1542	3000	2550	2227	2806.8	1900.8	2575.2	2648.4	1850
	Naive Bayes	2697.2	2365.3	3027.3	2706	1623	2859	2703	2457	2463	3000
	Decision Tree	2743.2	2430	2431.8	2202	2706	2736	2418	2709	2406	3000
	Logistic Regression	2556.2	1269	3000	3000	2715	2787	2703	2706	2430	2652
	Linear Classifier	2431.5	2511	2721.6	2727	2418	2619	3000	2202	2442	2406
	Artificial Neural Networks/Deep Learning	1999	1380	2062.5	1059	1899	2787	1884	2169	2001	1563
	Support Vector Machine	3000	1974	2755.2	3000	1788	2583	2574	2169	3000	2184
	AdaBoost	2752.5	2130	1671.6	2163	1578	2613	2190	2703	2049	2457
	Bagging	2365.3	2088	3000	3000	2733	3000	2913	2709	2361	2628

TABLE XI: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
WaveformEW_data	KNN	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Naive Bayes	3000	3000	3023.1	3000	3000	3000	3000	3000	3000	3000
	Decision Tree	3016.4	3000	3018.9	3000	3000	3000	3000	3000	3000	3000
	Logistic Regression	3015	3000	3021.3	3000	3000	3000	3000	3000	3000	3000
	Linear Classifier	3019.6	3000	3016.2	3000	3000	3000	3000	3000	3000	3000
	Artificial Neural Networks/Deep Learning	3021.8	3000	3015.9	3000	3000	3000	3000	3000	3000	3000
	Support Vector Machine	3000	3000	3022.2	3000	3000	3000	3000	3000	3000	3000
	AdaBoost	3016.8	3000	3015.9	3000	3000	3000	3000	3000	3000	3000
	Bagging	3000	3000	3018.3	3000	3000	3000	3000	3000	3000	3000
Wine_data	KNN	1388.88	990	2585.16	1627.2	1529	2232	1665.6	1492.8	1020	1619
	Naive Bayes	309.96	33	92.7	63	60	702	48	78	54	63
	Decision Tree	1246.9	336	1683.9	1326	942	1887	2478	1875	675	1986
	Logistic Regression	1317.6	648	1560.3	1533	426	1587	3000	1335	969	1089
	Linear Classifier	523	339	667.8	1620	1017	1815	2556	1530	762	465
	Artificial Neural Networks/Deep Learning	339.1	123	547.8	132	69	2928	186	147	105	102
	Support Vector Machine	387.8	33	656.1	354	387	879	63	333	165	351
	AdaBoost	572.6	147	683.1	915	189	1794	657	945	39	159
	Bagging	749.6	237	1176	244.8	186	2334	93	510	159	96
Zoo_data (#18)	KNN	1032.12	1017.6	2160.24	1771.2	1260	1833.6	1242	1305.6	1240.8	1267
	Naive Bayes	2459	2148	3000	2286	1269	2529	1932	2337	1815	2421
	Decision Tree	688.7	123	792.6	897	666	1644	2784	516	1623	345
	Logistic Regression	1551.1	2097	2138.7	2130	1533	1227	2703	1287	2097	1569
	Linear Classifier	99.8	57	361.2	381	108	1095	2895	36	687	387
	Artificial Neural Networks/Deep Learning	111.9	99	361.5	360	60	1566	96	45	30	60
	Support Vector Machine	307.1	345	668.1	66	3000	1188	207	330	135	330
	AdaBoost	93	78	361.8	354	78	861	90	30	30	180
	Bagging	3000	2775	3017.1	2912.4	3000	3000	42	3000	2958	3000

TABLE XII: Mean Accuracy obtained 10 runs for different algorithms by using wrapper approach

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
BreastCan	KNN	98.42%	98.13%	98.01%	94.88%	97.76%	97.53%	98.24%	98.33%	98.27%	98.07%
	Naive Bayes	97.77%	97.48%	97.70%	95.54%	96.98%	96.26%	97.55%	97.55%	98.06%	97.05%
	Decision Tree	97.41%	96.12%	97.19%	95.40%	96.98%	96.78%	97.76%	97.76%	97.73%	97.30%
	Logistic Regression	96.98%	97.34%	97.63%	95.18%	97.41%	96.91%	97.48%	98.06%	97.81%	97.34%
	Linear Classifier	97.84%	97.48%	97.91%	96.55%	97.27%	95.54%	97.76%	97.93%	98.22%	97.84%
	Artificial Neural Networks	95.40%	94.32%	93.96%	94.96%	95.90%	96.47%	94.46%	96.33%	96.69%	96.98%
	Support Vector Machine	97.76%	97.55%	97.76%	95.83%	97.52%	97.12%	98.49%	97.48%	98.56%	98.27%
	AdaBoost	97.63%	97.91%	97.99%	95.76%	98.49%	97.63%	98.63%	98.27%	98.71%	98.42%
	Bagging	96.47%	95.90%	97.05%	94.96%	96.40%	96.69%	96.83%	97.55%	96.26%	97.19%
BreastEW	KNN	96.00%	95.04%	95.58%	92.53%	96.11%	95.36%	95.79%	96.14%	96.25%	95.68%
	Naive Bayes	97.88%	97.35%	95.75%	92.83%	97.96%	97.61%	97.79%	97.96%	98.94%	98.05%
	Decision Tree	97.88%	96.19%	95.93%	93.36%	96.99%	96.89%	96.85%	97.63%	97.84%	97.31%
	Logistic Regression	96.64%	96.55%	96.19%	88.76%	97.70%	96.28%	97.17%	98.14%	97.56%	97.26%
	Linear Classifier	97.52%	96.46%	96.11%	92.21%	97.43%	87.43%	97.20%	97.84%	98.23%	98.30%
