Making predictions on new data using Weka perform Model fitting using weka toolkit
  a. Create **animal.arff** dataset with required data fields and class label as mammal
  b. Train the dataset using *j48 classifier model* and report the result
  c. Create a test dataset and make output predictions by applying the trained model

TASK-12 (a): Create **animal.arff** dataset with required data fields and class label as mammal
  Aim: Create **animal.arff** dataset with required data fields and specifying class label as mammal
  Tool: Weka
  Procedure:

  1) Open Start → Programs → Accessories → Notepad
  2) Type the following training data set with the help of Notepad for **animal** Table.

     % Changes to WEKA Format: SRG - November 1994

     %   1. Boolean attributes changed from 1 and 0 to Enumerated attribute with

     %   values {true and false}

     %   2. Class Number (Attribute 18) changed to an Enumerated type with

     %   values {1,2,3,4,5,6,7}

     %%December 1997 - Changed class attribute values to semi-sensible names

     %% 1. Title: Zoo database

     % % 2. Source Information

     %   -- Creator: Richard Forsyth

     %   -- Donor: Richard S. Forsyth

     %   8 Grosvenor Avenue

     %   Mapperley Park

     %   Nottingham NG3 5DX

     %   0602-621676

     %   -- Date: 5/15/1990

     % % 3. Past Usage:

     %   -- None known other than what is shown in Forsyth's PC/BEAGLE User's Guide.

     % % 4. Relevant Information:

     %   -- A simple database containing 17 Boolean-valued attributes. The "type"

     %   attribute appears to be the class attribute. Here is a breakdown of

     %   which animals are in which type: (I find it unusual that there are

     %   2 instances of "frog" and one of "girl"!)

     % %   Class# Set of animals:

     %   ======

```
===============================================
================
%           1 (41) aardvark, antelope, bear, boar, buffalo, calf,
%                cavy, cheetah, deer, dolphin, elephant,
%                fruitbat, giraffe, girl, goat, gorilla, hamster,
%                hare, leopard, lion, lynx, mink, mole, mongoose,
%                opossum, oryx, platypus, polecat, pony,
%                porpoise, puma, pussycat, raccoon, reindeer,
%                seal, sealion, squirrel, vampire, vole, wallaby,wolf
%           2 (20) chicken, crow, dove, duck, flamingo, gull, hawk,
%                kiwi, lark, ostrich, parakeet, penguin, pheasant,
%                rhea, skimmer, skua, sparrow, swan, vulture, wren
%           3 (5)  pitviper, seasnake, slowworm, tortoise, tuatara
%           4 (13) bass, carp, catfish, chub, dogfish, haddock,
%                herring, pike, piranha, seahorse, sole, stingray, tuna
%           5 (4)  frog, frog, newt, toad
%           6 (8)  flea, gnat, honeybee, housefly, ladybird, moth,
termite, wasp
%           7 (10) clam, crab, crayfish, lobster, octopus,
%                scorpion, seawasp, slug, starfish, worm
% % 5. Number of Instances: 101
% 6. Number of Attributes: 18 (animal name, 15 Boolean
attributes, 2 numerics)
% 7. Attribute Information: (name of attribute and type of value
domain)
%   1. animal name:     Unique for each instance
%   2. hair             Boolean
%   3. feathers  Boolean
%   4. eggs             Boolean
%   5. milk             Boolean
%   6. airborne Boolean
%   7. aquatic          Boolean
%   8. predator Boolean
%   9. toothed          Boolean
%  10. backbone         Boolean
%  11. breathes Boolean
%  12. venomous         Boolean
%  13. fins             Boolean
%  14. legs             Numeric (set of values: {0,2,4,5,6,8})
%  15. tail             Boolean
%  16. domestic         Boolean
%  17. catsize          Boolean
%  18. type             Numeric (integer values in range [1,7])
%
% 8. Missing Attribute Values: None
% 9. Class Distribution: Given above
```

@RELATION zoo

@ATTRIBUTE animal
{aardvark,antelope,bass,bear,boar,buffalo,calf,carp,catfish,cavy,ch
eetah,chicken,chub,clam,crab,crayfish,crow,deer,dogfish,dolphin,d
ove,duck,elephant,flamingo,flea,frog,fruitbat,giraffe,girl,gnat,goat,
gorilla,gull,haddock,hamster,hare,hawk,herring,honeybee,housefly
,kiwi,ladybird,lark,leopard,lion,lobster,lynx,mink,mole,mongoose,
moth,newt,octopus,opossum,oryx,ostrich,parakeet,penguin,pheasa
nt,pike,piranha,pitviper,platypus,polecat,pony,porpoise,puma,puss
ycat,raccoon,reindeer,rhea,scorpion,seahorse,seal,sealion,seasnake,
seawasp,skimmer,skua,slowworm,slug,sole,sparrow,squirrel,starfis
h,stingray,swan,termite,toad,tortoise,tuatara,tuna,vampire,vole,vult
ure,wallaby,wasp,wolf,worm,wren}

