

**Name**

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**Id**

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**Q1.**

**ANS**

**1.**

**Classification**

- Classification are considered as a supervised machine learning.in classification the training data (observation, measurements etc...) are used to classifier.
  - In classification the training data are Labeled data where new data (unlabeled) are classified using the training data.
  - A classification model can be Represent in the following forms...
  - Classification rules.
  - Decisions tree.
  - Mathematical formulas.
  - **Classification scenario**
- 
- When a Bank loan officer need to analysis of data to learn which loan application is safe or which is risky. so the loan officer will be analysis in the basis of label training data.

**2.**

**Regression**

- The word Regression mean go back or predict something on the basis of previous data record. Regression is the measure of average relationship between two or more variables in terms of the original units of the data.
  - **Regression scenario**
- 
- Let's we consider in a mart sell eggs, milk and bread in large Amount on every Sunday. so when we orders for the products for the coming days so we will be predict or analysis of previous Sunday records. So we will be order according our sells.

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**Q2.**

**ANS.**

**Naïve Bayes classification**

"SSN"	"Test1"	"Test2"	"Final"	"Grade"
"123-45-6789"	100	83	49	"D"
"123-12-1234"	96	97	48	"D"
"567-89-0123"	60	40	44	"C"
"087-65-4321"	36	45	47	"B-"
"456-78-9012"	88	77	45	"A-"
"234-56-7890"	80	90	46	"C-"
"345-67-8901"	-1	4	43	"F"
"632-79-9939"	30	40	50	"B+"
123-46-4455	85	31	30	?

We know that's

$$P(D)=2/8$$

$$P(C)=1/8$$

$$P(B-)=1/8$$

$$P(A-)=1/8$$

$$P(C-)=1/8$$

$$P(F)=1/8$$

$$P(B+) = 1/8$$

**Taking probability for SSN**

$P(123.45.6789/D)=2/2$	$P(234-56-7890/C-)=1/1$
$P(567-89-0123/C)=1/1$	$P(345-67-8901/F)=1/1$
$P(087-65-4321/B-)=1/1$	$P(632-79-9939"/B+)$
$P(456-78-9012/A-)=1/1$	

**Now taking probability for test1.**

$P(100/D)=2/2$
$P(60/C)=1/1$

$P(36/B^-)=1/1$
$P(88/A^-)=1/1$
$P(80/C^-)=1/1$
$P(-1/F)=1/1$
$P(30/B^+)=1/1$

**Now taking probability of test2**

$P(83/D)=2/2$
$P(40/C)=1/1$
$P(45/B^-)=1/1$
$P(77/A^-)=1/1$
$P(90/C^-)=1/1$
$P(4/F)=1/1$
$P(40/B^+)=1/1$

**Now taking probability of final**

$P(49/D)=2/2$
$P(44/C)=1/1$
$P(47/B^-)=1/1$
$P(45/A^-)=1/1$
$P(46/C^-)=1/1$
$P(43/F)=1/1$

$P(50/B+) = 1/1$

Now we finding new instance target attributes

$X=[123-46-4455,85,31,30]$  so the instance is invalid.

$X=(SSN,TEST1,TEST2,FINAL)$ .

