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Research Article

Unsupervised Discretization: An Analysis of Classification Approaches for Clinical Datasets

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Abstract: Discretization is a frequently used data preprocessing technique for enhancing the performance of data mining tasks in knowledge discovery from clinical data. It is used to transform the real-world quantitative data into qualitative data. The aim of this study is to present an experimental analysis of the variation in performance of two trivial unsupervised discretization methods with respect to different classification approaches. Equal width discretization and equal frequency discretization methods are applied for four benchmark clinical datasets obtained from the University of California, Irvine, machine learning repository. Both the methods were applied for transforming quantitative attributes into qualitative attributes with three, five, seven and ten intervals. Six classification approaches were evaluated using four evaluation measures. From the results of this experimental analysis, it can be observed that there is a variation in the performance of classification algorithms. Accuracy of classification varies with respect to the discretization method used and also with respect to the number of intervals of discretization. Moreover it can be inferred that different classification approaches require different discretization methods. No method can be deemed to be 'the best-suitable' for all applications; hence the choice of an appropriate discretization method application.

Keywords: Classification, clinical knowledge-mining, equal frequency discretization, equal width discretization, qualitative data, quantitative data

INTRODUCTION

Data mining is one of the emerging research areas in computer science and information technology. It is a process of extracting patterns, useful information or from retrospective, massive trends. and multidimensional data. Some application areas of data mining techniques for knowledge extraction include business, academics and medicine. Generally, clinical decisions on medical data are often made based on doctor's perception and experience rather than on the knowledge hidden in the database. This might lead to bias, errors and excessive medical costs which affects the quality of service provided to patients. Therefore, Knowledge Discovery in Databases (KDD) is commonly used to improve the quality of service. Integration of KDD process with medical data could reduce medical errors, provide clinical decision support and improve the diagnostic process. Data mining is an important step in KDD and is used for various aspects

in the medical domain such as diagnosis, prognosis and decision support (Christopher et al., 2015; Jane et al., 2016; Nahato et al., 2015; Susmi et al., 2015; Sweetlin et al., 2016). KDD involves the process of finding and interpreting knowledge from data which is described by the following steps: 1)understanding of domain 2) data set selection, 3) data cleaning and preprocessing, 4) data reduction and projection, 5) matching the objective into a data mining method (association rule mining, classification, clustering, regression etc.,), 6) choice of the algorithm for pattern searching, 7) searching for pattern of interest (data mining),8) data interpretation and 9) use of the discovered knowledge (Fayyad et al., 1996). Most prior work on KDD focuses on step 7, the data mining step. Data mining applications often involve quantitative data. However many learning algorithms are intended to handle qualitative data (Kohavi and Sahami, 1996). Algorithms that directly deal with quantitative data, learning is less efficient and less effective (Richeldi and Rossotto, 1995). In many

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machine learning techniques we need to transform such quantitative data into qualitative data. This process is called data discretization. Data discretization refers to partitioning the data into discrete set of intervals. Each interval is treated as a category.

Data discretization simplifies the original data and also improves the efficiency of prediction. It has several advantages in machine learning and data mining tasks. In particular, it increases the understandability of the classification models that uses rule sets (Liu et al., 2002; Fu, 2011). It also reduces the computation time needed for processing the continuous data by dividing data into reduced set of intervals (Mittal and Cheong, 2002). Maslove et al. (2013) have evaluated six discretization methods: two supervised methods (minimum descriptive length-based and ChiMerge), three unsupervised methods (equal width, equal frequency and K-means) and one method specific to clinical data with both supervised and unsupervised components (reference range based). They have examined the impact of discretization on three evaluation parameters: accuracy, consistency and simplicity. To evaluate the six discretization methods for accuracy, each of the discretization methods are examined with decision tree and naïve-bayes classification approach. They have evaluated the discretization methods for consistency by deriving the inconsistency count for each discretization experiment. For evaluating simplicity, they count the number of nodes in each decision tree generated by each of the discretization methods. For the evaluation of discretization methods, they use both laboratory data and physiologic data derived from adult patients in the intensive care unit. From the result, they observed that supervised methods were more accurate than unsupervised. Among the supervised methods, equal frequency and K-means performed well.

Yang and Webb (2009) have proved that discretization is an effective technique for probabilitybased learning. In their study it was inferred that, the effectiveness of discretization in naïve-bayes learning has impact on the performance of naïve-bayes classifiers. They make use of classification error as a performance measure for naïve-bayes classifier. In order to minimize the classification error, they analyze two factors with respect to discretization: 1) Decision boundaries and 2) the error tolerance of probability estimation for each quantitative attribute. From the analysis they conclude that discretization with these factors can affect the classification bias and variance of the classifiers. The effects are named as discretization bias and discretization variance. To manage the discretization bias and variance, they use the concepts called interval frequency and interval number. Moreover, they propose two efficient unsupervised discretization methods called proportional discretization and fixed frequency discretization for managing discretization bias and variance. They evaluate these two methods against four discretization methods for naïve-bayes classifier on 29 benchmark datasets from UCI machine learning repository. The results have demonstrated that the new proposed discretization methods reduce naïve-bayes classification when compared to current established error discretization methods.

This study focuses on two unsupervised discretization techniques: Equal width Discretization and Equal Frequency Discretization. Continuous-valued attributes are discretized into several intervals and the classification performances of five classification approaches are analyzed. The novel observations and findings of the experimental analysis can serve as guiding principles for preprocessing of clinical data.

MATERIALS AND METHODS

The clinical datasets used in this experimental study were selected from the University of California Irvine (UCI) Machine Learning repository. Datasets which contain categorical, discrete and continuous data were chosen. The list of datasets is presented in Table 1. The description about the Cleveland Heart Disease (CHD) dataset, Chronic Kidney Disease (CKD) dataset, Pima Indians Diabetes (PID) dataset and BUPA Liver Disorder (BLD) dataset are presented in Table 2 to 5 respectively. In particular, the PID dataset consists the details of 768 Pima Indian Women.