@ATTRIBUTE hair {false, true}

@ATTRIBUTE feathers {false, true}

@ATTRIBUTE eggs {false, true}

@ATTRIBUTE milk {false, true}

@ATTRIBUTE airborne {false, true}

@ATTRIBUTE aquatic {false, true}

@ATTRIBUTE predator {false, true}

@ATTRIBUTE toothed {false, true}

@ATTRIBUTE backbone {false, true}

@ATTRIBUTE breathes {false, true}

@ATTRIBUTE venomous {false, true}

@ATTRIBUTE fins {false, true}

@ATTRIBUTE legs INTEGER [0,9]

@ATTRIBUTE tail {false, true}

@ATTRIBUTE domestic {false, true}

@ATTRIBUTE catsize {false, true}

@ATTRIBUTE type { mammal, bird, reptile, fish, amphibian,
insect, invertebrate }

@DATA
%
% Instances (101):
%
aardvark,true,false,false,true,false,false,true,true,true,true,false,fals
e,4,false,false,true,mammal
antelope,true,false,false,true,false,false,false,true,true,true,false,fals
e,4,true,false,true,mammal
bass,false,false,true,false,false,true,true,true,true,false,false,true,0,t
rue,false,false,fish
bear,true,false,false,true,false,false,true,true,true,true,false,false,4,f
alse,false,true,mammal
boar,true,false,false,true,false,false,true,true,true,true,false,false,4,t
rue,false,true,mammal
buffalo,true,false,false,true,false,false,false,true,true,true,false,false
,4,true,false,true,mammal

calf,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

carp,false,false,true,false,false,true,false,true,true,false,false,true,0,true,true,false,fish

catfish,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,false,fish

cavy,true,false,false,true,false,false,false,true,true,true,false,false,4,false,true,false,mammal

cheetah,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

chicken,false,true,true,false,true,false,false,false,true,true,false,false,2,true,true,false,bird

chub,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,false,fish

clam,false,false,true,false,false,false,true,false,false,false,false,false,0,false,false,false,invertebrate

crab,false,false,true,false,false,true,true,false,false,false,false,false,4,false,false,false,invertebrate

crayfish,false,false,true,false,false,true,true,false,false,false,false,false,6,false,false,false,invertebrate

crow,false,true,true,false,true,false,true,false,true,true,false,false,2,true,false,false,bird

deer,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

dogfish,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,true,fish

dolphin,false,false,false,true,false,true,true,true,true,true,false,true,0,true,false,true,mammal

dove,false,true,true,false,true,false,false,false,true,true,false,false,2,true,true,false,bird

duck,false,true,true,false,true,true,false,false,true,true,false,false,2,true,false,false,bird

elephant,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

flamingo,false,true,true,false,true,false,false,false,true,true,false,false,2,true,false,true,bird

flea,false,false,true,false,false,false,false,false,false,true,false,false,6,false,false,false,insect

frog,false,false,true,false,false,true,true,true,true,true,false,false,4,false,false,false,amphibian

frog,false,false,true,false,false,true,true,true,true,true,true,false,4,false,false,false,amphibian

fruitbat,true,false,false,true,true,false,false,true,true,true,false,false,2,true,false,false,mammal

giraffe,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

girl,true,false,false,true,false,false,true,true,true,true,false,false,2,false,true,true,mammal