$$P(X/D).P(D)=P(SSN/D).P(Test1/D).P(Test2/D).P(Final/D).P(D)$$

$$2/2.2/2.2/2.2/2$$

$$P(X/C).P(C)=P(SSN/C).P(Test1/C).P(Test2/D).P(Final/C).P(C)$$

$$1/1.1/1.1/1.1/1$$

$$P(X/B-).P(B-)=P(SSN/B-).P(Test1/B-).P(Test2/B-).P(Final/B-).P(B-)$$

$$1/1.1/1.1/1.1/1$$

$$P(X/A-).P(A-)=P(SSN/A-).P(Test1/A-).P(Test2/A-).P(Final/A-).P(A-)$$

$$1/1.1/1.1/1.1/1$$

$$P(X/C-).P(C-)=P(SSN/C-).P(Test1/C-).P(Test2/C-).P(Final/C-).P(C-)$$

$$1/1.1/1.1/1.1/1$$

$$P(X/F).P(F)=P(SSN/F).P(Test1/F).P(Test2/F).P(Final/F).P(F)$$

$$1/1.1/1.1/1.1/1$$

$$P(X/B+).P(B+)=P(SSN/B+).P(Test1/B+).P(Test2/B+).P(Final/B+).P(B+)$$

$$1/1.1/1.1/1.1/1$$

**So the target attributes all values =1 so the new instance is invalid instance. ANS...**

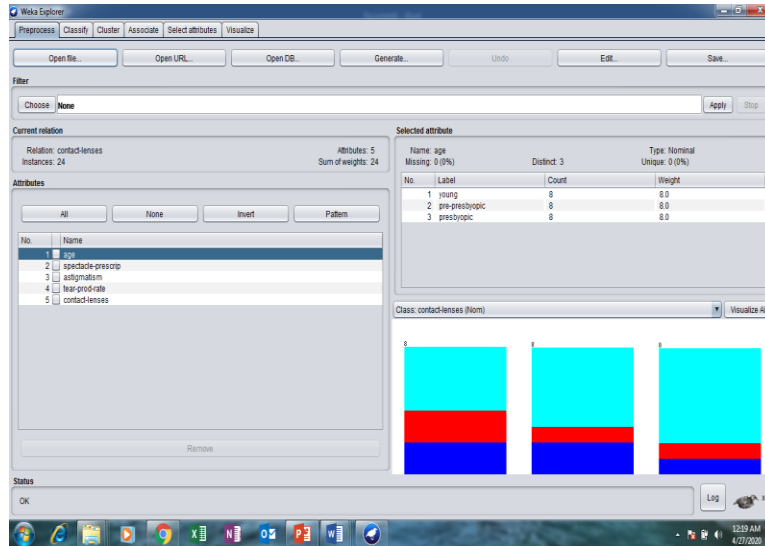
\*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*    \*\*\*\*\*

Q 3.

ANS.

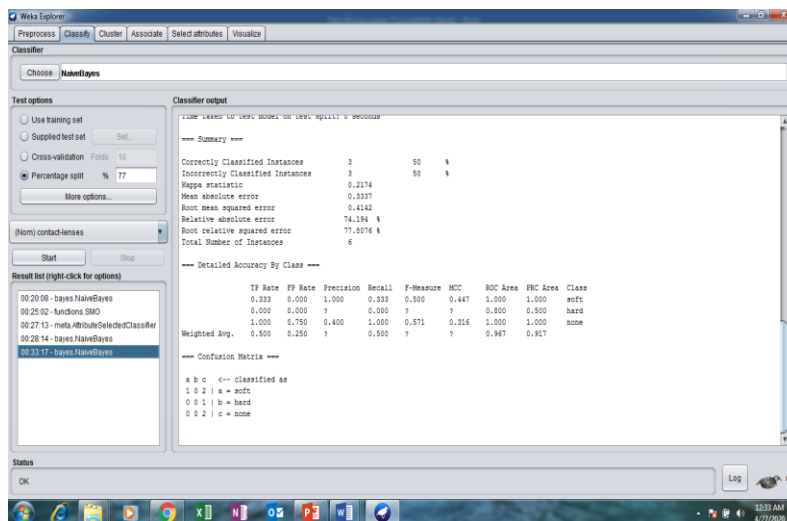
## Opening file.

Adding filter (Numeric to Nominal) so Naïve Bayes could be applied.



The screenshot shows the Weka Explorer interface. The 'Current relation' is 'contact-lenses' with 24 instances and 5 attributes. The 'Selected attribute' is 'age', which is of type 'Nominal' and has 3 distinct values: 'young', 'pre-presbyopic', and 'presbyopic'. Below the attribute list, there are three small bar charts showing the distribution of instances for each age group across the three classes: 'soft', 'hard', and 'none'.