The continuous-valued attributes in these datasets were discretized using Equal width discretization and equal frequency discretization methods. The former method divides the continuous-valued feature 'f' into k intervals of equal width, where k is a user-defined parameter. Thus each interval has a width (w), where w = (max-min) /k and interval boundaries are min+w, min+2w, ..., min+(k-1)w. The latter method divides the range of continuous-valued feature into k equally sized bins. Each interval contains approximately same number of instances, where k is a user-defined

Table 1: Datasets used		
Dataset	Number of instances	Number of features
Pima Indians Diabetes (PID)	768	9
BUPA Liver Disorder (BLD)	345	7
Cleveland Heart Disease (CHD)	303	76
Chronic Kidney Disease (CKD)	400	25

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Attribute name	Description	Туре	Range
Age	Age of the person	Discrete	29-77
Sex	Sex of the person	Categorical	0-1
Ср	Chest pain type	Categorical	1-4
Trestbps	Resting blood pressure	Continuous	94-200
Chol	Serum cholestoral	Continuous	126-564
Fbs	Fasting blood sugar	Categorical	0-1
Restecg	Resting electrocardiographic results	Categorical	0-2
Thalach	Maximum heart rate achieved	Continuous	71-202
Exang	Exercise induced angina	Categorical	0-1
Oldpeak	ST depression induced by exercise relative to rest	Continuous	0-6.2
Slope	The slope of the peak exercise ST segment	Categorical	1-3
Ca	Number of major vessels (0-3) colored by flourosopy	Categorical	0-3
Thal	Defect types	Categorical	3-7
Class	Presence /Absence of heart disease	Categorical	0-4

Table 2: Description of cleveland heart disease dataset

Table 3: Description of chronic kidney disease dataset

Attribute name	Description	Туре	Range
Age	Age in years	Discrete	12-90
Bp	Blood pressure	Continuous	50-180
Sg	Specific gravity	Categorical	1.005, 1.010, 1.015, 1.020, 1.025
Al	Albumin	Categorical	0-5
Su	Sugar	Categorical	0-5
Rbc	Red blood cells	Categorical	Normal, abnormal
Pc	Pus cell	Categorical	Normal, abnormal
Pcc	Pus cell clumps	Categorical	Present, not present
Ba	Bacteria	Categorical	Present, not present
Bgr	Blood glucose random	Continuous	22-490
Bu	Blood urea	Continuous	1.5-391
Sc	Serum creatinine	Continuous	0.4-76
Sod	Sodium	Continuous	4.5-163
Pot	Potassium	Continuous	2.5-47
Hemo	Hemoglobin	Continuous	3.1-17.8
Pcv	Packed cell volume	Continuous	9-54
Wc	White blood cell count	Continuous	2200-26400
Rc	Red blood cell count	Continuous	2.1-8
Htn	Hypertension	Categorical	Yes, no
Dm	Diabetes mellitus	Categorical	Yes, no
Cad	Coronary artery disease	Categorical	Yes, no
Appet	Appetite	Categorical	Good, poor
Pe	Pedal edema	Categorical	Yes, no
Ane	Anemia	Categorical	Yes, no
Class	Presence/Absence of kidney disease	Categorical	ckd, notckd

Table 4:	Description	of pima	Indian	diabetes	dataset
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Attribute name	Description	Туре	Range
Preg	Number of times pregnant	Discrete	0-17
Glucose	Plasma glucose concentration a 2 h in an oral glucose tolerance test	Continuous	0-199
Вр	Diastolic blood pressure	Continuous	0-122
Skin	Triceps skin fold thickness	Continuous	0-99
Insulin	2-Hour serum insulin	Continuous	0-846
BMI	Body mass index	Continuous	0-67.1
Pedi	Diabetes pedigree function	Continuous	0-2.42
Age	Age of the person	Discrete	21-81
Class	Diabetes/Non-Diabetes	Categorical	0-1

Table 5: Description of liver disorder dataset

Attribute name	Description	Туре	Range
Mcv	Mean corpuscular volume	Continuous	65-103
Alkphos	Alkaline phosphotase	Continuous	23-138
Sgpt	Alamine aminotransferase	Continuous	4-155
Sgot	Aspartate aminotransferase	Continuous	5-82
Gammagt	Gamma-glutamyltranspeptidase	Continuous	5-297
Drinks	Number of half-pint equivalents of alcoholic beverages drunk per day	Continuous	0-20
Class	Diagnosis of disease	Categorical	Present/Absent

parameter. Thus each interval contain n/k values, where 'n' is the total number of instances (records) in the dataset. The discretized data is split into training and testing data. The former is used for obtaining the classifier using an induction algorithm and the latter is used for evaluating the performance of the classifier using performance evaluation measures.

Cross-Validation (CV) with 'k' folds is a technique whereby the dataset 'D', is randomly split into k folds of approximately equal size. The classifier (model) is trained and tested k times. Each time (k-1) folds are used for training and the remaining one fold is used for testing. In classification, k-fold cross-validation is the best method to use for validating and selecting a classifier (Kohavi, 1995). Associative classifier (CBA), Decision tree classifier (C4.5), Support Vector Machine (SVM), Multi-Layer Perceptron classifier (MLP), Naïve Bayes classifier (NB) and k-Nearest Neighbour classifier (kNN) are validated (Han and Kamber, 2006).

In this experimental study, six trivial classification approaches were used. Each approach differs from the other in two aspects: first, the induction (learning) algorithm used for training the classifier; and second, the knowledge-representation form used to represent the classification model. The six classification approaches are as follows: first, a decision tree classifier (Quinlan, 1986), induced (trained) using the C4.5 algorithm is used. The classifier (knowledge model) is represented in the form of a tree; second, the naïve Bayes classifier uses a probabilistic induction approach and the knowledge model is represented in the form of probabilistic values; third, the Class-Based Associative (CBA) (Liu et al., 1998) classifier uses an Apriori-based (Agrawal and Srikant. 1994) classification rule induction approach and the knowledge model is represented in the form of IF-THEN associative classification rules; fourth, the Multilayer Perceptron (MLP) (Rosenblatt, 1958) is using induced а gradient descent-based backpropagation algorithm and the knowledge is represented by a trained feed-forward Neural Network; fifth, the Support Vector Machine (Boser et al., 1992) is induced using the Sequential Minimal Optimization (SMO) algorithm and the knowledge model is represented in the form of support vectors and the separating hyper planes; sixth, the K-NN classifier trained using distance-based approach and the classifier is represented in terms of distance measures from neighboring instances. The choice of a classification approach and an appropriate classifier depends on the need and purpose of the classifier for that domain of application. Moreover, factors such as data distribution, entropy of discretization may also be considered.