	Artificial Neural Networks	82.65%	80.35%	90.71%	73.89%	73.54%	82.48%	89.56%	97.52%	94.25%	84.25%
	Support Vector Machine	97.91%	97.63%	97.35%	94.42%	97.38%	97.70%	98.32%	98.50%	99.12%	98.27%
	AdaBoost	99.29%	98.67%	98.14%	95.93%	98.23%	98.76%	98.32%	98.94%	98.94%	99.12%
	Bagging	95.31%	95.66%	93.27%	93.98%	95.49%	95.66%	95.66%	96.28%	95.49%	96.02%
CongressEW	KNN	97.44%	97.02%	96.23%	89.40%	76.32%	96.65%	97.02%	97.58%	97.63%	98.14%
	Naive Bayes	96.63%	95.93%	95.12%	88.37%	96.63%	95.47%	97.33%	96.40%	97.79%	96.28%
	Decision Tree	97.67%	96.98%	96.63%	92.21%	97.33%	97.02%	97.26%	97.91%	97.63%	98.19%
	Logistic Regression	98.14%	96.51%	96.51%	92.33%	97.79%	96.16%	98.49%	97.33%	97.44%	98.02%
	Linear Classifier	97.09%	96.51%	95.58%	88.60%	96.51%	94.93%	95.30%	96.56%	96.60%	96.84%
	Artificial Neural Networks	95.23%	96.16%	91.74%	88.84%	92.67%	95.58%	96.16%	94.77%	95.81%	96.86%
	Support Vector Machine	96.28%	96.51%	96.00%	92.74%	97.56%	95.12%	96.40%	96.51%	97.09%	96.40%
	AdaBoost	98.02%	97.56%	96.86%	90.00%	97.56%	96.40%	98.02%	98.37%	98.60%	98.14%
	Bagging	94.53%	96.51%	95.58%	91.86%	95.81%	92.09%	94.42%	95.47%	96.28%	96.05%
Exactly	KNN	91.34%	84.72%	73.54%	64.98%	78.06%	70.24%	90.08%	94.82%	92.88%	90.50%
	Naive Bayes	68.30%	68.70%	69.25%	69.90%	69.15%	67.45%	70.40%	70.80%	70.50%	69.10%
	Decision Tree	97.95%	86.25%	73.75%	68.90%	80.35%	70.84%	90.50%	97.66%	97.10%	97.66%
	Logistic Regression	69.75%	70.10%	69.30%	70.20%	67.60%	69.35%	70.15%	70.30%	68.88%	68.80%
	Linear Classifier	70.10%	69.45%	69.50%	68.30%	70.20%	69.52%	68.58%	68.56%	68.78%	68.42%
	Artificial Neural Networks	99.90%	89.30%	69.95%	66.10%	81.20%	73.20%	94.35%	99.70%	94.35%	99.80%
	Support Vector Machine	69.24%	69.32%	69.70%	68.52%	70.70%	68.40%	68.40%	71.05%	67.85%	70.05%
	AdaBoost	99.85%	85.70%	86.65%	70.95%	91.40%	72.05%	94.75%	99.95%	100.00%	99.95%
	Bagging	68.55%	67.10%	68.70%	67.75%	70.75%	70.35%	68.75%	69.40%	67.65%	69.65%
Exactly2	KNN	78.72%	77.06%	76.80%	71.74%	76.90%	76.24%	77.08%	77.52%	77.18%	77.60%
	Naive Bayes	76.95%	76.80%	76.40%	76.75%	75.05%	74.60%	76.70%	75.90%	75.60%	75.40%
	Decision Tree	76.90%	75.95%	75.95%	70.90%	75.10%	75.72%	76.98%	77.58%	77.20%	77.62%
	Logistic Regression	75.25%	75.85%	76.40%	77.45%	74.30%	75.20%	76.80%	75.45%	75.86%	75.80%
	Linear Classifier	76.00%	75.80%	75.15%	75.70%	76.30%	75.14%	75.84%	76.36%	76.06%	75.84%
	Artificial Neural Networks	99.50%	79.25%	73.90%	73.30%	74.10%	77.05%	80.70%	99.75%	78.35%	97.30%
	Support Vector Machine	76.16%	76.34%	76.38%	75.50%	75.40%	76.20%	75.10%	75.10%	76.25%	75.15%
	AdaBoost	79.60%	77.65%	77.15%	70.50%	76.20%	75.35%	77.90%	78.80%	77.70%	79.25%
	Bagging	74.70%	74.75%	76.10%	76.10%	76.30%	74.35%	74.70%	75.85%	74.95%	75.40%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
BreastCan	KNN	98.38%	98.62%	97.89%	98.50%	98.45%	98.50%	97.60%	98.42%	98.47%	95.25%
	Naive Bayes	98.07%	97.52%	97.51%	98.04%	95.40%	98.13%	97.70%	98.06%	97.77%	96.33%
	Decision Tree	98.13%	97.99%	98.06%	96.26%	97.12%	98.27%	98.13%	96.69%	97.99%	94.24%
	Logistic Regression	98.13%	98.13%	97.70%	98.42%	97.27%	98.06%	97.55%	97.70%	98.01%	95.68%
	Linear Classifier	98.20%	98.42%	97.63%	97.91%	97.48%	98.35%	98.27%	98.13%	98.92%	96.55%
	Artificial Neural Networks	96.98%	96.40%	96.26%	96.91%	95.83%	96.47%	96.19%	95.32%	95.61%	93.31%
	Support Vector Machine	98.63%	97.77%	98.20%	98.56%	98.13%	98.06%	98.27%	95.32%	97.99%	96.40%
	AdaBoost	97.77%	98.78%	97.00%	98.13%	97.55%	98.42%	98.85%	97.84%	97.99%	98.06%
	Bagging	95.04%	83.72%	97.34%	94.46%	94.60%	96.12%	95.90%	94.10%	95.68%	93.53%
BreastEW	KNN	96.38%	96.35%	95.64%	96.21%	96.64%	96.21%	97.53%	95.75%	97.24%	93.45%
	Naive Bayes	98.12%	95.04%	98.00%	98.87%	91.95%	98.58%	98.32%	98.05%	98.58%	94.69%
	Decision Tree	97.61%	98.58%	97.96%	97.61%	97.52%	97.96%	98.05%	97.88%	98.05%	95.31%
	Logistic Regression	97.43%	97.61%	97.88%	98.41%	98.23%	98.14%	98.41%	97.88%	98.27%	93.98%