## Applying Naïve Bayes



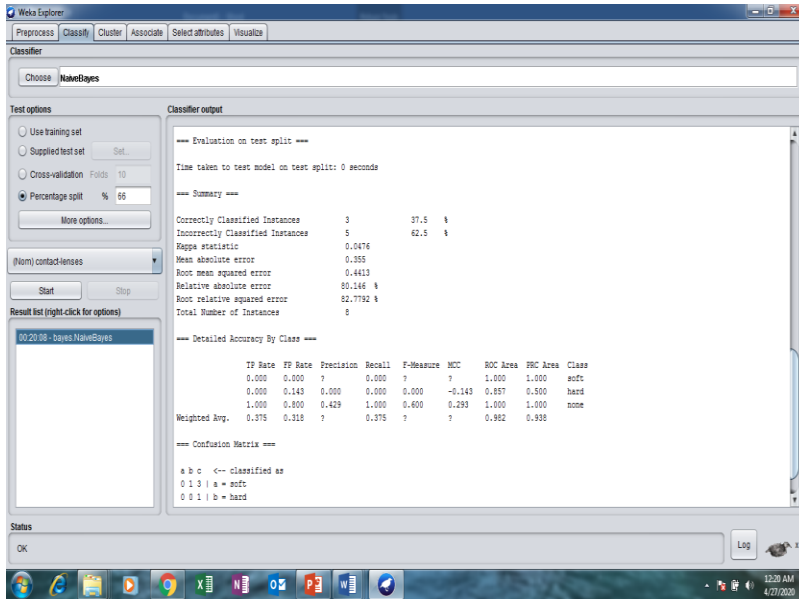
The screenshot shows the Weka Explorer interface with the 'NaiveBayes' classifier selected. The 'Classifier output' window displays the following summary and detailed accuracy by class:

```
==== Summary ====
Correctly Classified Instances      3      50 %
Incorrectly Classified Instances    3      50 %
Kappa statistic                    0.2174
Mean absolute error                0.3337
Root mean squared error            0.4242
Relative absolute error            74.126 %
Root relative squared error        77.8076 %
Total Number of Instances         6

==== Detailed Accuracy By Class ====
TP Rate  FP Rate  Precision  Recall  F-Measure  MCC  ROC Area  PRC Area  Class
0.000  0.000  1.000  0.333  0.500  0.447  1.000  1.000  soft
0.000  0.000  ?  0.000  ?  ?  0.800  0.800  hard
1.000  0.750  0.400  1.000  0.571  0.316  1.000  1.000  none
Weighted Avg.  0.500  0.250  ?  0.500  ?  ?  0.947  0.927

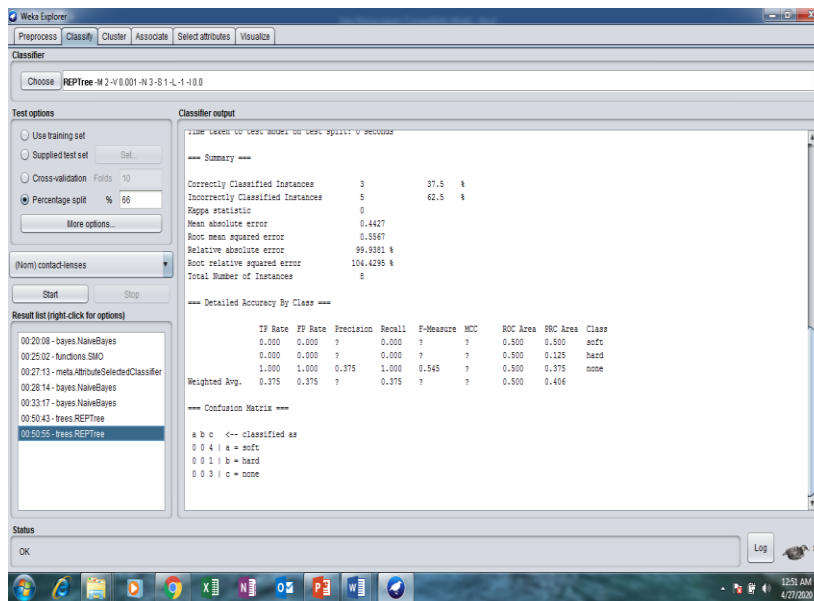
==== Confusion Matrix ====
a b c <- Classified as
1 0 2 | a = soft
0 0 1 | b = hard
0 0 2 | c = none
```