In this experimental study, four performance evaluation measures were used. The four measures

namely, Sensitivity, Specificity, Fmeasure and Accuracy differ in their evaluation focus. Sensitivity is used to evaluate the effectiveness of a classifier to identify positive labels whereas Specificity evaluates how effectively a classifier identifies negative labels. Fmeasurerelates between data's positive labels and those given by a classifier based on per-class average and finally Accuracy evaluates the overall classification efficiency of the classifier.

RESULTS AND DISCUSSION

The evaluation of classification performance of six classification approaches for equal width discretization and equal frequency discretization is presented in Table 6. A discussion on the observations, findings and important inferences are presented below.

For the PID dataset, bayes classifier achieves the highest accuracy of 76.307% for EW discretization with 7 intervals whereas the bayes classifier with 7 intervals for EF discretization yields 73.96%. The highest accuracy for EF discretization for the PID dataset is achieved by C4.5 algorithm (74.867%). Though entropy of the partitions (intervals) are proportional to the number of partitions, a drop in classification accuracy for increase in the number of partitions can be inferred. This accuracy-drop is due to the intercorrelation between the attribute-subset and also the correlation between the attribute and the class attribute. A diminish in the former and a rise in the latter is preferred.

A change in the choice of the attribute selection order or the attribute-subset, for the construction of a decision tree, may result in a variation in classification performance. For example, the highest classification accuracy for EF discretization, for the BLD dataset was achieved by the C4.5 classifier trained using 3 intervals. Moreover, the increase in the number of intervals enhanced the information gain of the individual attributes. But during tree construction, the attributesubsets for lower levels of the trees yields different combination of attributes; different combination of attributes in the attribute-subsets differ in the level of inter-correlation. Hence a fall in accuracy for EF 10interval can be observed.

In some scenarios, as the number of intervals increase the number of pure partitions also increase; a pure partition has low entropy and hence it is a desirable characteristic for classification. For example, in the case of the CKD dataset, a drop in accuracy for the five-interval data can be observed. This is due to the disproportionate change in the number of pure partitions for a linear increase in the number of intervals.

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Table 6: Classification performance evaluation for Equal Width (EW) and Equal Frequency (EF) discretization methods

