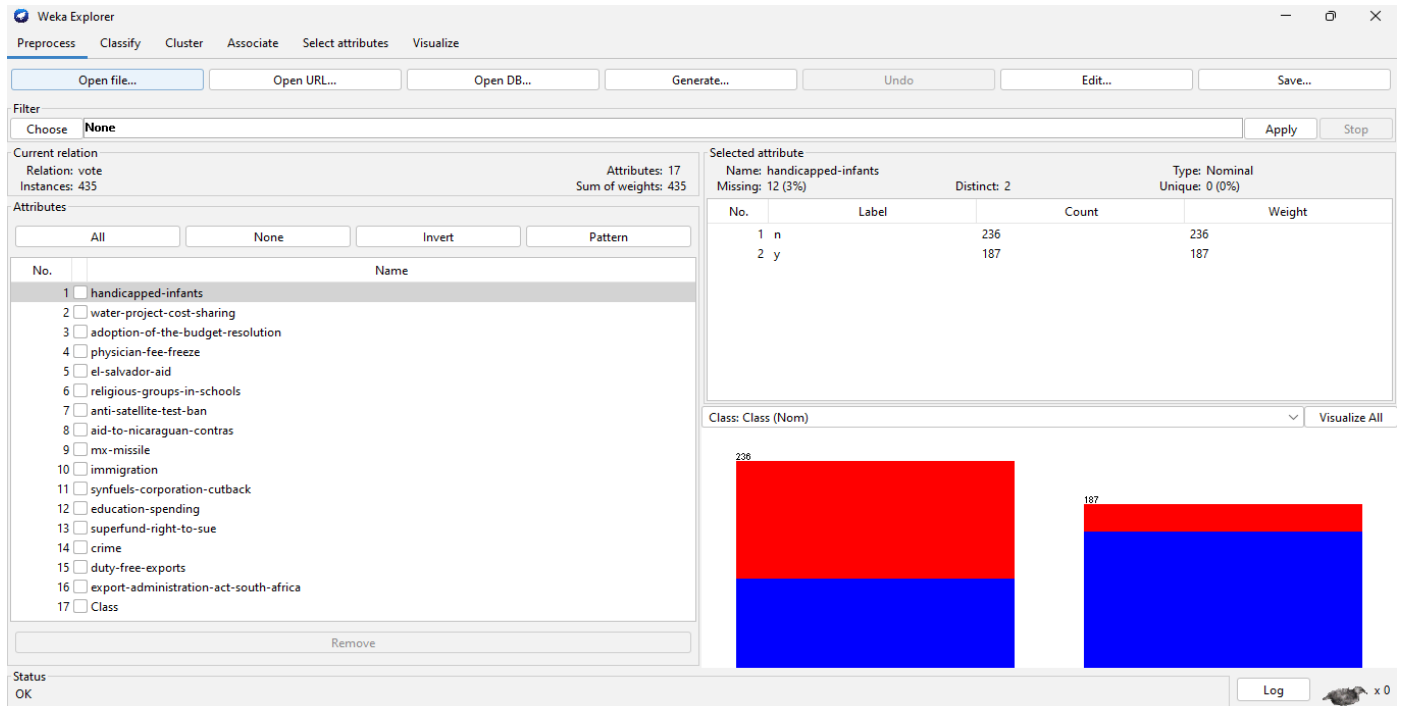


) Perform assignment 3 above using any available attribute selection algorithm in WEKA and note the accuracy and compare it with accuracy obtained in assignment 3 above

## Dataset : Vote



### Results before applying attribute selection :

=== Run information ===

Scheme: weka.classifiers.functions.MultilayerPerceptron -L 0.3 -M 0.2 -N 500 -V 0 -S 0 -E 20 -H a

Relation: vote

Instances: 435

Attributes: 17

handicapped-infants  
water-project-cost-sharing  
adoption-of-the-budget-resolution  
physician-fee-freeze  
el-salvador-aid  
religious-groups-in-schools  
anti-satellite-test-ban  
aid-to-nicaraguan-contras  
mx-missile  
immigration  
synfuels-corporation-cutback

education-spending  
superfund-right-to-sue  
crime  
duty-free-exports  
export-administration-act-south-africa  
Class