	Linear Classifier	98.50%	98.85%	98.05%	97.43%	98.50%	98.41%	98.23%	97.17%	98.41%	93.63%
	Artificial Neural Networks	90.00%	91.24%	97.08%	80.53%	83.72%	89.73%	72.92%	94.87%	82.92%	91.77%
	Support Vector Machine	98.58%	98.76%	98.14%	98.14%	98.67%	97.79%	98.58%	94.87%	98.67%	96.64%
	AdaBoost	99.20%	99.56%	99.12%	99.12%	98.85%	98.94%	98.67%	99.03%	99.38%	98.05%
	Bagging	94.07%	93.27%	92.57%	92.12%	94.07%	92.04%	95.66%	93.89%	93.54%	93.10%
CongressEW	KNN	97.76%	98.19%	97.35%	97.44%	97.72%	98.28%	97.95%	97.49%	97.81%	94.37%
	Naive Bayes	95.53%	97.49%	96.74%	96.79%	91.51%	96.86%	97.21%	97.44%	97.33%	90.00%
	Decision Tree	97.56%	98.37%	97.21%	97.44%	97.44%	98.02%	98.14%	97.67%	96.74%	95.58%
	Logistic Regression	97.67%	97.91%	97.44%	97.21%	97.67%	97.91%	98.02%	96.63%	97.95	96.86%
	Linear Classifier	97.21%	97.44%	94.77%	97.21%	96.98%	97.09%	96.28%	97.33%	97.79%	94.53%
	Artificial Neural Networks	95.12%	96.86%	96.63%	96.05%	96.05%	96.63%	94.65%	96.28%	94.77%	95.00%
	Support Vector Machine	96.05%	98.26%	97.21%	96.86%	96.98%	97.44%	96.16%	96.28%	97.33%	95.35%
	AdaBoost	97.91%	98.02%	97.67%	98.49%	98.49%	98.60%	97.79%	98.37%	98.72%	97.44%
	Bagging	94.65%	95.81%	96.16%	96.28%	95.47%	96.86%	96.16%	94.53%	94.77%	94.88%
Exactly	KNN	100.00%	100.00%	94.40%	94.34%	99.92%	99.04%	98%	94.82%	99.70%	98.12%
	Naive Bayes	68.54%	68.60%	68.11%	67.94%	69.50%	67.90%	69.00%	68.95%	68.70%	68.95%
	Decision Tree	100%	100.00%	89.55%	96.45%	100.00%	99.40%	98.35%	95.35%	99.85%	100.00%
	Logistic Regression	69.30%	69.40%	69.45%	69.60%	69.10%	69.65%	69.00%	69.55%	69.78%	69.15%
	Linear Classifier	67.05%	66.45%	70.70%	69.85%	69.20%	67.50%	68.40%	68.95%	69.25%	69.15%
	Artificial Neural Networks	100.00%	100.00%	94.20%	98.90%	99.30%	98.95%	97.10%	99.80%	99.40%	99.80%
	Support Vector Machine	68.80%	68.95%	68.45%	69.75%	69.75%	68.40%	69.50%	99.80%	71.80%	69.85%
	AdaBoost	100.00%	100.00%	95.15%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	68.95%
	Bagging	68.60%	68.35%	70.55%	66.10%	68.45%	68.80%	70.75%	68.35%	69.25%	69.75%
Exactly2	KNN	78.32%	78.98%	76.39%	78.46%	78.52%	78.46%	79.02%	77.12%	78.52%	75.10%
	Naive Bayes	76.40%	77.55%	75.25%	76.18%	75.90%	76.50%	76.15%	74.80%	75.60%	75.70%
	Decision Tree	77.50%	79.55%	78.00%	76.15%	77.80%	77.75%	78.65%	76.15%	80.00%	76.45%
	Logistic Regression	75.50%	76.50%	76.65%	75.85%	76.05%	76.50%	75.55%	76.40%	76.06%	75.50%
	Linear Classifier	76.25%	74.85%	75.15%	76.35%	74.80%	76.25%	76.60%	74.80%	75.15%	74.50%
	Artificial Neural Networks	99.35%	99.90%	84.90%	99.50%	98.90%	99.70%	74.50%	96.80%	99.45%	97.25%
	Support Vector Machine	74.95%	75.95%	75.45%	77.10%	76.30%	75.40%	75.70%	96.80%	75.75%	76.35%
	AdaBoost	80.60%	81.35%	77.65%	79.35%	80.10%	79.90%	79.70%	79.20%	79.55%	74.80%
	Bagging	77.55%	75.40%	76.95%	75.50%	77.15%	75.75%	75.30%	75.70%	75.90%	74.70%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
HeartEW	KNN	86.37%	83.93%	81.85%	66.81%	85.41%	84.52%	87.11%	87.85%	88.44%	88.00%
	Naive Bayes	88.33%	87.59%	84.63%	76.11%	85.93%	85.37%	87.04%	89.81%	88.89%	85.37%
	Decision Tree	87.41%	83.52%	84.07%	77.59%	86.48%	85.48%	87.85%	88.30%	88.96%	87.41%
	Logistic Regression	90.00%	88.89%	88.15%	80.00%	90.56%	88.89%	88.15%	89.81%	91.78%	90.74%
	Linear Classifier	89.44%	88.52%	85.93%	78.52%	87.59%	80.37%	88.89%	88.89%	89.93%	90.30%
	Artificial Neural Networks	79.26%	75.37%	73.70%	70.00%	77.78%	73.89%	78.89%	74.81%	80.56%	72.22%
	Support Vector Machine	87.04%	88.22%	88.15%	79.81%	90.19%	85.00%	90.19%	88.89%	91.67%	90.00%
	AdaBoost	90.37%	86.85%	82.78%	72.04%	86.48%	83.33%	85.56%	88.15%	88.15%	86.67%
	Bagging	83.70%	84.63%	79.81%	82.59%	87.04%	81.48%	83.52%	84.26%	85.37%	86.67%
ionosphere	KNN	93.77%	89.71%	89.37%	83.09%	94.63%	94.40%	93.20%	95.37%	96.40%	95.43%
	Naive Bayes	95.86%	95.43%	93.57%	87.00%	95.43%	95.29%	96.14%	96.57%	97.00%	95.71%
	Decision Tree	96.29%	94.86%	95.14%	89.86%	93.29%	95.77%	95.31%	96.17%	98.06%	96.11%