		No. of	SVM				KNN				C4.5			
Dataset	Method	No. of Intervals	*Acc	Sen	Spec	Fmes	Acc	Sen	Spec	Fmes	Acc	Sen	Spec	Fme
ID	EW	3	73.823	0.589	0.818	0.606	72.650	0.604	0.792	0.605	73.043	0.563	0.820	0.58
		5	68.628	0.246	0.922	0.353	71.476	0.537	0.810	0.563	73.963	0.529	0.852	0.58
		7	69.137	0.320	0.890	0.412	68.749	0.485	0.796	0.517	74.475	0.607	0.818	0.61
		10	64.985	0.272	0.852	0.350	67.984	0.463	0.796	0.501	73.307	0.428	0.896	0.52
	EF	3	73.438	0.544	0.836	0.583	68.630	0.623	0.720	0.580	75.133	0.566	0.850	0.61
		5	70.965	0.366	0.894	0.462	72.920	0.672	0.760	0.633	74.867	0.570	0.844	0.60
		7	66.541	0.250	0.888	0.338	69.405	0.571	0.760	0.563	73.706	0.489	0.870	0.56
		10	63.156	0.026	0.956	0.047	66.806	0.560	0.726	0.539	72.262	0.462	0.862	0.53
CHD	EW	3	81.151	0.807	0.818	0.821	77.892	0.861	0.679	0.810	76.237	0.808	0.708	0.78
		5	81.473	0.868	0.752	0.837	80.441	0.885	0.709	0.834	77.538	0.827	0.716	0.79
		7	82.817	0.855	0.795	0.847	79.806	0.903	0.673	0.831	77.194	0.819	0.715	0.79
	F F	10	80.204	0.813	0.788	0.819	78.161	0.903	0.636	0.822	79.183	0.850	0.724	0.81
	EF	3	82.452	0.867	0.773	0.845	80.161	0.892	0.694	0.833	77.183	0.826	0.709	0.79
		5	79.839	0.849	0.737 0.714	0.822	80.817	0.879	0.723	0.834	77.860	0.844	0.701	0.80
		7 10	79.484 75.505	0.860 0.842	0.714 0.649	0.823 0.791	77.161 82.430	0.848 0.909	0.680 0.722	0.802	77.527 78.204	0.838 0.839	0.701	0.80 0.80
BLD	EW	3	73.303 58.277	0.842	0.849	0.791	82.430 59.479	0.909	0.722	0.853 0.460	78.204 55.941	0.839	0.716 0.835	0.80
SLD	EW	5	57.689	0.049	0.970	0.083	59.479 53.286	0.425	0.720	0.400	55.908	0.177	0.833	0.22
		3 7	60.017	0.350	0.913	0.137	55.924	0.407	0.580	0.418	54.815	0.386	0.665	0.20
		10	64.916	0.330	0.820	0.419	62.622	0.648	0.580	0.490	61.151	0.438	0.735	0.41
	EF	3	64.655	0.386	0.835	0.473	64.353	0.655	0.635	0.607	70.983	0.522	0.845	0.47
	LI	5	64.429	0.459	0.780	0.512	60.555	0.594	0.615	0.555	66.420	0.407	0.850	050
		7	60.908	0.366	0.785	0.434	59.975	0.600	0.600	0.554	65.513	0.477	0.785	0.53
		10	62.655	0.271	0.885	0.368	56.496	0.551	0.575	0.517	64.681	0.450	0.790	0.49
CKD	EW	3	96.000	0.936	1.000	0.966	94.750	0.916	1.000	0.955	98.000	0.988	0.967	0.98
	2.0	5	92.250	0.896	0.967	0.935	88.750	0.820	1.000	0.898	98.000	0.972	0.993	0.98
		7	94.250	0.948	0.933	0.954	88.750	0.824	0.993	0.897	98.000	0.976	0.987	0.98
		10	94.500	0.948	0.940	0.955	88.750	0.824	0.993	0.898	96.250	0.956	0.973	0.97
	EF	3	95.500	0.944	0.973	0.963	92.250	0.876	1.000	0.931	97.000	0.956	0.993	0.97
		5	96.250	0.960	0.967	0.969	91.500	0.868	0.993	0.926	98.250	0.976	0.993	0.98
		7	95.250	0.956	0.947	0.962	92.000	0.876	0.993	0.930	97.500	0.964	0.993	0.97
					0.007				1 000		07 250	0.070	0.993	
		10	92.550	0.936	0.907	0.939	91.750	0.868	1.000	0.928	97.250	0.960	0.995	0.97
			92.550 CBA	0.936	0.907	0.939	Bayes	0.868	1.000	0.928	97.250 MLP	0.960	0.995	0.97
<u></u>) (-th - d	No. of	CBA				Bayes				MLP			
	Method	No. of Intervals	CBA Acc	Sen	Spec	Fmes	Bayes Acc	Sen	Spec	Fmes	MLP Acc	Sen	Spec	Fme
	Method EW	No. of Intervals 3	CBA Acc 65.106	Sen 0.000	Spec 1.000	Fmes 0.000	Bayes Acc 73.561	Sen 0.562	Spec 0.828	Fmes 0.591	MLP 71.625	Sen 0.534	Spec 0.814	Fme 0.56
Dataset PID		No. of Intervals 3 5	CBA 65.106 63.93	Sen 0.000 0.422	Spec 1.000 0.756	Fmes 0.000 0.307	Bayes 73.561 75.267	Sen 0.562 0.604	Spec 0.828 0.832	Fmes 0.591 0.625	MLP 71.625 70.444	Sen 0.534 0.515	Spec 0.814 0.806	Fme 0.56 0.54
		No. of Intervals 3 5 7	CBA Acc 65.106 63.93 65.106	Sen 0.000 0.422 0.000	Spec 1.000 0.756 1.000	Fmes 0.000 0.307 0.000	Bayes <u>Acc</u> 73.561 75.267 76.307	Sen 0.562 0.604 0.653	Spec 0.828 0.832 0.822	Fmes 0.591 0.625 0.656	MLP 71.625 70.444 68.628	Sen 0.534 0.515 0.503	Spec 0.814 0.806 0.784	Fme 0.56 0.54 0.52
	EW	No. of Intervals 3 5 7 10	CBA 65.106 63.93 65.106 67.196	Sen 0.000 0.422 0.000 0.759	Spec 1.000 0.756 1.000 0.624	Fmes 0.000 0.307 0.000 0.580	Bayes <u>Acc</u> 73.561 75.267 76.307 75.533	Sen 0.562 0.604 0.653 0.645	Spec 0.828 0.832 0.822 0.814	Fmes 0.591 0.625 0.656 0.646	MLP 	Sen 0.534 0.515 0.503 0.605	Spec 0.814 0.806 0.784 0.808	0.97 Fme 0.56 0.54 0.52 0.61
		No. of Intervals 3 5 7 10 3	CBA Acc 65.106 63.93 65.106 67.196 67.051	Sen 0.000 0.422 0.000 0.759 0.873	Spec 1.000 0.756 1.000 0.624 0.562	Fmes 0.000 0.307 0.000 0.580 0.650	Bayes 	Sen 0.562 0.604 0.653 0.645 0.672	Spec 0.828 0.832 0.822 0.814 0.790	Fmes 0.591 0.625 0.656 0.646 0.649	MLP 	Sen 0.534 0.515 0.503 0.605 0.578	Spec 0.814 0.806 0.784 0.808 0.760	Fme 0.56 0.54 0.52 0.61 0.57
	EW	No. of Intervals 3 5 7 10 3 5	CBA 65.106 63.93 65.106 67.196 67.051 63.937	Sen 0.000 0.422 0.000 0.759 0.873 0.248	Spec 1.000 0.756 1.000 0.624 0.562 0.848	Fmes 0.000 0.307 0.000 0.580 0.650 0.179	Bayes 73.561 75.267 76.307 75.533 74.880 74.228	Sen 0.562 0.604 0.653 0.645 0.672 0.675	Spec 0.828 0.832 0.822 0.814 0.790 0.778	Fmes 0.591 0.625 0.656 0.646 0.649 0.645	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579	Spec 0.814 0.806 0.784 0.808 0.760 0.806	Fme 0.56 0.54 0.52 0.61 0.57 0.59
	EW	No. of Intervals 3 5 7 10 3 5 7	CBA 65.106 63.93 65.106 67.196 67.051 63.937 65.106	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000	Bayes 73.561 75.267 76.307 75.533 74.880 74.228 73.968	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.646	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57
D	EW EF	No. of Intervals 3 5 7 10 3 5 7 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.000	Bayes <u>Acc</u> 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.686	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.646 0.646 0.654	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58
	EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.000 0.673	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.000 0.740	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.686 0.837	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.646 0.654 0.844	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80
D	EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.000 0.673 0.624	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832 0.884	Fmes 0.000 0.307 0.000 0.580 0.179 0.000 0.000 0.740 0.721	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 75.005 82.796 83.462	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.686 0.837 0.856	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.646 0.654 0.844 0.853	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820 0.836	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83