Test mode: 10-fold cross-validation

=== Classifier model (full training set) ===

Sigmoid Node 0

Inputs	Weights
Threshold	-1.2892771681185227
Node 2	5.042710525133231
Node 3	5.365105178038634
Node 4	-3.157383257358147
Node 5	3.0573422138101103
Node 6	-5.474987627327791
Node 7	2.7055575594073864
Node 8	4.909139124319275
Node 9	3.1297530278171304
Node 10	2.4722425466278146

Sigmoid Node 1

Inputs	Weights
Threshold	1.3196817437873254
Node 2	-5.045891982166665
Node 3	-5.356999537635435
Node 4	3.1230232316115702
Node 5	-3.0383010742790497
Node 6	5.478394978049478
Node 7	-2.7398433055185945
Node 8	-4.920523751259424
Node 9	-3.1692076385269146
Node 10	-2.4390555307269093

Sigmoid Node 2

Inputs	Weights
Threshold	-1.205081713139082
Attrib handicapped-infants=y	-2.45636221429098
Attrib water-project-cost-sharing=y	1.597598436739651
Attrib adoption-of-the-budget-resolution=y	-0.3075836367907363
Attrib physician-fee-freeze=y	-2.146824366634577
Attrib el-salvador-aid=y	-1.0305221202774335
Attrib religious-groups-in-schools=y	0.7760600390255875
Attrib anti-satellite-test-ban=y	-1.6494526203970856
Attrib aid-to-nicaraguan-contras=y	-0.86248122119303
Attrib mx-missile=y	1.9108875859295285
Attrib immigration=y	-2.0259495639270595
Attrib synfuels-corporation-cutback=y	1.74277573369365

Attrib education-spending=y -0.8652598234054595  
Attrib superfund-right-to-sue=y 0.8200302915354775  
Attrib crime=y 1.0351165425769473  
Attrib duty-free-exports=y 0.3356497686674467  
Attrib export-administration-act-south-africa=y -0.09941064837091697

#### Sigmoid Node 3

Inputs Weights

Threshold -3.079833833506967  
Attrib handicapped-infants=y -0.6588054354030801  
Attrib water-project-cost-sharing=y -1.0769146203908602  
Attrib adoption-of-the-budget-resolution=y 5.007175235597914  
Attrib physician-fee-freeze=y -3.5967917089880186  
Attrib el-salvador-aid=y 0.23799047038379792  
Attrib religious-groups-in-schools=y 2.804903054496885  
Attrib anti-satellite-test-ban=y -2.72380717167434  
Attrib aid-to-nicaraguan-contras=y -1.1312320257092523  
Attrib mx-missile=y 0.003563943639855297  
Attrib immigration=y -0.9209956246153141  
Attrib synfuels-corporation-cutback=y 2.489451069731482  
Attrib education-spending=y -2.9906063740121414  
Attrib superfund-right-to-sue=y -1.9165335259259135  
Attrib crime=y 0.738137966956631  
Attrib duty-free-exports=y -2.1582929833096762  
Attrib export-administration-act-south-africa=y -2.4572063861490614

#### Sigmoid Node 4

Inputs Weights

Threshold 0.9894736402524893  
Attrib handicapped-infants=y -0.9010948115194602  
Attrib water-project-cost-sharing=y 0.38475808299600933  
Attrib adoption-of-the-budget-resolution=y 0.20104660767965737  
Attrib physician-fee-freeze=y 3.5480987349708166  
Attrib el-salvador-aid=y 1.0653154896723211  
Attrib religious-groups-in-schools=y -0.31695951934289224  
Attrib anti-satellite-test-ban=y -1.3244365164689214  
Attrib aid-to-nicaraguan-contras=y -0.5016469527052998  
Attrib mx-missile=y -1.6633467145325667  
Attrib immigration=y 1.3032934323890075  
Attrib synfuels-corporation-cutback=y -1.0431528894818871  
Attrib education-spending=y 0.3210504538651641  
Attrib superfund-right-to-sue=y -1.1778889150243164  
Attrib crime=y 1.3374053699374915  
Attrib duty-free-exports=y 0.702072255662492  
Attrib export-administration-act-south-africa=y -0.2813525077666688