## Naïve Bayes Summary

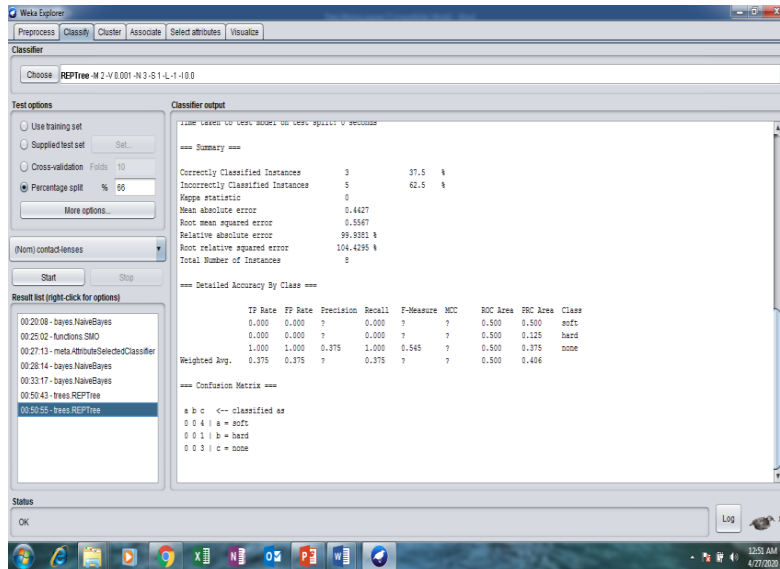


### Applying decision tree

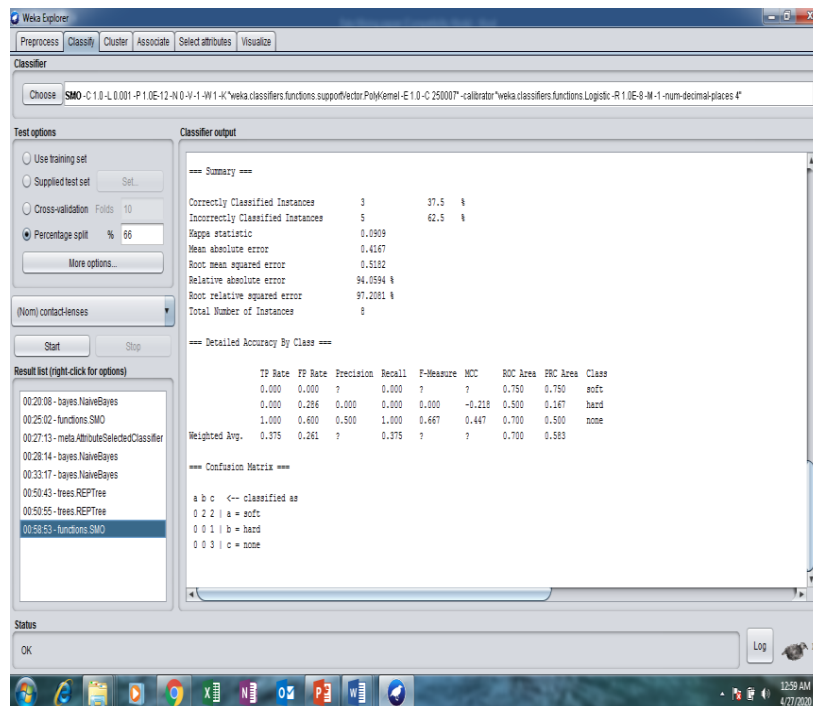
We are select classifier and choose REPTree which is known as Decision Tree.