gnat,false,false,true,false,true,false,false,false,false,true,false,false,
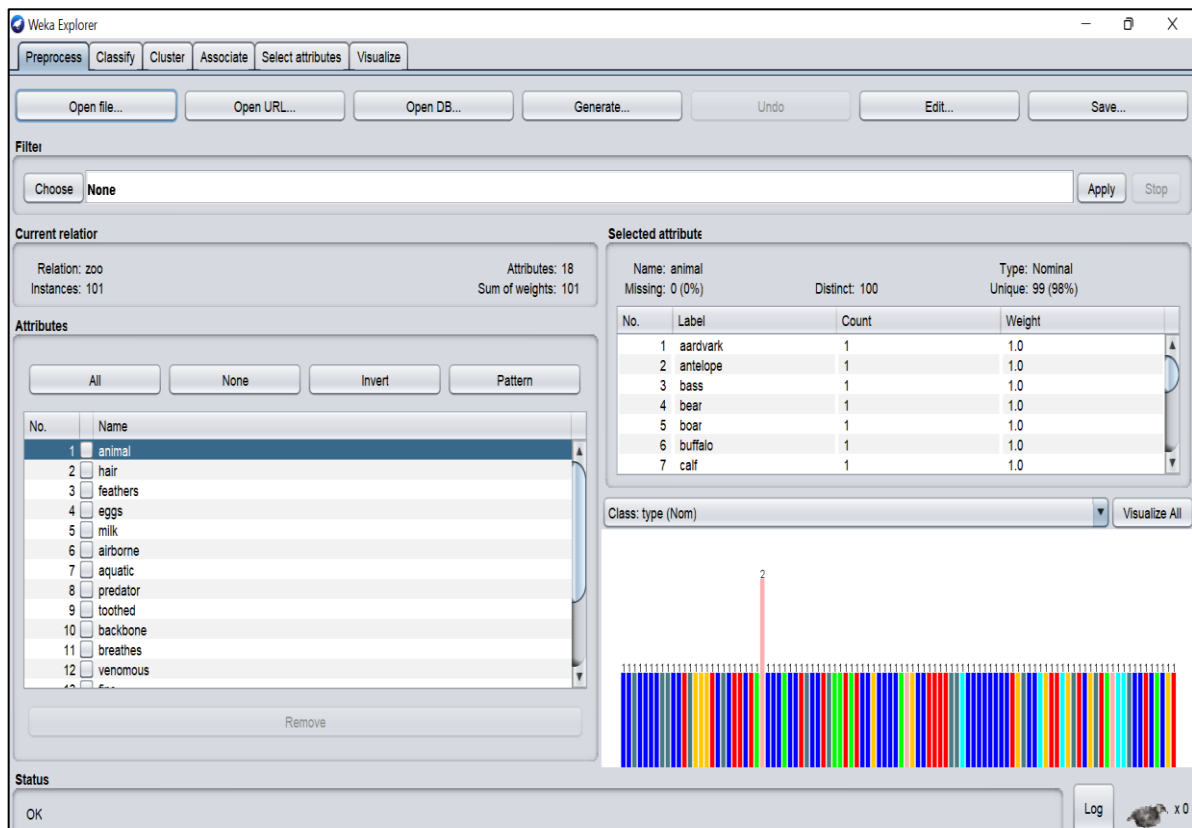
6,false,false,false,insect

goat,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

gorilla,true,false,false,true,false,false,false,true,true,true,false,false,2,false,false,true,mammal

gull,false,true,true,false,true,true,true,false,true,true,false,false,2,true,false,false,bird

haddock,false,false,true,false,false,true,false,true,true,false,false,true,0,true,false,false,fish

hamster,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,false,mammal

hare,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,false,mammal

hawk,false,true,true,false,true,false,true,false,true,true,false,false,2,true,false,false,bird

herring,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,false,fish

honeybee,true,false,true,false,true,false,false,false,false,true,true,false,6,false,true,false,insect

housefly,true,false,true,false,true,false,false,false,false,true,false,false,6,false,false,false,insect

kiwi,false,true,true,false,false,false,true,false,true,true,false,false,2,true,false,false,bird

ladybird,false,false,true,false,true,false,true,false,false,true,false,false,6,false,false,false,insect

lark,false,true,true,false,true,false,false,false,true,true,false,false,2,true,false,false,bird

leopard,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

lion,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

lobster,false,false,true,false,false,true,true,false,false,false,false,false,6,false,false,false,invertebrate

lynx,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

mink,true,false,false,true,false,true,true,true,true,true,false,false,4,true,false,true,mammal

mole,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,false,mammal

mongoose,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

moth,true,false,true,false,true,false,false,false,false,true,false,false,6,false,false,false,insect

newt,false,false,true,false,false,true,true,true,true,true,false,false,4,true,false,false,amphibian

octopus,false,false,true,false,false,true,true,false,false,false,false,false,8,false,false,true,invertebrate

opossum,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,false,mammal

oryx,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

ostrich,false,true,true,false,false,false,false,false,true,true,false,false,2,true,false,true,bird

parakeet,false,true,true,false,true,false,false,false,true,true,false,false,2,true,true,false,bird

penguin,false,true,true,false,false,true,true,false,true,true,false,false,2,true,false,true,bird

pheasant,false,true,true,false,true,false,false,false,true,true,false,false,2,true,false,false,bird