#### Sigmoid Node 5

Inputs Weights

Threshold -1.2802507445016005  
Attrib handicapped-infants=y 0.09467655096089006  
Attrib water-project-cost-sharing=y 1.5749530517070582

Attrib adoption-of-the-budget-resolution=y -0.574773173652035  
Attrib physician-fee-freeze=y -0.9052207619710423  
Attrib el-salvador-aid=y -0.8097048617218255  
Attrib religious-groups-in-schools=y -0.01364090659733859  
Attrib anti-satellite-test-ban=y -0.43854373594912605  
Attrib aid-to-nicaraguan-contras=y 0.03173595432639047  
Attrib mx-missile=y 1.128191869490766  
Attrib immigration=y -1.227853923428814  
Attrib synfuels-corporation-cutback=y -0.32403972261313096  
Attrib education-spending=y -0.43618220264020385  
Attrib superfund-right-to-sue=y -0.40777091520533854  
Attrib crime=y -1.3908123621158386  
Attrib duty-free-exports=y 2.5176556475974805  
Attrib export-administration-act-south-africa=y 0.8030620340416722

#### Sigmoid Node 6

Inputs Weights  
Threshold 2.9060209731828466  
Attrib handicapped-infants=y 0.1423622133067101  
Attrib water-project-cost-sharing=y 1.656816367475693  
Attrib adoption-of-the-budget-resolution=y -4.281317027123549  
Attrib physician-fee-freeze=y 5.72305144999406  
Attrib el-salvador-aid=y 0.13267318136630304  
Attrib religious-groups-in-schools=y -2.162505848240554  
Attrib anti-satellite-test-ban=y 1.571273775968278  
Attrib aid-to-nicaraguan-contras=y 0.849743957995068  
Attrib mx-missile=y 0.8062082117290517  
Attrib immigration=y 1.320641515993374  
Attrib synfuels-corporation-cutback=y -1.5903561623599296  
Attrib education-spending=y 2.5510611719320564  
Attrib superfund-right-to-sue=y -3.290570799767247  
Attrib crime=y -0.43826867279048176  
Attrib duty-free-exports=y 1.0618365768292555  
Attrib export-administration-act-south-africa=y 2.2379763865735605

#### Sigmoid Node 7

Inputs Weights  
Threshold -1.5894608023977708  
Attrib handicapped-infants=y 0.9453709554327445  
Attrib water-project-cost-sharing=y 0.7475930512215491  
Attrib adoption-of-the-budget-resolution=y 0.0645442692705597  
Attrib physician-fee-freeze=y -2.2156677973590284  
Attrib el-salvador-aid=y -0.7287917268224171  
Attrib religious-groups-in-schools=y 0.35428662604552863  
Attrib anti-satellite-test-ban=y 0.818835510984522  
Attrib aid-to-nicaraguan-contras=y 1.0840062778311226  
Attrib mx-missile=y 2.3511525809319695  
Attrib immigration=y 0.615018374821677  
Attrib synfuels-corporation-cutback=y 1.7666765388185128  
Attrib education-spending=y -0.12047217660652795

Attrib superfund-right-to-sue=y 0.22174787720739794  
Attrib crime=y -0.7170286726580505  
Attrib duty-free-exports=y -0.20932080597793007  
Attrib export-administration-act-south-africa=y 0.8787899248555823

#### Sigmoid Node 8

Inputs Weights

Threshold -1.351859434148115  
Attrib handicapped-infants=y 0.6919745336460381  
Attrib water-project-cost-sharing=y 2.0101053408422493  
Attrib adoption-of-the-budget-resolution=y -0.665865919886842  
Attrib physician-fee-freeze=y -0.17177547031952659  
Attrib el-salvador-aid=y -0.6912882593314786  
Attrib religious-groups-in-schools=y 0.0833411694700436  
Attrib anti-satellite-test-ban=y -1.3780637851625366  
Attrib aid-to-nicaraguan-contras=y -0.3872188306818966  
Attrib mx-missile=y 0.9459478156926503  
Attrib immigration=y -1.0798640538074131  
Attrib synfuels-corporation-cutback=y -0.09097196470569206  
Attrib education-spending=y -0.6381884648582161  
Attrib superfund-right-to-sue=y -2.842490593779207  
Attrib crime=y -1.070788388941386  
Attrib duty-free-exports=y 1.9926934306264175  
Attrib export-administration-act-south-africa=y -0.45786641654317933