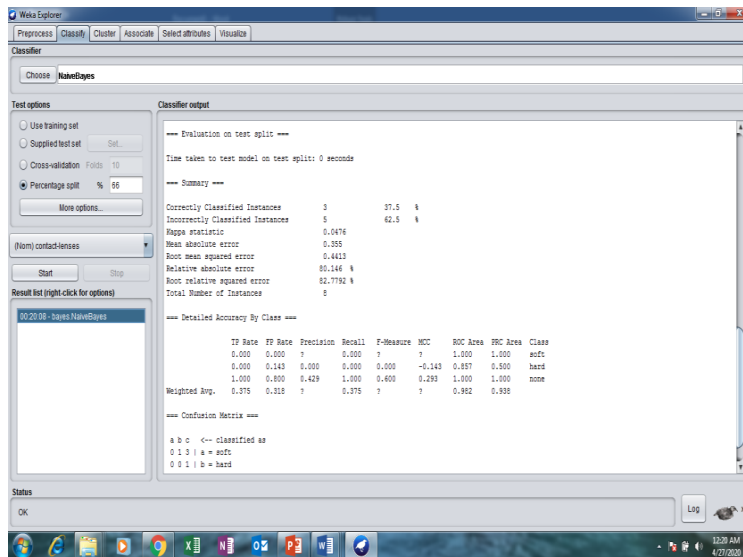
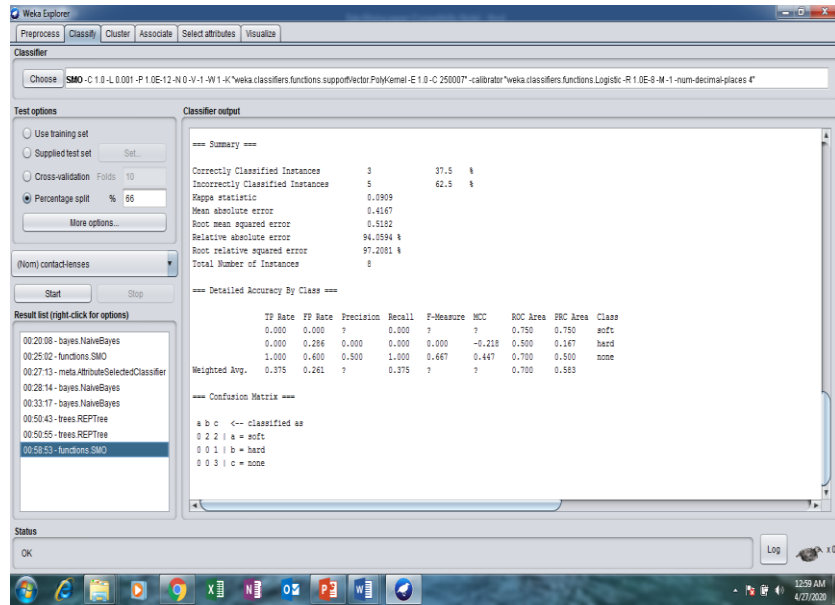
### Decision Tree summary



## Svm



## Svm summary



Comparing the results.

### Naïve Bayes

Precision	Recall	Mare	MMRE
<b>1,000</b>	<b>1,000</b>	<b>1,000</b>	<b>1,000</b>
<b>0.000</b>	<b>0.333</b>	<b>0.550</b>	<b>0.447</b>
<b>0.400</b>	<b>1.000</b>	<b>0.571</b>	<b>0.361</b>
<b>0.318</b>	<b>0.379</b>	<b>0.881</b>	<b>0.400</b>



Decision Tree

Precision	Recall	Mare	MMRE
0.100	0.100	0.500	0.559
0.050	0.044	0.125	0.525
0.375	0.100	0.445	0.500
0.262	0.267	0.375	0.442

Svm

Precision	Recall	Mare	MMRE
0.100	0.100	0.100	0.100
0.0100	0.123	0.147	0.155
0.429	0.100	0.600	0.932
0.316	0.375	0.395	0.392

\*\*\*\*\*

---THE END---