pike,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,true,fish

piranha,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,false,fish

pitviper,false,false,true,false,false,false,true,true,true,true,true,false,0,true,false,false,reptile

platypus,true,false,true,true,false,true,true,false,true,true,false,false,4,true,false,true,mammal

polecat,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

pony,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

porpoise,false,false,false,true,false,true,true,true,true,true,false,true,0,true,false,true,mammal

puma,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

pussycat,true,false,false,true,false,false,true,true,true,true,false,false,4,true,true,true,mammal

raccoon,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

reindeer,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

rhea,false,true,true,false,false,false,true,false,true,true,false,false,2,true,false,true,bird

scorpion,false,false,false,false,false,false,true,false,false,true,true,false,8,true,false,false,invertebrate

seahorse,false,false,true,false,false,true,false,true,true,false,false,true,0,true,false,false,fish

seal,true,false,false,true,false,true,true,true,true,true,false,true,0,false,false,true,mammal

sealion,true,false,false,true,false,true,true,true,true,true,false,true,2,true,false,true,mammal

seasnake,false,false,false,false,false,true,true,true,true,false,true,false,0,true,false,false,reptile

seawasp,false,false,true,false,false,true,true,false,false,false,true,false,0,false,false,false,invertebrate

skimmer,false,true,true,false,true,true,true,false,true,true,false,false,2,true,false,false,bird

skua,false,true,true,false,true,true,true,false,true,true,false,false,2,tr

ue,false,false,bird

slowworm,false,false,true,false,false,false,true,true,true,true,false,false,0,true,false,false,reptile

slug,false,false,true,false,false,false,false,false,false,true,false,false,0,false,false,false,invertebrate

sole,false,false,true,false,false,true,false,true,true,false,false,true,0,true,false,false,fish

sparrow,false,true,true,false,true,false,false,false,true,true,false,false,2,true,false,false,bird

squirrel,true,false,false,true,false,false,false,true,true,true,false,false,2,true,false,false,mammal

starfish,false,false,true,false,false,true,true,false,false,false,false,false,5,false,false,false,invertebrate

stingray,false,false,true,false,false,true,true,true,true,false,true,true,0,true,false,true,fish

swan,false,true,true,false,true,true,false,false,true,true,false,false,2,true,false,true,bird

termite,false,false,true,false,false,false,false,false,false,true,false,false,6,false,false,false,insect

toad,false,false,true,false,false,true,false,true,true,true,false,false,4,false,false,false,amphibian

tortoise,false,false,true,false,false,false,false,false,true,true,false,false,4,true,false,true,reptile

tuatara,false,false,true,false,false,false,true,true,true,true,false,false,4,true,false,false,reptile

tuna,false,false,true,false,false,true,true,true,true,false,false,true,0,true,false,true,fish

vampire,true,false,false,true,true,false,false,true,true,true,false,false,2,true,false,false,mammal

vole,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,false,mammal

vulture,false,true,true,false,true,false,true,false,true,true,false,false,2,true,false,true,bird

wallaby,true,false,false,true,false,false,false,true,true,true,false,false,2,true,false,true,mammal

wasp,true,false,true,false,true,false,false,false,false,true,true,false,6,false,false,false,insect

wolf,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

worm,false,false,true,false,false,false,false,false,false,true,false,false,0,false,false,false,invertebrate

wren,false,true,true,false,true,false,false,false,true,true,false,false,2,true,false,false,bird

%

3) Save the file with. arff format and mention the file name as **animal.arff**
4) Select **"EXPLORER" button** in the application.
5) Select "**Pre-process" Tab**.
6) Go to **"OPEN file" button** and browse the file that is already stored in the system- **animal.arff**

    which shows the attributes of animal dataset and are in visual form

Output:

TASK-12 (b): Train the dataset using *j48 classifier model* and report the result

    Aim: Train the dataset using *j48 classifier model* and report the result

    Tool: Weka

    Procedure:

1) Open Weka GUI Chooser.
2) Select **"EXPLORER" button** in the application.
3) Select "**Pre-process" Tab**.
4) Go to **"OPEN file" button** to browse and select the file that is already stored in the system— **animal.arff**
5) Click on "**Classify" tab** to perform classification**.**
6) Go to **"Choose" button** to select the j48 classification algorithm.
   Here the **c4.5 algorithm** has been chosen which is entitled as **j48** in Java and can be selected by clicking the button choose and **select tree j48**
7) In Test options, select the radio button labelled with **Use training set**
8) if need, select attribute.
9) Click on the "**Start" button** to run the J48 decision tree classifier.
10) See the output details in the **Classifier output window.**
11) Right click and select **"visualize tree"** option to see the decision tree.
12) Right click and select **"visualize classifier error"** option to see the **classifier error.**