PID	EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577	Spec 1.000 0.756 1.000 0.624 0.848 1.000 1.000 0.832 0.884 0.869	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661	Bayes 	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.686 0.837 0.856 0.861	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.852	MLP 	Sen 0.534 0.515 0.503 0.578 0.578 0.575 0.575 0.820 0.836 0.814	Spec 0.814 0.806 0.784 0.760 0.806 0.760 0.806 0.778 0.796 0.737 0.810 0.781	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83 0.81
PID	EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 65.106 74.237 70.989 68.419	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518	Spec 1.000 0.756 1.000 0.624 0.848 1.000 1.000 0.832 0.884 0.869 0.884	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.000 0.740 0.721 0.661 0.614	Bayes 	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.682 0.886 0.837 0.856 0.861 0.868	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.778 0.778 0.778 0.818 0.803 0.810	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.645 0.645 0.854 0.853 0.852 0.857	MLP 	Sen 0.534 0.515 0.503 0.578 0.578 0.575 0.820 0.836 0.814 0.849	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83 0.81 0.84
PID	EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 65.106 74.570 74.237 70.989 68.419 76.849	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832 0.884 0.869 0.884 0.803	Fmes 0.000 0.307 0.000 0.580 0.179 0.000 0.740 0.721 0.661 0.614 0.776	Bayes 	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.682 0.887 0.856 0.837 0.856 0.861 0.868 0.873	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.810 0.825	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.645 0.645 0.853 0.853 0.852 0.857 0.867	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83 0.81 0.84 0.81
PID	EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 5	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.237 70.989 68.419 76.849 67.753	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.884 0.803 0.836	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 84.140 85.108 85.430	Sen 0.562 0.604 0.653 0.645 0.672 0.682 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.785 0.818 0.803 0.810 0.825 0.832	Fmes 0.591 0.625 0.656 0.646 0.649 0.645 0.645 0.645 0.853 0.853 0.852 0.857 0.867 0.868	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.778 0.778 0.810 0.781 0.809 0.765 0.796	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83 0.81 0.84 0.81
PID	EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832 0.884 0.869 0.884 0.803 0.836 0.836	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.614 0.776 0.617 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 84.140 85.108 85.430 84.118	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.785 0.818 0.803 0.810 0.825	Fmes 0.591 0.625 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.853 0.857 0.867 0.868 0.857	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825	Spec 0.814 0.806 0.784 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.796 0.796	Fme 0.56 0.54 0.52 0.61 0.57 0.59 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82
DD CHD	EW EF EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832 0.884 0.869 0.884 0.803 0.836 0.836 0.836	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.617 0.617 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.118 85.430 84.118 83.129	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855 0.843	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.832 0.825 0.832	Fmes 0.591 0.625 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.857 0.867 0.868 0.857 0.868	MLP 	Sen 0.534 0.503 0.605 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831	Spec 0.814 0.806 0.784 0.806 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780	Fme 0.56 0.54 0.52 0.61 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82
ID CHD	EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 1.000 0.832 0.884 0.869 0.884 0.803 0.836 0.836 0.836 0.836 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.118 85.430 84.118 83.129 61.193	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855 0.843 0.388	Spec 0.828 0.832 0.832 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.832 0.825 0.832 0.825 0.817 0.775	Fmes 0.591 0.625 0.646 0.646 0.645 0.646 0.645 0.844 0.853 0.852 0.857 0.868 0.857 0.868 0.857 0.846 0.451	MLP 	Sen 0.534 0.515 0.503 0.605 0.579 0.582 0.575 0.820 0.836 0.814 0.813 0.812 0.825 0.831 0.378	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780 0.695	Fmc 0.56 0.54 0.52 0.61 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.81 0.82 0.82 0.82
ID CHD	EW EF EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 5 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000 0.000 0.542 0.542 0.000 0.542 0.500 0.500 0.542 0.500 0.500 0.542 0.500 0.500 0.542 0.500 0.500 0.542 0.500 0.500 0.500 0.542 0.500 0.500 0.500 0.500 0.542 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.884 0.836 0.836 0.836 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.617 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.140 85.108 85.108 84.118 83.129 61.193 55.050	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855 0.843 0.388 0.301	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.810 0.825 0.817 0.775 0.730	Fmes 0.591 0.625 0.646 0.646 0.646 0.645 0.844 0.853 0.857 0.867 0.868 0.857 0.868 0.857 0.846 0.451 0.348	MLP 	Sen 0.534 0.515 0.503 0.579 0.579 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406	Spec 0.814 0.806 0.784 0.780 0.760 0.778 0.796 0.777 0.810 0.781 0.796 0.7781 0.781 0.796 0.774 0.774 0.780 0.695 0.690	Fmce 0.56 0.54 0.52 0.61 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.82 0.82 0.82 0.82 0.82