	Logistic Regression	94.43%	92.43%	89.86%	85.00%	89.29%	90.14%	92.57%	92.86%	94.00%	93.00%
	Linear Classifier	92.71%	93.43%	90.00%	85.57%	91.29%	80.63%	93.60%	94.57%	94.80%	94.23%
	Artificial Neural Networks	92.43%	91.43%	90.71%	88.71%	91.00%	92.57%	91.00%	92.57%	90.71%	93.00%
	Support Vector Machine	93.66%	90.97%	91.83%	89.20%	89.86%	93.00%	91.71%	94.00%	94.71%	96.14%
	AdaBoost	97.29%	97.86%	95.57%	92.86%	98.14%	96.57%	97.57%	97.57%	97.43%	97.14%
	Bagging	92.86%	91.29%	90.71%	91.29%	93.14%	91.43%	93.71%	93.14%	93.43%	93.14%
KrVsKpEW	KNN	97.42%	97.51%	93.97%	82.47%	90.25%	87.53%	97.05%	97.46%	97.57%	97.38%
	Naive Bayes	81.25%	81.92%	78.90%	67.25%	72.71%	79.01%	81.46%	82.27%	82.66%	83.00%
	Decision Tree	99.47%	98.65%	96.64%	87.51%	97.40%	90.37%	98.85%	99.34%	98.97%	99.47%
	Logistic Regression	95.96%	95.43%	94.95%	74.54%	95.82%	85.93%	95.71%	96.04%	95.82%	96.03%
	Linear Classifier	95.79%	95.07%	94.52%	77.07%	92.36%	86.03%	95.20%	95.53%	95.96%	95.70%
	Artificial Neural Networks	96.96%	96.51%	83.60%	79.97%	95.49%	88.36%	96.06%	96.43%	96.45%	97.36%
	Support Vector Machine	95.72%	95.35%	94.50%	71.50%	93.85%	85.54%	95.24%	95.74%	95.70%	95.35%
	AdaBoost	99.78%	98.58%	96.82%	83.99%	99.42%	86.98%	98.79%	99.75%	99.08%	99.81%
	Bagging	90.74%	93.63%	75.56%	84.33%	91.05%	82.49%	92.68%	90.92%	92.35%	91.97%
Lymphography	KNN	91.17%	86.76%	85.79%	71.72%	88.55%	88.28%	89.24%	88.97%	92.97%	91.86%
	Naive Bayes	83.10%	78.28%	80.34%	76.21%	80.00%	84.14%	90.34%	92.41%	92.07%	90.00%
	Decision Tree	91.03%	87.59%	85.86%	75.52%	91.38%	88.55%	89.24%	92.97%	92.41%	88.62%
	Logistic Regression	89.66%	87.59%	86.21%	75.52%	88.28%	85.17	87.59%	91.72%	92.07%	90.34%
	Linear Classifier	91.72%	88.62%	87.59%	73.45%	92.07%	89.31%	92.41%	91.72%	93.10%	91.38%
	Artificial Neural Networks	82.41%	82.41%	76.21%	79.31%	84.83%	76.90%	75.52%	82.76%	80.69%	82.41%
	Support Vector Machine	93.52%	90.07%	88.97%	75.72%	88.41%	88.62%	90.34%	93.79%	94.48%	93.79%
	AdaBoost	93.10%	90.00%	90.69%	76.55%	92.41%	90.00%	93.45%	93.79%	96.21%	92.07%
	Bagging	83.79%	79.31%	80.00%	75.52%	78.28%	83.79%	84.83%	86.55%	84.83%	79.31%
M-of-n	KNN	97.92%	94.00%	86.46%	75.40%	91.86%	82.88%	98.80%	98.72%	100%	98.72%
	Naive Bayes	86.60%	84.15%	83.05%	73.65%	82.80%	79.90%	85.55%	85.50%	86.75%	85.05%
	Decision Tree	100%	90.75%	89.75%	77.10%	86.15%	83.68%	98.44%	100%	100%	100%
	Logistic Regression	100%	91.60%	88.30%	78.85%	87.20%	83.25%	98.55%	100%	100%	100%
	Linear Classifier	100%	97.55%	91.70%	77.10%	87.60%	83.10%	97.78%	100%	100%	100%
	Artificial Neural Networks	100%	91.15%	83.85%	75.15%	85.55%	83.90%	98.55%	100%	100%	100%
	Support Vector Machine	100%	94.52%	92.02%	80.00%	92.05%	83.15%	92.15%	100%	100%	100%
	AdaBoost	100%	93.25%	91.85%	80.50%	90.00%	86.60%	98.95%	100%	100%	100%
	Bagging	81.50%	80.90%	74.85%	76.50%	79.15%	79.50%	82.35%	83.05%	84.25%	81.50%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
HeartEW	KNN	85.92%	88.81%	86.32%	87.25%	89.33%	88.52%	89.26%	88.00%	88.15%	72.00%
	Naive Bayes	90.74%	80.56%	88.10%	87.93%	80.37%	89.81%	87.96%	89.07%	89.44%	80.56%
	Decision Tree	88.33%	88.89%	87.78%	88.52%	87.59%	88.33%	91.11%	86.48%	89.63%	76.48%
	Logistic Regression	89.44%	90.37%	90.37%	87.96%	92.22%	91.67%	92.59%	89.26%	90.67%	77.04%
	Linear Classifier	90.37%	91.67%	90.93%	90.19%	91.67%	88.70%	90.00%	89.07%	90.19%	81.48%
	Artificial Neural Networks	77.78%	67.78%	80.93%	76.11%	79.07%	73.70%	76.48%	74.63%	78.33%	69.44%
	Support Vector Machine	91.67%	98.20%	90.93%	89.81%	90.19%	87.78%	88.89%	74.63%	91.67%	82.59%
	AdaBoost	86.48%	90.00%	84.44%	79.35%	88.89%	87.59%	88.89%	87.22%	88.15%	89.07%
	Bagging	80.56%	83.89%	81.48%	84.26%	80.00%	82.59%	83.89%	81.11%	81.11%	73.33%
ionosphere	KNN	94.00%	95.14%	92.83%	94.05%	96.23%	95.66%	94.51%	95.20%	96.46%	92.34%
	Naive Bayes	95.88%	84.43%	96.72%	96.34%	83.57%	95.43%	97.00%	96.14%	97.57%	96.29%