#### Sigmoid Node 9

Inputs Weights

Threshold -0.9681148442235445  
Attrib handicapped-infants=y 0.370485001745078  
Attrib water-project-cost-sharing=y 0.3807478577089387  
Attrib adoption-of-the-budget-resolution=y 1.4274191601985748  
Attrib physician-fee-freeze=y -3.7071632826921133  
Attrib el-salvador-aid=y -0.3415030899124408  
Attrib religious-groups-in-schools=y 1.5411726654399804  
Attrib anti-satellite-test-ban=y -0.03129761785238191  
Attrib aid-to-nicaraguan-contras=y 0.13353610869424132  
Attrib mx-missile=y 0.7342012678816682  
Attrib immigration=y 0.9330690361754982  
Attrib synfuels-corporation-cutback=y 0.7789794737613785  
Attrib education-spending=y 0.8789641162245342  
Attrib superfund-right-to-sue=y 1.6660884732622188  
Attrib crime=y -1.2088668081092353  
Attrib duty-free-exports=y 0.8416999902932788  
Attrib export-administration-act-south-africa=y 0.7458798207128257

#### Sigmoid Node 10

Inputs Weights

Threshold -0.7608538292411479  
Attrib handicapped-infants=y 0.35330395613128335  
Attrib water-project-cost-sharing=y 0.24266374690878054  
Attrib adoption-of-the-budget-resolution=y 1.8885404170424205

Attrib physician-fee-freeze=y -3.202516780814176  
 Attrib el-salvador-aid=y -0.4450942305214511  
 Attrib religious-groups-in-schools=y 1.2682985503633517  
 Attrib anti-satellite-test-ban=y -0.5126567535822115  
 Attrib aid-to-nicaraguan-contras=y -0.033646300201511874  
 Attrib mx-missile=y 0.46293058210909216  
 Attrib immigration=y 0.4295117741977577  
 Attrib synfuels-corporation-cutback=y -0.025106602605615973  
 Attrib education-spending=y 0.9619990173173824  
 Attrib superfund-right-to-sue=y 1.6835722621862161  
 Attrib crime=y -0.9602030352546411  
 Attrib duty-free-exports=y 0.4139995648629073  
 Attrib export-administration-act-south-africa=y 0.4531008559476385

Class democrat

Input

Node 0

Class republican

Input

Node 1

Time taken to build model: 0.64 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	412	94.7126 %
Incorrectly Classified Instances	23	5.2874 %
Kappa statistic	0.8888	
Mean absolute error	0.0528	
Root mean squared error	0.2078	
Relative absolute error	11.135 %	
Root relative squared error	42.6788 %	
Total Number of Instances	435	