    Output:

        === Run information ===

            Scheme: weka. classifiers.trees.J48 -C 0.25 -M 2

            Relation: zoo

            Instances: 101

            Attributes: 18

            Test mode: evaluate on training data

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

        J48 pruned tree

        ----

        feathers = false

        | milk = false

        | | backbone = false

        | | | airborne = false

        | | | | predator = false

        | | | | | legs <= 2: invertebrate (2.0)

        | | | | | legs > 2: insect (2.0)

        | | | | predator = true: invertebrate (8.0)

        | | | airborne = true: insect (6.0)

        | | backbone = true

        | | | fins = false

```
|  |  |  |  tail = false: amphibian (3.0)
|  |  |  |  tail = true: reptile (6.0/1.0)
|  |  |  fins = true: fish (13.0)
|  milk = true: mammal (41.0)
feathers = true: bird (20.0)
```

Number of Leaves :   9
Size of the tree :   17
Time taken to build model: 0 seconds

=== **Evaluation on training set** ===
Time taken to test model on training data: 0 seconds

=== **Summary** ===

Correctly Classified Instances	**100**	**99.0099 %**
Incorrectly Classified Instances	**1**	**0.9901 %**
Kappa statistic	0.987	
Mean absolute error	0.0047	
Root mean squared error	0.0486	
Relative absolute error	2.1552 %	
Root relative squared error	14.7377 %	
Total Number of Instances	101	

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

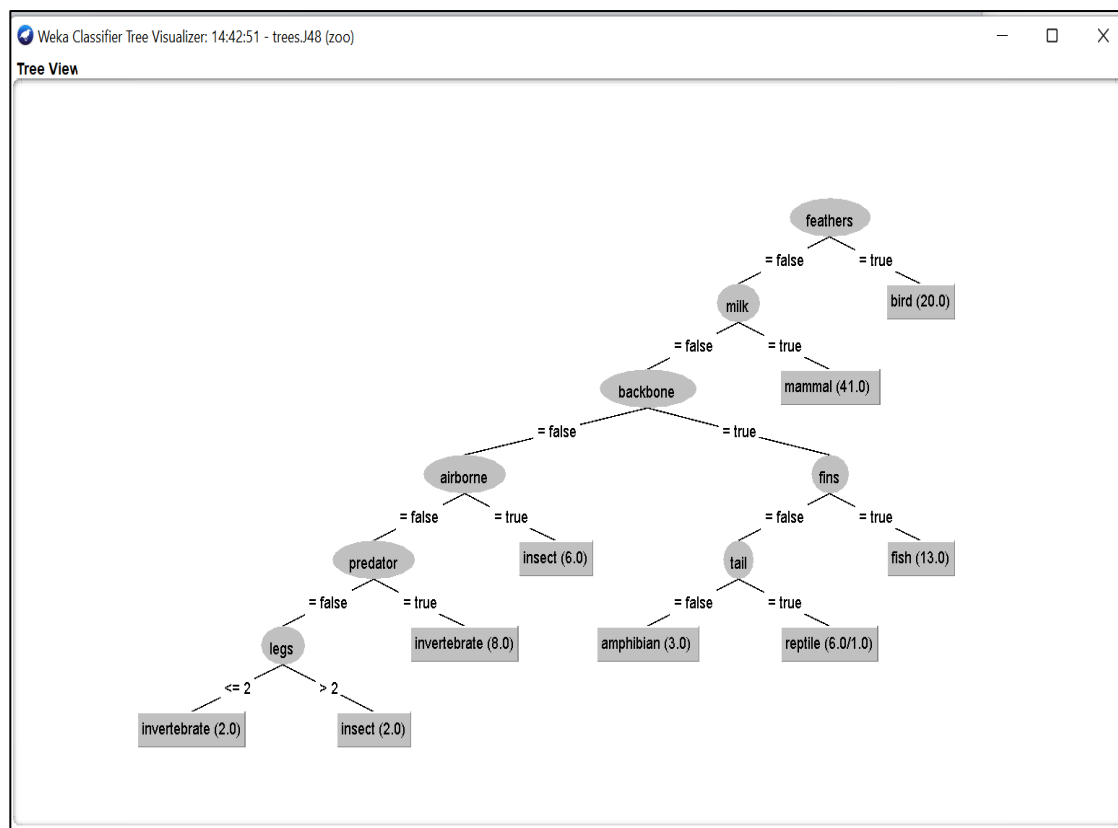| TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	mammal
1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	bird
1.000	0.010	0.833	1.000	0.909	0.908	0.995	0.833	reptile
1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	fish
0.750	0.000	1.000	0.750	0.857	0.862	0.994	0.861	amphibian
1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	insect
1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	invertebrate
Weighted Avg.	0.990	0.001	0.992	0.990	0.990	0.990	0.999	0.986