	Decision Tree	96.29%	98.29%	96.29%	96.57%	97.14%	97.43%	96.86%	96.86%	98.00%	92.57%
	Logistic Regression	91.43%	96.29%	93.71%	94.00%	94.00%	93.44%	94.57%	93.43%	94.63%	87.00%
	Linear Classifier	94.71%	95.71%	92.71%	94.71%	96.00%	94.29%	95.00%	94.14%	94.00%	88.14%
	Artificial Neural Networks	91.57%	91.14%	93.43%	92.29%	92.57%	88.86%	90.43%	91.71%	91.14%	90.29%
	Support Vector Machine	93.57%	97.00%	93.86%	94.71%	95.43%	93.57%	92.86%	91.71%	95.00%	88.00%
	AdaBoost	96.43%	98.00%	97.71%	97.29%	98.43%	99.14%	97.86%	96.86%	97.71%	96.14%
	Bagging	84.43%	88.14%	81.14%	85.57%	87.71%	85.14%	93.86%	83.57%	85.00%	86.14%
KrVsKpEW	KNN	97.19%	98.98%	97.64%	97.67%	98.59%	97.87%	97.43%	97.45%	97.94%	90.84%
	Naive Bayes	69.45%	86.98%	90.72%	81.60%	63.47%	82.91%	82.88%	82.63%	83.52%	77.90%
	Decision Tree	99.51%	99.62%	98.73%	99.50%	99.66%	99.69%	98.84%	99.19%	99.48%	88.92%
	Logistic Regression	96.18%	96.67%	96.24%	96.09%	96.42%	96.40%	95.76%	96.04%	96.44%	90.11%
	Linear Classifier	95.96%	96.70%	96.06%	95.82%	96.65%	96.13%	95.57%	95.51%	96.35%	87.82%
	Artificial Neural Networks	97.87%	97.39%	96.37%	96.95%	97.86%	96.26%	86.89%	96.31%	97.39%	91.27%
	Support Vector Machine	95.56%	96.81%	95.67%	96.06%	96.09%	96.37%	95.51%	96.31%	95.82%	92.61%
	AdaBoost	99.84%	99.91%	98.94%	99.86%	99.83%	99.73%	99.00%	99.66%	99.80%	82.63%
	Bagging	86.98%	90.94%	81.28%	83.05%	87.62%	84.23%	89.91%	86.51%	82.02%	81.06%
Lymphography	KNN	90.89%	92.82%	90.90%	91.86%	92.14%	91.03%	92.55%	91.17%	93.79%	79.17%
	Naive Bayes	71.03%	96.55%	81.82%	91.03%	84.83%	90.34%	93.10%	91.38%	94.83%	86.21%
	Decision Tree	93.10%	93.10%	91.38%	90.00%	91.72%	93.10%	91.38%	87.93%	93.45%	77.93%
	Logistic Regression	93.10%	92.41%	90.69%	89.31%	91.03%	93.10%	88.28%	91.38%	93.10%	79.31%
	Linear Classifier	92.41%	97.59%	91.72%	93.45%	95.52%	93.79%	90.69%	92.41%	92.76%	81.38%
	Artificial Neural Networks	77.59%	88.28%	82.07%	84.83%	82.07%	80.34%	78.62%	83.10%	77.93%	77.93%
	Support Vector Machine	92.76%	97.24%	92.76%	98.05%	78.62%	93.45%	94.83%	91.72%	92.41%	81.38%
	AdaBoost	96.55%	97.59%	92.76%	93.10%	93.45%	96.21%	95.86%	92.76%	95.17%	85.17%
	Bagging	77.24%	75.86%	80.69%	76.41%	70.69%	83.45%	80.00%	81.03%	80.34%	80.00%
M-of-n	KNN	100%	100%	100%	99.12%	100%	99.84%	99.98%	98.88%	99.92%	97.50%
	Naive Bayes	78.16%	73.55%	75.93%	86.08%	79.45%	86.60%	88.15%	84.25%	85.85%	77.85%
	Decision Tree	100%	100%	98.65%	100%	100%	100%	100%	100%	100%	100%
	Logistic Regression	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Linear Classifier	100%	100%	95.85%	100%	100%	100%	100%	100%	100%	100%
	Artificial Neural Networks	100%	100%	98.80%	100%	100%	100%	97.20%	100%	100%	100%
	Support Vector Machine	100%	100%	98.85%	100%	100%	100%	100%	100%	100%	97.05%
	AdaBoost	100%	100%	96.05%	100%	100%	100%	100%	100%	100%	84.25%
	Bagging	73.55%	75.85%	75.55%	73.25%	72.95%	73.40%	89.40%	71.65%	70.85%	69.80%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
PenglungEW	KNN	93.43%	90.00%	85.71%	74.29%	92.29%	96.29%	91.43%	93.14%	97.71%	95.14%
	Naive Bayes	95.00%	90.71%	92.86%	87.86%	86.43%	95.00%	88.57%	95.00%	96.43%	88.57%
	Decision Tree	89.29%	72.14%	73.57%	52.86%	88.57%	88.86%	81.43%	85.14%	96.57%	89.71%
	Logistic Regression	94.29%	34.29%	42.14%	32.14%	90.71%	97.85%	87.14%	95.00%	100%	100%
	Linear Classifier	82.86%	82.14%	83.57%	81.43%	88.57%	99.29%	85.71%	90.00%	97.14%	93.57%
	Artificial Neural Networks	70.00%	61.43%	53.57%	68.57%	69.29%	65.71%	60.71%	61.43%	60.71%	72.14%
	Support Vector Machine	94.86%	88.29%	89.71%	85.14%	92.29%	95.00%	90.71%	96.43%	98.57%	94.29%
	AdaBoost	97.86%	94.29%	90.00%	72.86%	87.86%	97.86%	96.43%	95.00%	99.29%	99.29%
	Bagging	66.43%	63.57%	55.71%	64.29%	60.71%	58.57%	62.86%	65.71%	65.71%	58.57%
Sonar	KNN	91.02%	91.51%	87.22%	78.63%	89.95%	91.71%	91.22%	93.27%	96.68%	93.76%
	Naive Bayes	97.88%	97.35%	95.75%	92.83%	97.96%	97.61%	97.79%	97.96%	98.94%	98.05%
	Decision Tree	97.88%	96.19%	95.93%	93.36%	96.99%	96.89%	96.85%	97.63%	97.84%	97.31%