ID CHD	EW EF EW EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.542 0.000 0.000 0.000 0.000 0.000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.884 0.836 0.836 0.836 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.617 0.617	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 73.968 73.968 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.140 85.108 85.108 84.118 83.129 61.193 55.050 63.479	Sen 0.562 0.604 0.653 0.672 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.873 0.873 0.873 0.8543 0.388 0.301 0.489	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.810 0.825 0.817 0.775 0.730 0.740	Fmes 0.591 0.625 0.656 0.646 0.645 0.645 0.646 0.654 0.846 0.857 0.8667 0.846 0.451 0.348 0.517	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109	Sen 0.534 0.515 0.503 0.579 0.579 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421	Spec 0.814 0.806 0.784 0.780 0.806 0.778 0.796 0.777 0.810 0.781 0.809 0.765 0.796 0.776 0.796 0.776 0.796 0.796 0.7781 0.809 0.765 0.796 0.7780 0.695 0.690 0.645	Fmc 0.56 0.54 0.52 0.57 0.59 0.57 0.58 0.80 0.88 0.88 0.88 0.88 0.88 0.84 0.82 0.82 0.39 0.39 0.44
ID CHD	EW EF EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.542 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.552 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.884 0.836 0.836 0.836 1.000 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.617 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 73.968 73.968 83.462 83.129 61.193 55.050 63.479 65.269	Sen 0.562 0.604 0.653 0.672 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855 0.843 0.385 0.381 0.388 0.301 0.489 0.504	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.810 0.825 0.817 0.775 0.730 0.740	Fmes 0.591 0.625 0.656 0.646 0.645 0.645 0.645 0.844 0.853 0.852 0.857 0.8667 0.846 0.451 0.348 0.517 0.547	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353	Sen 0.534 0.515 0.503 0.578 0.578 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.777 0.810 0.781 0.809 0.765 0.796 0.774 0.796 0.774 0.796 0.774 0.695 0.690 0.645 0.700	Fmce 0.56 0.54 0.57 0.57 0.57 0.57 0.57 0.57 0.80 0.81 0.84 0.81 0.82 0.82 0.39 0.44 0.43 0.43
ID CHD	EW EF EW EF	No. of Intervals 3 5 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 7 10 3 3 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 3 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 7 7 10 10 3 5 5 7 7 10 3 5 7 7 10 10 3 5 5 7 7 10 10 10 10 1 5 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 65.106 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.542 0.0000 0.000 0.000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.0000000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.803 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 75.005 82.796 83.462 83.479 63.479 63.470 63.470 63.470	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.873 0.855 0.843 0.301 0.489 0.504 0.469	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.810 0.825 0.812 0.825 0.810 0.825 0.810 0.825 0.810 0.775 0.730 0.740 0.760	Fmes 0.591 0.625 0.656 0.646 0.645 0.645 0.645 0.844 0.853 0.852 0.857 0.866 0.451 0.348 0.517 0.547 0.560	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353 64.950	Sen 0.534 0.515 0.503 0.578 0.578 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.609	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780 0.695 0.690 0.645 0.700 0.680	Fmee 0.56 0.54 0.52 0.57 0.59 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.89 0.44 0.43 0.56 0.43 0.43
DD CHD	EW EF EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 10 3 5 5 7 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 5 5 5 7 7 10 10 5 5 5 7 10 10 5 5 5 5 7 10 10 5 5 5 5 5 1 5 5 7 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.0000 0.000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.802 1.000 0.832 0.884 0.803 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.617 0.617 0.617 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 75.005 82.796 83.462 83	Sen 0.562 0.604 0.653 0.645 0.672 0.672 0.685 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.301 0.489 0.504 0.469 0.456	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.812 0.825 0.812 0.825 0.817 0.775	Fmes 0.591 0.625 0.656 0.646 0.645 0.646 0.645 0.646 0.654 0.844 0.853 0.857 0.868 0.857 0.868 0.451 0.348 0.517 0.560 0.514	MLP 	Sen 0.534 0.515 0.503 0.605 0.578 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.609 0.581	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780 0.695 0.690 0.645 0.700 0.680 0.675	Fmee 0.56 0.54 0.57 0.57 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.82 0.82 0.44 0.43 0.56 0.57
DD CHD	EW EF EW EF EW	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000 0.552 0.555 0.55	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.848 0.800 0.832 0.836 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.614 0.776 0.617 0.617 0.617 0.617 0.617 0.6100 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 84.140 85.108 85.430 84.118 83.129 61.193 55.050 63.479 65.269 68.706 64.092 66.109	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.873 0.855 0.843 0.388 0.301 0.489 0.504 0.469 0.456 0.498	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.832 0.770 0.776 0.778 0.775 0.730 0.764 0.760 0.775 0.730 0.764 0.765 0.775 0.730 0.767 0.775 0.780 0.775 0.7	Fmes 0.591 0.625 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.857 0.867 0.868 0.857 0.866 0.857 0.866 0.451 0.346 0.517 0.547 0.549	MLP 	Sen 0.534 0.515 0.503 0.605 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.569 0.581 0.609 0.581 0.628	Spec 0.814 0.806 0.784 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780 0.695 0.695 0.690 0.645 0.700 0.680 0.675 0.710	Fmee 0.56 0.54 0.52 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.39 0.44 0.43 0.56 0.91 0.57 0.58
TD CHD BLD	EW EF EW EF EF	No. of Intervals 3 5 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.000 0.558 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.0000000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.800 0.832 0.884 0.836 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.617 0.617 0.617 0.617 0.617 0.617 0.610 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 84.140 85.108 85.430 84.118 85.430 84.118 85.430 61.193 55.050 63.479 65.269 68.706 64.092 66.109 62.353	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.873 0.855 0.843 0.388 0.301 0.489 0.456 0.498 0.476	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.832 0.825 0.832 0.825 0.832 0.825 0.832 0.825 0.832 0.825 0.832 0.825 0.775 0.730 0.740 0.775 0.730 0.775 0.730 0.775 0.730 0.775 0.775 0.730 0.730 0.775 0.730 0.7	Fmes 0.591 0.625 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.857 0.867 0.868 0.857 0.868 0.857 0.868 0.857 0.846 0.451 0.348 0.517 0.547 0.560 0.514 0.514 0.513	MLP 	Sen 0.534 0.503 0.605 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.569 0.581 0.609 0.581 0.609	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.780 0.695 0.690 0.695 0.700 0.680 0.675 0.710 0.710	Fmee 0.56 0.54 0.52 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.39 0.44 0.43 0.56 0.91 0.57 0.58