=== **Confusion Matrix** ===
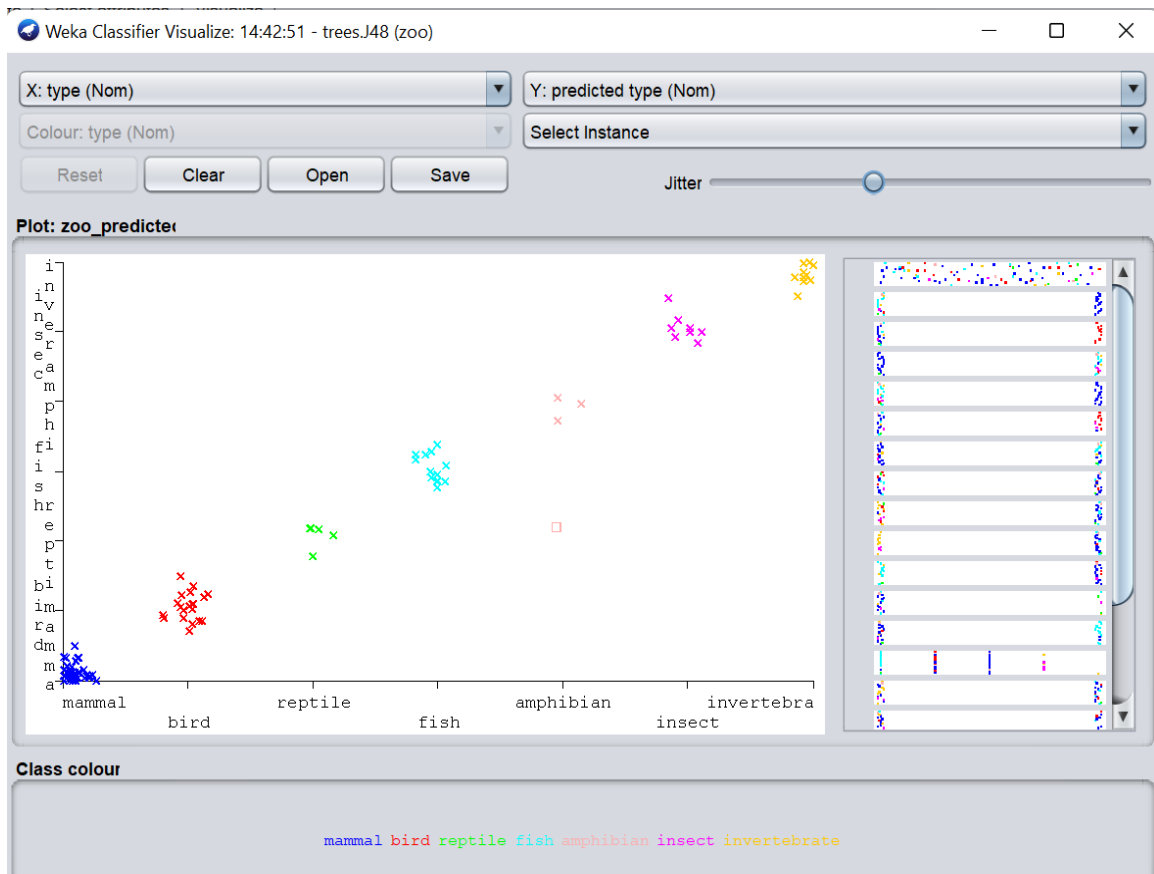```
a b c d e f g   <-- classified as
41 0 0 0 0 0 0 | a = mammal
0 20 0 0 0 0 0 | b = bird
0 0 5 0 0 0 0 | c = reptile
0 0 0 13 0 0 0 | d = fish
0 0 1 0 3 0 0 | e = amphibian
0 0 0 0 0 8 0 | f = insect
0 0 0 0 0 0 10 | g = invertebrate
```

**Trained model output: Decision Tree**



**Classifier errors of J48 decision tree:**

**TASK-12 (c):** Create a test dataset and make **output predictions** by applying the trained model

   **Aim:** Create **animal test** dataset and make output predictions by applying the trained model

**Tool:** Weka

**Procedure:**

1) Open Start → Programs → Accessories → Notepad

2) Type the following training data set with the help of Notepad for animals test data.

   @RELATION zoo

   @ATTRIBUTE animal
   {aardvark,antelope,bass,bear,boar,buffalo,calf,carp,catfish,cavy,cheetah,chicken,chub,clam,crab,crayfish,crow,deer,dogfish,dolphin,dove,duck,elephant,flamingo,flea,frog,fruitbat,giraffe,girl,gnat,goat,gorilla,gull,haddock,hamster,hare,hawk,herring,honeybee,housefly,kiwi,ladybird,lark,leopard,lion,lobster,lynx,mink,mole,mongoose,moth,newt,octopus,opossum,oryx,ostrich,parakeet,penguin,pheasant,pike,piranha,pitviper,platypus,polecat,pony,porpoise,puma,pussycat,raccoon,reindeer,rhea,scorpion,seahorse,seal,sealion,seasnake,seawasp,skimmer,skua,slowworm,slug,sole,sparrow,squirrel,starfish,stingray,swan,termite,toad,tortoise,tuatara,tuna,vampire,vole,vulture,wallaby,wasp,wolf,worm,wren}

   @ATTRIBUTE hair {false, true}

   @ATTRIBUTE feathers {false, true}

   @ATTRIBUTE eggs {false, true}

   @ATTRIBUTE milk {false, true}

   @ATTRIBUTE airborne {false, true}

   @ATTRIBUTE aquatic {false, true}

   @ATTRIBUTE predator {false, true}

   @ATTRIBUTE toothed {false, true}

   @ATTRIBUTE backbone {false, true}

   @ATTRIBUTE breathes {false, true}

   @ATTRIBUTE venomous {false, true}

   @ATTRIBUTE fins {false, true}

   @ATTRIBUTE legs INTEGER [0,9]

   @ATTRIBUTE tail {false, true}

   @ATTRIBUTE domestic {false, true}

   @ATTRIBUTE catsize {false, true}

   @ATTRIBUTE type {mammal, bird, reptile, fish, amphibian, insect, invertebrate}

   @DATA

   %

   % Instances (12):