	Logistic Regression	87.32%	82.93%	82.44%	75.37%	87.56%	87.56%	85.85%	86.83%	90.05%	88.05%
	Linear Classifier	89.27%	84.88%	84.63%	73.41%	86.83%	70.83%	87.61%	89.07%	91.12%	87.51%
	Artificial Neural Networks	80.98%	76.59%	77.56%	76.34%	80.00%	80.24%	77.07%	78.78%	82.20%	81.95%
	Support Vector Machine	88.78%	85.76%	83.17%	71.46%	84.88%	86.34%	87.80%	87.80%	92.20%	89.76%
	AdaBoost	96.10%	92.68%	90.98%	83.90%	90.24%	96.59%	97.07%	95.85%	96.83%	97.07%
	Bagging	77.80%	79.27%	74.88%	73.17%	81.71%	79.02%	80.00%	81.22%	88.54%	82.44%
SpectEW	KNN	88.30%	84.75%	83.85%	74.57%	85.58%	85.74%	87.92%	89.36%	89.58%	89.13%
	Naive Bayes	83.21%	83.02%	79.62%	78.11%	83.40%	82.26%	81.32%	87.55%	82.45%	86.60%
	Decision Tree	89.06%	87.36%	87.92%	81.70%	86.79%	89.13%	90.04%	90.72%	90.04%	91.40%
	Logistic Regression	87.17%	87.92%	84.72%	80.38%	89.06%	87.74%	90.38%	89.06%	90.79%	90.19%
	Linear Classifier	87.55%	86.04%	85.47%	77.74%	88.30%	79.47%	88.91%	90.34%	88.15%	89.36%
	Artificial Neural Networks	86.23%	83.21%	75.66%	79.25%	85.09%	86.79%	83.96%	86.79%	88.11%	88.11%
	Support Vector Machine	87.17%	85.89%	87.92%	81.70%	87.74%	78.49%	86.98%	87.92%	89.81%	89.06%
	AdaBoost	89.62%	89.25%	86.23%	79.81%	84.91%	86.98	90.38%	90.57%	92.08%	90.75%
	Bagging	82.45%	78.49%	79.43%	80.57%	76.60%	77.92%	77.36%	79.25%	80.38%	81.13%
Tic-tac-toe	KNN	84.38%	80.57%	79.20%	68.06%	82.12%	77.72%	82.85%	84.04%	83.66%	83.29%
	Naive Bayes	72.36%	73.98%	71.83%	67.85%	70.37%	70.94%	70.73%	73.25%	72.83%	72.88%
	Decision Tree	86.60%	83.30%	83.56%	73.19%	87.23%	77.47%	86.41%	87.14%	87.69%	86.95%
	Logistic Regression	69.63%	67.59%	68.38%	65.34%	69.69%	66.39%	70.21%	67.07%	69.24%	71.94%
	Linear Classifier	67.33%	65.03%	64.97%	65.55%	62.93%	64.69%	65.47%	65.42%	65.86%	64.46%
	Artificial Neural Networks	78.59%	79.32%	74.08%	75.55%	78.53%	72.98%	79.32%	84.24%	83.04%	83.66%
	Support Vector Machine	66.28%	66.12%	67.96%	65.39%	67.07%	66.49%	66.39%	64.82%	65.71%	64.87%
	AdaBoost	100%	91.20%	90.21%	69.58%	90.26%	80.94%	98.64%	100%	100%	100%
	Bagging	74.55%	69.74%	69.58%	67.75%	71.73%	71.31%	73.66%	73.04%	70.52%	72.25%
Vote	KNN	97.33%	96.00%	95.67%	89.07%	96.07%	96.47%	97.33%	98.07%	97.87%	90.48%
	Naive Bayes	96.00%	96.00%	93.67%	86.33%	94.50%	96.50%	97.17%	96.50%	97.33%	96.67%
	Decision Tree	97.33%	96.50%	95.83%	90.33%	97.17%	96.33%	96.80%	97.00%	97.60%	97.13%
	Logistic Regression	97.67%	97.17%	95.33%	87.00%	96.50%	95.83%	97.17%	97.33%	98.33%	97.00%
	Linear Classifier	99.00%	95.83%	95.33%	86.00%	96.50%	93.80%	96.67%	96.73%	96.67%	96.67%
	Artificial Neural Networks	95.33%	94.33%	90.83%	87.17%	91.67%	94.83%	94.33%	94.33%	94.50%	94.33%
	Support Vector Machine	97.00%	95.67%	95.33%	89.33%	95.00%	94.83%	96.50%	97.33%	96.67%	96.67%
	AdaBoost	96.67%	97.33%	95.33%	89.00%	95.83%	97.00%	97.17%	98.00%	99.00%	98.17%
	Bagging	94.17%	96.33%	89.50%	91.83%	94.83%	96.17%	94.83%	95.00%	95.83%	95.83%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
PenglungEW	KNN	96.57%	92.00%	89.33%	91.71%	97.71%	92.29%	95.14%	96.29%	96.29%	88.57%
	Naive Bayes	97.71%	96.43%	93.71%	92.14%	98.57%	90.34%	97.86%	97.86%	97.86%	95.71%
	Decision Tree	88.57%	92.86%	84.29%	83.57%	92.14%	88.57%	92.07%	90.00%	92.14%	73.57%
	Logistic Regression	99.29%	41.43%	53.57%	88.57%	100%	100%	93.79%	95.71%	99.29%	95.00%
	Linear Classifier	93.57%	84.29%	82.86%	84.29%	98.57%	91.43%	94.14%	88.57%	98.57%	90.00%
	Artificial Neural Networks	57.86%	50.00%	63.57%	67.14%	65.71%	51.43%	70.00%	57.86%	67.86%	57.14%
	Support Vector Machine	97.14%	97.14%	94.29%	93.57%	45.00%	98.57%	96.43%	96.43%	98.57%	92.14%
	AdaBoost	97.86%	100%	97.86%	97.86%	97.14%	97.14%	98.57%	97.14%	100%	92.86%
	Bagging	49.29%	59.29%	55.71%	50.86%	54.29%	47.14%	70.00%	50.00%	55.71%	51.43%
Sonar	KNN	94.24%	97.46%	92.32%	92.39%	96.10%	94.83%	93.95%	95.80%	96.88%	87.61%
	Naive Bayes	98.12%	95.04%	98.00%	98.87%	91.95%	98.58%	98.32%	98.05%	98.58%	94.69%