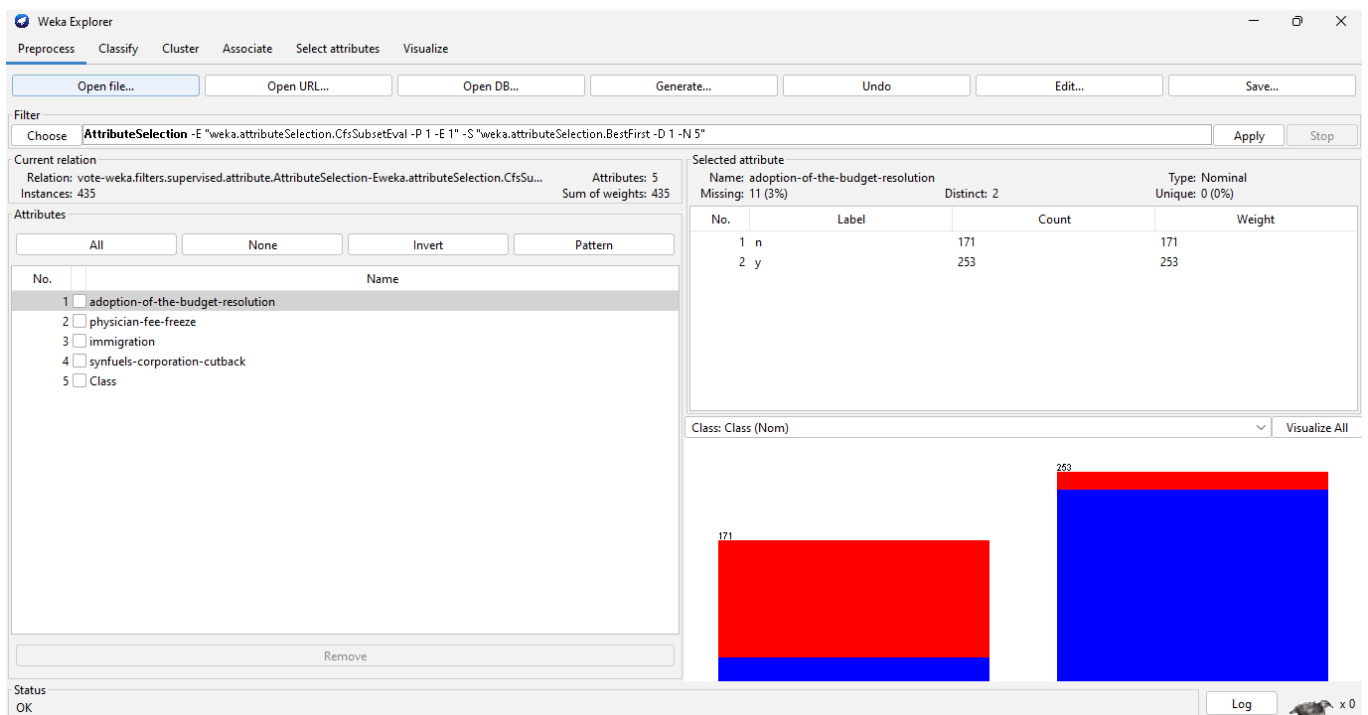
=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.951	0.060	0.962	0.951	0.957	0.889	0.991	0.995	democrat
	0.940	0.049	0.924	0.940	0.932	0.889	0.991	0.984	republican
Weighted Avg.	0.947	0.055	0.947	0.947	0.947	0.889	0.991	0.991	

=== Confusion Matrix ===

a b <-- classified as  
 254 13 | a = democrat  
 10 158 | b = republican

## Results after applying attribute selection :



=== Run information ===

Scheme: weka.classifiers.functions.MultilayerPerceptron -L 0.3 -M 0.2 -N 500 -V 0 -S 0 -E 20 -H a

Relation: vote-weka.filters.supervised.attribute.AttributeSelection-Eweka.attributeSelection.CfsSubsetEval -P 1 -E 1-Sweka.attributeSelection.BestFirst -D 1 -N 5

Instances: 435

Attributes: 5

adoption-of-the-budget-resolution

physician-fee-freeze

immigration

synfuels-corporation-cutback

Class

Test mode: 10-fold cross-validation

=== Classifier model (full training set) ===

Sigmoid Node 0

Inputs Weights

Threshold -4.990052486163605

Node 2 6.708506486654053

Node 3 4.704502352239631

Node 4 4.0507370318039095

Sigmoid Node 1

Inputs Weights

Threshold 4.990058346423584

Node 2 -6.708512340183136

Node 3 -4.7045082227424135

Node 4 -4.050742754858022

Sigmoid Node 2

Inputs Weights

Threshold -2.623051327008313

Attrib adoption-of-the-budget-resolution=y -0.7927580885172734

Attrib physician-fee-freeze=y -7.599408429530798

Attrib immigration=y 4.178510506438999

Attrib synfuels-corporation-cutback=y -0.6747069372956528

Sigmoid Node 3

Inputs Weights

Threshold 1.5922373539819912

Attrib adoption-of-the-budget-resolution=y 3.0900670510307866

Attrib physician-fee-freeze=y -3.578678950661743

Attrib immigration=y -1.6806074446288337

Attrib synfuels-corporation-cutback=y 6.2430931645372985

Sigmoid Node 4

Inputs Weights

Threshold -2.991653699619647

Attrib adoption-of-the-budget-resolution=y 5.042192118126158

Attrib physician-fee-freeze=y -1.5053826262402283

Attrib immigration=y -4.234033080137335

Attrib synfuels-corporation-cutback=y 1.3249407393931634

Class democrat

Input

Node 0

Class republican

Input

Node 1



Time taken to build model: 0.17 seconds

==== Stratified cross-validation ====

==== Summary ====

Correctly Classified Instances	417	95.8621 %
Incorrectly Classified Instances	18	4.1379 %
Kappa statistic	0.9135	
Mean absolute error	0.0543	
Root mean squared error	0.1771	
Relative absolute error	11.4448 %	
Root relative squared error	36.3821 %	
Total Number of Instances	435	

==== Detailed Accuracy By Class ====

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.951	0.030	0.981	0.951	0.966	0.914	0.991	0.995	democrat
	0.970	0.049	0.926	0.970	0.948	0.914	0.991	0.973	republican
Weighted Avg.	0.959	0.037	0.960	0.959	0.959	0.914	0.991	0.987	