PID CHD BLD	EW EF EW EF EW	No. of Intervals 3 5 7 10 3 5 7 7 10 3 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 3 5 7 7 10 3 3 5 7 7 10 3 3 5 7 7 10 3 3 5 7 7 10 3 3 5 7 7 10 3 3 5 7 7 10 3 5 7 7 10 3 3 5 7 7 10 3 5 7 7 10 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 1 3 5 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10	CBA Acc 65.106 63.93 65.106 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000 0.592 0.592 0.542 0.500 0.542 0.542 0.542 0.500 0.542 0.542 0.500 0.500 0.542 0.542 0.500 0.000 0.000 0.577 0.542 0.542 0.500 0.000 0.000 0.542 0.542 0.500 0.500 0.500 0.500 0.542 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.500 0.000 0.000 0.000 0.577 0.542 0.500 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.836 0.836 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.980	Fmes 0.000 0.307 0.000 0.580 0.650 0.79 0.000 0.740 0.721 0.661 0.617 0.617 0.617 0.617 0.617 0.617 0.617 0.6100 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.118 85.108 85.108 84.118 85.108 64.092 66.109 62.353 98.000	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.873 0.855 0.843 0.388 0.301 0.489 0.469 0.456 0.498 0.476 0.968	Spec 0.828 0.832 0.832 0.832 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.832 0.825 0.817 0.775 0.730 0.740 0.765 0.775 0.776 0.775 0.730 0.740 0.750 0.770	Fmes 0.591 0.625 0.646 0.649 0.645 0.646 0.654 0.844 0.853 0.857 0.867 0.868 0.857 0.868 0.857 0.868 0.857 0.846 0.451 0.348 0.517 0.547 0.540 0.514 0.513 0.983	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353 64.950 63.521 67.571 66.731 98.250	Sen 0.534 0.515 0.503 0.605 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.609 0.581 0.628 0.609 0.976	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.796 0.737 0.810 0.781 0.796 0.695 0.695 0.665 0.700 0.665 0.710 0.675 0.710 0.693 0.710 0.693 0.710 0.710 0.693 0.710 0.993	Fmea 0.56 0.54 0.52 0.57 0.58 0.80 0.83 0.81 0.84 0.82 0.82 0.39 0.44 0.43 0.56 0.90 0.44
D	EW EF EW EF EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 10 3 5 5 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 5 7 7 10 5 5 7 7 10 5 5 7 7 10 5 5 7 7 10 5 5 7 7 10 5 7 5 5 7 7 10 5 5 7 7 10 5 5 5 5 7 7 10 5 5 5 7 10 5 5 5 7 5 10 5 5 5 7 10 5 5 5 5 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.542 0.542 0.542 0.500 0.000 0.000 0.575 0.542 0.542 0.500 0.000 0.000 0.000 0.575 0.542 0.542 0.000 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.577 0.542 0.500 0.000 0.000 0.577 0.542 0.500 0.000 0.000 0.000 0.000 0.542 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.848 0.869 0.836 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.980 0.940	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.617 0.617 0.617 0.617 0.617 0.617 0.617 0.6100 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.980 0.970	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.140 85.108 85.108 84.118 83.129 61.193 55.050 63.479 65.269 68.706 64.092 66.109 62.353 98.000 97.250	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.388 0.301 0.489 0.504 0.476 0.496 0.476 0.956	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.825 0.825 0.825 0.825 0.770 0.740 0.760 0.845 0.730 0.730 1.000 1.000	Fmes 0.591 0.625 0.666 0.646 0.645 0.646 0.654 0.857 0.867 0.868 0.451 0.348 0.517 0.567 0.513 0.513 0.983	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353 64.950 63.521 67.571 66.731 98.250 98.000	Sen 0.534 0.515 0.503 0.579 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.609 0.581 0.568 0.609 0.581 0.581 0.598 0.59	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.796 0.737 0.810 0.781 0.796 0.774 0.780 0.695 0.774 0.780 0.695 0.690 0.645 0.700 0.665 0.700 0.665 0.710 0.710 0.993 0.980	Fmc 0.56 0.54 0.57 0.58 0.80 0.83 0.81 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82
PID CHD BLD	EW EF EW EF EF	No. of Intervals 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 10 3 5 7 7 7 10 3 5 7 7 10 3 5 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 7 10 3 5 7 7 7 10 3 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 67.753 67.753 67.753 67.753 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983 57.983	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.000 0.572 0.572 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.542 0.542 0.500 0.000 0.000 0.000 0.575 0.542 0.542 0.500 0.000 0.000 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.000 0.575 0.542 0.500 0.000 0.000 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.575 0.572 0.500 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.000000 0.00000000	Spec 1.000 0.756 1.000 0.624 0.562 0.848 1.000 0.832 0.884 0.869 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.980 0.940 0.953	Fmes 0.000 0.307 0.000 0.580 0.650 0.179 0.000 0.740 0.721 0.661 0.614 0.767 0.617 0.617 0.617 0.617 0.617 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.980 0.970 0.974	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 83.462 84.140 85.108 85.108 84.118 83.129 61.193 55.050 63.479 65.269 68.706 64.092 66.109 62.353 98.000 97.250 97.250	Sen 0.562 0.604 0.653 0.645 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.388 0.301 0.489 0.504 0.469 0.466 0.476 0.956	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.810 0.825 0.817 0.775 0.730 0.740 0.760 0.845 0.775 0.730 1.000 1.000	Fmes 0.591 0.625 0.666 0.646 0.645 0.646 0.654 0.857 0.857 0.846 0.451 0.348 0.517 0.547 0.547 0.547 0.513 0.983 0.977	MLP 	Sen 0.534 0.515 0.503 0.579 0.579 0.582 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.421 0.566 0.609 0.581 0.628 0.609 0.976 0.980 0.976	Spec 0.814 0.806 0.784 0.808 0.760 0.806 0.778 0.796 0.737 0.810 0.781 0.796 0.737 0.810 0.781 0.796 0.774 0.765 0.774 0.780 0.695 0.690 0.645 0.700 0.645 0.700 0.680 0.675 0.710 0.993 0.980 0.993	Fmc 0.56 0.54 0.57 0.58 0.67 0.58 0.80 0.83 0.81 0.84 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82