	Decision Tree	97.61%	98.58%	97.96%	97.61%	97.52%	97.96%	98.05%	97.88%	98.05%	95.31%
	Logistic Regression	85.12%	90.49%	88.78%	89.27%	91.22%	88.29%	89.51%	91.22%	88.78%	84.15%
	Linear Classifier	88.29%	93.66%	89.51%	90.24%	90.73%	90.24%	89.76%	89.76%	91.95%	83.90%
	Artificial Neural Networks	80.00%	80.24%	75.85%	83.41%	80.49%	79.51%	82.20%	82.68%	80.00%	81.46%
	Support Vector Machine	90.24%	93.90%	89.76%	89.51%	91.95%	87.80%	88.29%	82.68%	91.46%	82.93%
	AdaBoost	96.34%	99.51%	97.07%	98.05%	99.02%	97.32%	96.10%	98.29%	98.78%	91.95%
	Bagging	79.27%	76.34%	73.90%	75.37%	80.49%	78.29%	82.68%	79.27%	73.90%	74.15%
SpectEW	KNN	87.62%	91.92%	86.60%	87.84%	90.64%	89.51%	89.81%	90.34%	91.02%	82.57%
	Naive Bayes	80.22%	80.00%	83.65%	88.68%	79.06%	85.66%	82.26%	83.77%	85.47%	84.34%
	Decision Tree	89.81%	91.89%	90.94%	90.75%	90.38%	88.87%	92.08%	88.87%	90.75%	83.58%
	Logistic Regression	87.55%	90.94%	91.51%	87.92%	90.19%	91.13%	88.87%	89.25%	89.43%	87.55%
	Linear Classifier	87.92%	90.57%	89.06%	89.25%	89.25%	90.38%	89.76%	89.62%	88.11%	81.32%
	Artificial Neural Networks	85.85%	88.49%	85.28%	88.49%	87.36%	85.47%	81.32%	87.74%	85.66%	80.38%
	Support Vector Machine	89.43%	91.89%	88.11%	88.87%	88.87%	88.49%	89.43%	87.74%	89.25%	80.94%
	AdaBoost	90.75%	93.21%	89.81%	91.70%	90.19%	89.81%	91.32%	91.32%	91.51%	83.77%
	Bagging	80.00%	79.25%	80.57%	78.30%	80.19%	81.70%	87.17%	78.87%	78.87%	79.25%
Tic-tac-toe	KNN	83.51%	84.57%	81.63%	83.60%	83.96%	83.75%	83.98%	83.41%	83.98%	69.51%
	Naive Bayes	73.24%	65.29%	73.35%	72.57%	70.52%	70.73%	72.67%	70.05%	73.04%	68.17%
	Decision Tree	87.70%	87.07%	87.17%	87.02%	87.59%	88.06%	87.43%	86.70%	87.12%	77.43%
	Logistic Regression	69.37%	68.90%	70.00%	69.69%	71.26%	69.01%	69.21%	68.43%	69.84%	66.18%
	Linear Classifier	63.35%	64.82%	66.07%	64.19%	63.46%	64.03%	66.13%	63.56%	65.50%	65.39%
	Artificial Neural Networks	80.73%	79.74%	77.80%	80.58%	81.83%	81.31%	76.75%	80.21%	81.47%	75.86%
	Support Vector Machine	64.82%	64.87%	65.50%	65.34%	65.86%	64.97%	65.71%	80.21%	64.92%	66.13%
	AdaBoost	100%	100%	98.90%	100%	100%	100%	100%	100%	100%	70.05%
	Bagging	65.29%	64.87%	63.56%	63.40%	65.34%	66.18%	81.10%	64.29%	64.08%	66.44%
Vote	KNN	97.40%	99.00%	96.66%	97.27%	98.07%	97.27%	98.27%	97.40%	97.80%	93.87%
	Naive Bayes	96.67%	94.33%	97.67%	96.33%	92.67%	96.50%	96.33%	96.67%	97.00%	88.33%
	Decision Tree	96.33%	97.83%	96.83%	97.17%	96.67%	97.50%	97.33%	96.33%	97.50%	93.83%
	Logistic Regression	97.83%	99.00%	96.50%	97.00%	97.33%	94.17%	97.17%	97.17%	97.50%	91.00%
	Linear Classifier	97.00%	97.83%	96.33%	97.67%	97.67%	97.00%	96.83%	97.00%	97.50%	95.83%
	Artificial Neural Networks	94.67%	94.50%	94.83%	95.67%	94.00%	94.17%	92.67%	94.00%	93.50%	94.50%
	Support Vector Machine	96.83%	98.00%	94.50%	96.83%	98.17%	98.33%	97.00%	94.00%	95.67%	95.17%
	AdaBoost	97.00%	98.83%	99.00%	97.50%	98.83%	97.00%	98.00%	96.50%	98.17%	96.67%
	Bagging	94.33%	94.17%	92.83%	93.50%	93.50%	94.50%	93.67%	95.33%	91.67%	93.00%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		RSA	WSO	ARO	SAO	KMA	SHO	AFT	CSA	ESOA	FHO
WaveformEW	KNN	83.67%	83.12%	80.58%	75.86%	84.12%	79.91%	83.47%	84.43%	84.16%	84.26%
	Naive Bayes	82.51%	83.15%	81.82%	77.75%	82.09%	79.71%	82.91%	82.60%	83.66%	82.91%
	Decision Tree	77.33%	77.74%	74.97%	71.70%	75.05%	74.05%	77.27%	74.76%	77.78%	78.05%
	Logistic Regression	87.20%	86.64%	84.46%	82.00%	84.30%	83.92%	86.66%	87.31%	87.00%	87.46%
	Linear Classifier	87.21%	86.95%	85.11%	82.60%	86.99%	84.28%	86.14%	87.57%	87.08%	87.05%
	Artificial Neural Networks	84.55%	84.65%	78.93%	78.93%	85.00%	81.66%	84.94%	84.41%	85.25%	84.26%
	Support Vector Machine	87.16%	87.22%	84.87%	79.98%	86.10%	83.05%	86.86%	87.19%	86.92%	87.26%
	AdaBoost	84.34%	84.66%	82.48%	77.27%	84.20%	78.91%	83.45%	84.28%	84.89%	84.68%
	Bagging	77.92%	78.06%	73.65%	74.33%	78.61%	73.38%	78.13%	77.85%	78.46%	78.63%
Wine	KNN	98.40%	95.77%	94.63%	78.17%	93.37%	96.23%	98.63%	97.94%	98.29%	97.94%
	Naive Bayes	99.71%	99.71%	99.71%	96.29%	97.14%	99.43%	100%	100%	100%	100%
	Decision Tree	98.57%	98.00%	95.71%	87.71%	94.29%	97.60%	98.63%	98.63%	99.09%	98.29%
	Logistic Regression	98.57%	97.43%	97.14%	83.71%	97.14%	96.85%	98.57%	99.71%	99.43%	98.86%
	Linear Classifier	98.29%	98.29%	96.86%	88.29%	94.86%	97.14%	98.00%	99.14%	99.43%	99.71%
	Artificial Neural Networks	56.00%	72.29%	72.57%	63.14%	72.57%	87.14%	73.14%	54.29%	74.29%	89.43%
	Support Vector Machine	100%	98.97%	98.86%	93.43%	97.26%	98.40%	99.43%	99.71%	99.71%	99.31%
	AdaBoost	99.43%	96.86%	97.71%	59.14%	97.71%	97.71%	98.86%	99.14%	99.43%	99.43%
	Bagging	96.86%	97.14%	93.71%	95.71%	94.29%	96.00%	97.14%	97.43%	97.43%	95.71%
Zoo_data	KNN	96.00%	93.40%	93.00%	81.60%	93.80%	94.80%	97.00%	96.40%	98.20%	97.20%
	Naive Bayes	93.00%	92.00%	90.00%	84.50%	92.50%	77.50%	94.50%	93.50%	95.00%	94.50%
	Decision Tree	99.00%	96.50%	93.50%	85.50%	94.00%	97.40%	97.20%	98.60%	99.00%	99.00%
	Logistic Regression	94.50%	92.50%	95.00%	84.00%	93.50%	91.50%	96.00%	97.00%	95.50%	97.00%
	Linear Classifier	99.00%	99.00%	98.50%	89.50%	95.50%	96.50%	97.00%	99.00%	100%	97.50%
	Artificial Neural Networks	93.00%	97.00%	90.00%	85.50%	93.00%	96.00%	93.00%	90.00%	95.50%	93.00%
	Support Vector Machine	98.00%	98.20%	97.60%	86.00%	96.40%	96.00%	98.00%	100%	100%	99.80%
	AdaBoost	98.50%	97.50%	98.00%	76.50%	96.00%	97.50%	99.00%	99.50%	99.50%	99.50%
	Bagging	87.00%	87.50%	89.00%	80.00%	87.00%	81.50%	87.00%	81.50%	87.00%	90.00%

TABLE XII: Continued

Dataset	Classifier	80-20 training-validation									
		BWO	DMOA	DO	CapSA	RUN	TSO	AHA	HBA	Crystal	SO
WaveformEW	KNN	82.52%	85.26%	83.82%	83.72%	84.62%	84.31%	83.40%	84.06%	84.41%	81.46%
	Naive Bayes	80.14%	83.74%	84.70%	83.35%	84.08%	83.61%	83.28%	82.78%	83.46%	80.14%
	Decision Tree	76.99%	79.23%	78.49%	77.93%	78.97%	78.11%	90.69%	77.72%	78.73%	73.97%
	Logistic Regression	87.13%	87.87%	87.19%	87.40%	87.39%	87.11%	93.79%	86.93%	87.40%	85.13%
	Linear Classifier	87.40%	88.14%	87.46%	87.42%	88.10%	87.72%	94.14%	87.28%	87.88%	86.56%
	Artificial Neural Networks	83.98%	85.62%	83.61%	83.93%	83.97%	84.13%	82.40%	84.43%	84.77%	81.68%
	Support Vector Machine	87.80%	88.10%	87.48%	87.18%	72.19%	87.73%	86.95%	87.43%	87.82%	85.82%
	AdaBoost	84.95%	85.01%	84.71%	85.03%	85.22%	84.93%	84.13%	84.67%	84.70%	80.08%
	Bagging	71.72%	72.69%	71.75%	72.63%	72.47%	73.07%	82.23%	70.14%	71.86%	71.50%
Wine	KNN	98.51%	98.97%	97.20%	97.82%	98.40%	98.17%	98.40%	98.29%	98.97%	91.09%
	Naive Bayes	99.77%	100%	100%	100%	100%	100%	100%	100%	100%	98.86%
	Decision Tree	99.14%	99.71%	98.57%	98.86%	99.14%	99.14%	93.10%	97.71%	99.43%	94.86%
	Logistic Regression	98.86%	99.43%	98.57%	98.57%	99.71%	99.43%	90.34%	98.86%	99.14%	97.71%
	Linear Classifier	99.71%	99.71%	99.14%	98.29%	99.14%	99.14%	95.52%	98.57%	99.43%	100%
	Artificial Neural Networks	90.00%	67.71%	72.00%	90.86%	84.29%	68.86%	65.14%	71.14%	65.43%	62.00%
	Support Vector Machine	99.71%	100%	99.43%	99.71%	95.43%	99.71%	100%	99.71%	100%	98.86%
	AdaBoost	99.71%	100%	99.43%	99.43%	100%	99.43%	99.71%	98.57%	100%	100%
	Bagging	92.86%	91.43%	91.43%	93.83%	95.43%	92.29%	98.57%	93.43%	92.00%	91.43%
Zoo_data	KNN	98.20%	98.20%	96.13%	96.20%	97.40%	95.80%	98.20%	96.40%	98.00%	94.80%
	Naive Bayes	93.40%	94.50%	92.50%	93.50%	97.00%	94.50%	94.50%	93.00%	94.00%	85.00%
	Decision Tree	99.00%	100%	99.00%	99.00%	99.00%	99.00%	92.76%	99.50%	97.50%	97.50%
	Logistic Regression	97.50%	95.00%	94.00%	95.00%	97.50%	99.50%	93.45%	96.50%	97.00%	94.00%
	Linear Classifier	100%	100%	99.50%	99.50%	100%	99.50%	93.10%	100%	99.00%	99.50%
	Artificial Neural Networks	93.00%	95.50%	95.00%	94.50%	97.50%	92.00%	94.50%	95.50%	95.00%	95.00%
	Support Vector Machine	100%	99.50%	99.00%	100%	69.00%	99.50%	100%	99.50%	100%	99.50%
	AdaBoost	100%	100%	99.00%	99.50%	100%	100%	100%	100%	100%	100%
	Bagging	63.00%	64.50%	72.00%	69.60%	74.50%	70.00%	99.00%	66.00%	68.50%	62.00%