   %

calf,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

deer,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

elephant,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

fruitbat,true,false,false,true,true,false,false,true,true,true,false,false,2,true,false,false,mammal

giraffe,true,false,false,true,false,false,false,true,true,true,false,false,4,true,false,true,mammal

honeybee,true,false,true,false,true,false,false,false,false,true,true,false,6,false,true,false,insect

ostrich,false,true,true,false,false,false,false,false,true,true,false,false,2,true,false,true,bird

reindeer,true,false,false,true,false,false,false,true,true,true,false,false,4,true,true,true,mammal

seal,true,false,false,true,false,true,true,true,true,true,false,true,0,false,false,true,mammal

tortoise,false,false,true,false,false,false,false,false,true,true,false,false,4,true,false,true,reptile

vampire,true,false,false,true,true,false,false,true,true,true,false,false,2,true,false,false,mammal

wolf,true,false,false,true,false,false,true,true,true,true,false,false,4,true,false,true,mammal

3) Save the file with **.arff** file format with file name **animaltest.arff**
4) Perform **Task-12(b)** to train the J48 model with animal.arff
5) After performing the **Task-12(b),** select "**Pre-process" Tab**.
6) Go to **"OPEN file" button** to browse and select the file that is already stored in the system— **animaltest.arff**
7) In Test options, select the radio button labelled with **Supply test set**
8) Click on "Set" button and browse and select the test dataset which is already saved in system- **animaltest.arff**
9) Click on the "**Start" button** to run the J48 decision tree classifer on test
10) See the output details in the **Classifier output window.**

**Output:**

**Results on Test data**

**=== Run information ===**

    Scheme:      weka.classifiers.trees.J48 -C 0.25 -M 2

    Relation:   zoo

    Instances:   101

    Attributes:  18

Test mode:    User supplied test set:  size unknown (reading incrementally)

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

J48 pruned tree

------------------

feathers = false

|  milk = false

|  |  backbone = false