PID CHD 3LD	EW EF EW EF EW EF	No. of Intervals 3 5 7 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 3 5 7 7 10 10 10 3 5 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 57.983 57.5000 57.5000 57.50000000000	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.542 0.542 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.575 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.500 0.000 0.000 0.542 0.542 0.542 0.500 0.000 0.000 0.000 0.542 0.542 0.500 0.000 0.000 0.000 0.000 0.542 0.542 0.500 0.000 0.000 0.000 0.000 0.000 0.542 0.542 0.500 0.000 0.000 0.000 0.542 0.542 0.500 0.000 0.000 0.000 0.542 0.542 0.500 0.000 0.000 0.000 0.000 0.542 0.542 0.500 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	Spec 1.000 0.756 1.000 0.756 1.000 0.562 0.848 1.000 0.832 0.884 0.836 0.836 0.836 0.836 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.980 0.940 0.953	Fmes 0.000 0.307 0.000 0.307 0.000 0.580 0.179 0.000 0.740 0.721 0.661 0.614 0.776 0.617 0.617 0.617 0.617 0.617 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.970 0.974 0.974	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 75.005 82.796 83.462 84.118 83.129 61.193 55.050 63.479 65.269 68.706 64.092 66.109 62.353 98.000 97.250 97.250 97.750	Sen 0.562 0.604 0.653 0.645 0.672 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.388 0.301 0.489 0.504 0.466 0.469 0.466 0.476 0.956 0.956 0.956 0.956	Spec 0.828 0.832 0.822 0.814 0.790 0.770 0.778 0.770 0.784 0.825 0.818 0.803 0.810 0.825 0.817 0.775 0.730 0.740 0.760 0.845 0.775 0.780 0.780 0.700 1.000 1.000 1.000	Fmes 0.591 0.625 0.656 0.646 0.645 0.646 0.645 0.846 0.857 0.866 0.857 0.846 0.451 0.348 0.517 0.560 0.514 0.513 0.977 0.981	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353 64.950 63.521 67.571 66.731 98.250 98.000 98.250 98.500	Sen 0.534 0.515 0.503 0.579 0.579 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.831 0.378 0.406 0.421 0.566 0.609 0.581 0.568 0.609 0.581 0.609 0.976 0.980 0.976 0.984	Spec 0.814 0.806 0.784 0.780 0.760 0.778 0.796 0.777 0.810 0.781 0.796 0.777 0.810 0.781 0.796 0.776 0.796 0.777 0.810 0.780 0.695 0.690 0.645 0.700 0.680 0.645 0.700 0.680 0.675 0.710 0.710 0.993 0.980 0.993 0.987	Fmee 0.56 0.54 0.52 0.67 0.59 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.82 0.82 0.39 0.44 0.43 0.56 0.91 0.57 0.61 0.57 0.61 0.59 0.44 0.43 0.56 0.99 0.44 0.43 0.56 0.99 0.57 0.59 0.59 0.57 0.59 0.59 0.57 0.59 0.59 0.59 0.59 0.59 0.59 0.59 0.59
PID CHD 3LD	EW EF EW EF EF	No. of Intervals 3 5 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 5 7 7 10 3 5 7 7 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 3 5 5 7 7 10 10 10 10 10 10 10 10 10 10 10 10 10	CBA Acc 65.106 63.93 65.106 67.196 67.051 63.937 65.106 65.106 74.570 74.237 70.989 68.419 76.849 67.753 67.753 67.753 67.753 67.753 57.983 57.500 96.750	Sen 0.000 0.422 0.000 0.759 0.873 0.248 0.000 0.673 0.624 0.577 0.518 0.739 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.542 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.976 0.976 0.976 0.976	Spec 1.000 0.756 1.000 0.756 1.000 0.624 0.868 1.000 0.832 0.848 0.803 0.836 0.900 1.000 1.000 0.953 0.953 0.953	Fmes 0.000 0.307 0.000 0.580 0.179 0.000 0.740 0.721 0.661 0.617 0.617 0.617 0.617 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.970 0.974 0.974 0.974	Bayes Acc 73.561 75.267 76.307 75.533 74.880 74.228 73.968 73.968 73.968 73.968 73.968 73.968 83.462 84.110 85.050 63.479 65.269 68.706 64.092 66.109 62.353 98.000 97.250 97.250 97.250 97.750 97.000	Sen 0.562 0.604 0.653 0.672 0.675 0.682 0.686 0.837 0.856 0.861 0.868 0.873 0.855 0.843 0.3873 0.385 0.843 0.301 0.489 0.504 0.469 0.456 0.469 0.456 0.956 0.956 0.956 0.956 0.956	Spec 0.828 0.832 0.822 0.814 0.790 0.778 0.770 0.784 0.825 0.818 0.803 0.825 0.810 0.825 0.810 0.825 0.810 0.825 0.810 0.775 0.730 0.740 0.760 0.845 0.775 0.730 1.000 1.000 1.000 1.000 1.000	Fmes 0.591 0.625 0.656 0.646 0.647 0.645 0.646 0.654 0.846 0.857 0.867 0.451 0.513 0.977 0.981 0.975	MLP Acc 71.625 70.444 68.628 73.706 69.667 72.667 70.960 71.885 78.215 82.473 79.871 83.118 79.871 83.118 79.161 80.505 80.172 80.828 55.975 57.034 55.109 64.353 64.950 63.521 67.571 66.731 98.250 98.000 98.250 98.500 98.500 98.750	Sen 0.534 0.515 0.503 0.578 0.578 0.575 0.820 0.836 0.814 0.849 0.813 0.812 0.825 0.821 0.378 0.406 0.421 0.566 0.609 0.581 0.568 0.609 0.581 0.628 0.609 0.976 0.984 0.992	Spec 0.814 0.806 0.784 0.806 0.780 0.806 0.778 0.796 0.737 0.810 0.796 0.737 0.810 0.781 0.809 0.765 0.796 0.774 0.796 0.778 0.796 0.778 0.796 0.778 0.796 0.778 0.796 0.778 0.796 0.778 0.796 0.778 0.796 0.774 0.795 0.695 0.695 0.690 0.645 0.700 0.680 0.675 0.710 0.993 0.980 0.980 0.980	Fmee 0.56 0.54 0.52 0.61 0.57 0.58 0.80 0.83 0.81 0.84 0.81 0.82 0.82 0.39 0.39 0.44 0.43 0.56 0.91 0.57 0.61 0.57 0.61 0.57 0.61 0.99 0.98 0.98 0.98 0.98 0.98 0.98 0.98
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* Acc- Accuracy; Sen- Sensitivity; Spec- Specificity; Fmes- Fmeasure/FScore

CONCLUSION

Clinical data usually consist of sensor readings from medical equipments, temperature readings fromthermometers, height and weight measurements from appropriate devices; however representation of such values in an easy human-interpretable form requires the data to be discretized. Improper use of discretization approaches can penalize the efficiency of the data mining tasks such as classification. Moreover appropriate use of discretization, improves the data data interpretability. representation and The observations and findings of this study enable engineers to choose a fitting discretization approach while designing clinical knowledge-based systems. This study is focused on the use of unsupervised approaches for clinical datasets. This study may further be extended by analyzing the effect of many more discretization approaches over various domains. Experimental analysis of more datasets and approaches may yield novel findings which may improve the performance of the systems that use typical data mining tasks.

CONFLICT OF INTEREST

The authors state that there are no financial/relevant interests that influence the development of the manuscript.

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