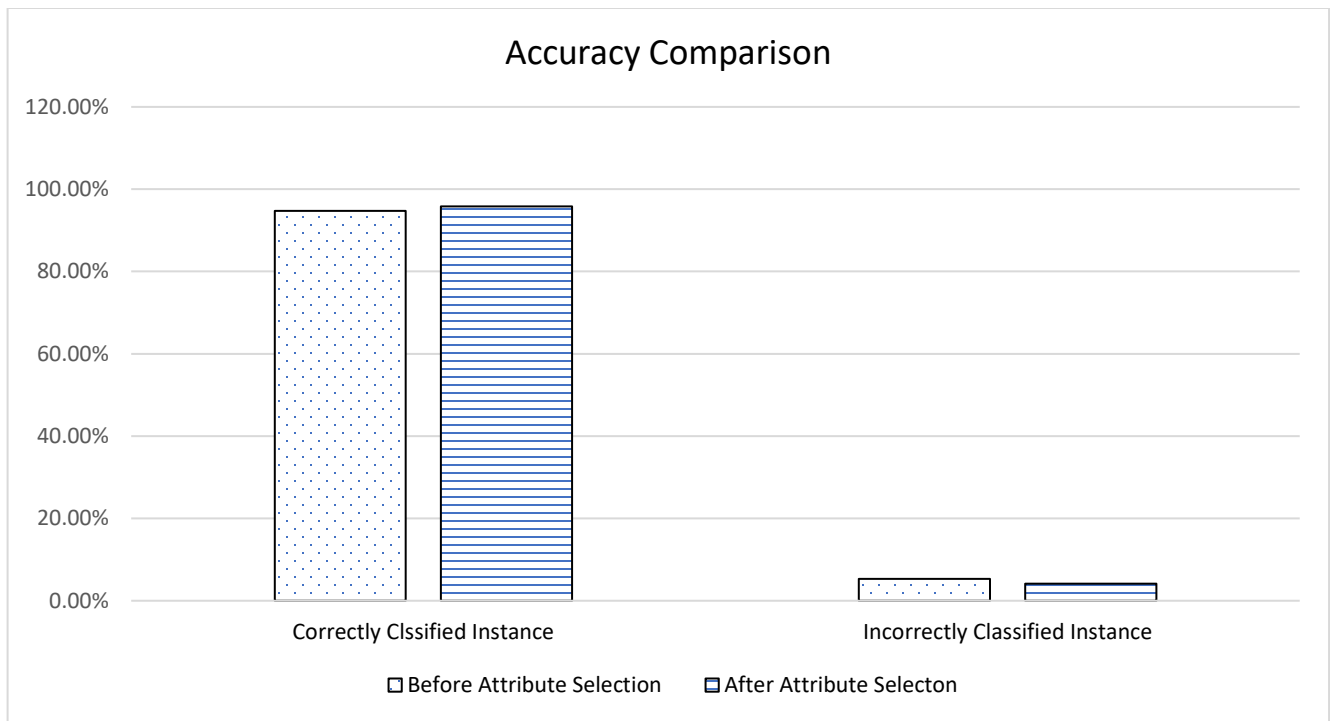
==== Confusion Matrix ====

a b <-- classified as  
254 13 | a = democrat  
5 163 | b = republican

## **RESULTS COMPARISON :**

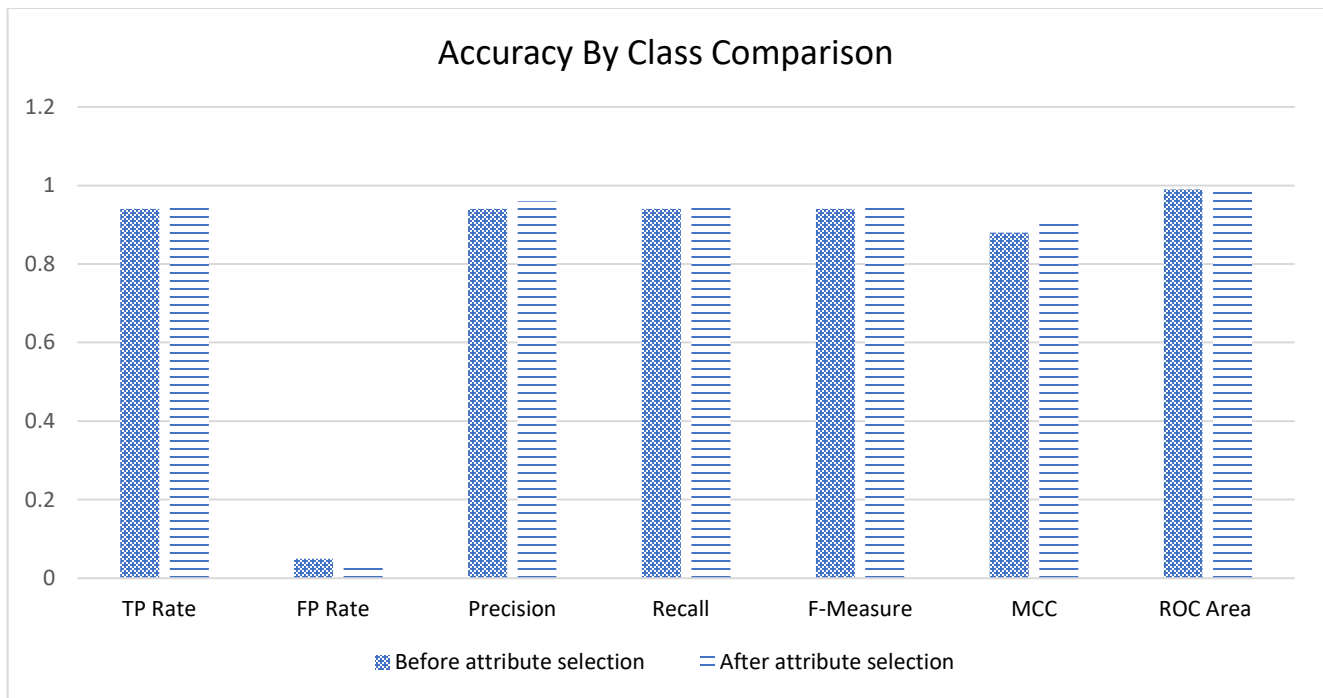
### **1 ) Accuracy Comparison :**

	Correctly Classified Instances	Incorrectly Classified Instances
Before attribute selection	94.71 %	5.28 %
After attribute selection	95.86 %	4.13 %



## 2 ) Accuracy by class comparison :

	TP Rate	FP Rate	Precision	Recall	F- Measure	MCC	ROC Area	PRC Area
Before attribute selection	0.94	0.05	0.94	0.94	0.94	0.88	0.99	0.99
After attribute selection	0.95	0.03	0.96	0.95	0.95	0.91	0.99	0.98



### 3 ) Confusion Matrix :

Before attribute selection		After attribute selection	
a	b <-- classified as	a	b <-- classified as
254	13	258	9
10	158	8	160

Where, a = democrat  
b = republican