|  |  |  airborne = false

|  |  |  |  predator = false

|  |  |  |  |  legs <= 2: invertebrate (2.0)

|  |  |  |  |  legs > 2: insect (2.0)

|  |  |  |  predator = true: invertebrate (8.0)

|  |  |  airborne = true: insect (6.0)

|  |  backbone = true

|  |  |  fins = false

|  |  |  |  tail = false: amphibian (3.0)

|  |  |  |  tail = true: reptile (6.0/1.0)

|  |  |  fins = true: fish (13.0)

|  milk = true: mammal (41.0)

feathers = true: bird (20.0)


Number of Leaves  :   9

Size of the tree :        17


Time taken to build model: 0.01 seconds

=== **Evaluation on test set** ===

Time taken to test model on supplied test set: 0 seconds

=== **Summary** ===

| | | | |
|---|---|---|---|
| **Correctly Classified Instances** | **12** | **100** | **%** |
| **Incorrectly Classified Instances** | **0** | **0** | **%** |
| Kappa statistic | 1 | | |
| Mean absolute error | 0.004 | | |
| Root mean squared error | 0.0257 | | |
| Relative absolute error | 2.0408 % | | |
| Root relative squared error | 8.8619 % | | |
| Total Number of Instances | 12 | | |

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

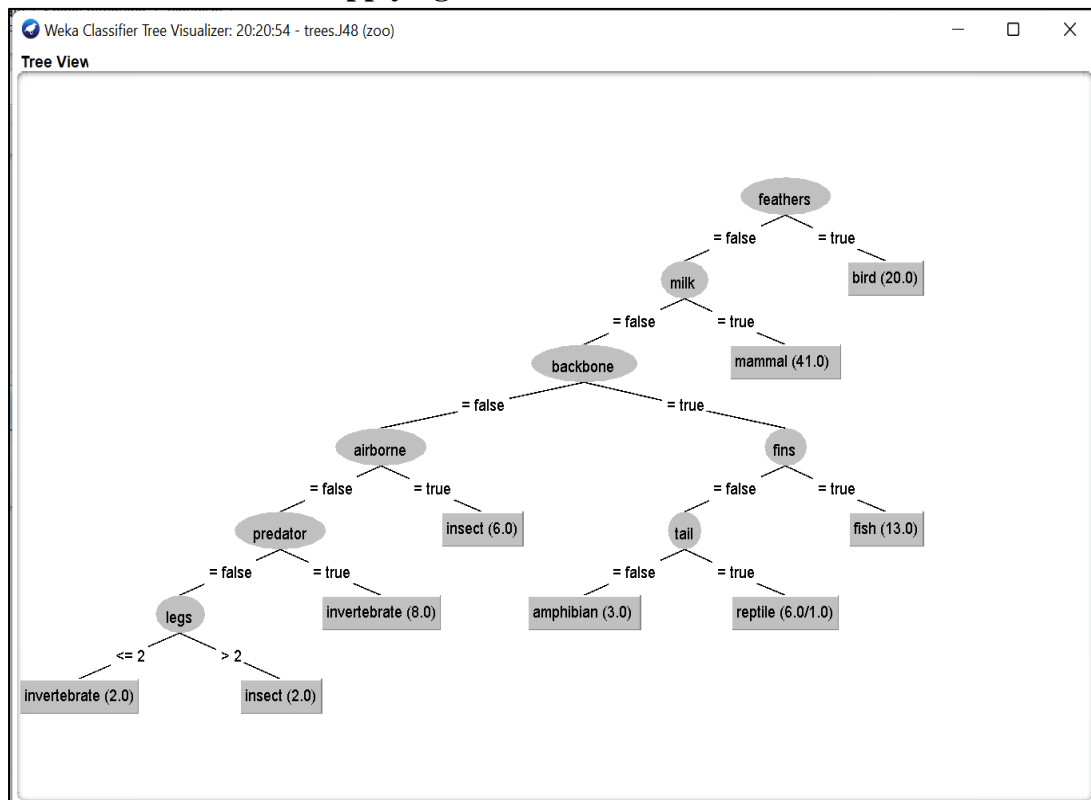| TP Rate | FP Rate | Precision | Recall | F-Measure | MCC | ROC Area | PRC Area | Class |
|---------|---------|-----------|--------|-----------|-----|----------|----------|-------|
| 1.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | mammal |
| 1.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | bird |
| 1.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | reptile |
| ? | 0.000 | ? | ? | ? | ? | ? | ? | fish |
| ? | 0.000 | ? | ? | ? | ? | ? | ? | amphibian |
| 1.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | insect |
| ? | 0.000 | ? | ? | ? | ? | ? | ? | invertebrate |
| Weighted Avg. 1.000 | 0.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | |

## === Confusion Matrix ===

```
a b c d e f g   <-- classified as
9 0 0 0 0 0 0 | a = mammal
0 1 0 0 0 0 0 | b = bird
0 0 1 0 0 0 0 | c = reptile
0 0 0 0 0 0 0 | d = fish
0 0 0 0 0 0 0 | e = amphibian
0 0 0 0 0 1 0 | f = insect
0 0 0 0 0 0 0 | g = invertebrate
```

Decision Tree on after supplying test data

Classifier errors of J48 decision tree: