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COS 277

Overview summary-

The dataset is compromised of different animals found in a zoo, and it not only classifies them based on what type of animal they are, but then goes further to show the breakdown of how many animals have different features such as if they’re venomous or predators. These features are also broken down further by being color coded based on what kind of animal they are.

**ZeroR**

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

ZeroR predicts class value: mammal

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 41 40.5941 %

Incorrectly Classified Instances 60 59.4059 %

Kappa statistic 0

Mean absolute error 0.2192

Root mean squared error 0.3299

Relative absolute error 100 %

Root relative squared error 100 %

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 1.000 0.406 1.000 0.577 ? 0.474 0.394 mammal

0.000 0.000 ? 0.000 ? ? 0.494 0.196 bird

0.000 0.000 ? 0.000 ? ? 0.235 0.043 reptile

0.000 0.000 ? 0.000 ? ? 0.403 0.112 fish

0.000 0.000 ? 0.000 ? ? 0.187 0.033 amphibian

0.000 0.000 ? 0.000 ? ? 0.388 0.073 insect

0.000 0.000 ? 0.000 ? ? 0.495 0.098 invertebrate

Weighted Avg. 0.406 0.406 ? 0.406 ? ? 0.441 0.232

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**Naïve Bayes**

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

Naive Bayes Classifier

Class

Attribute mammal bird reptile fish amphibian insect invertebrate

(0.39) (0.19) (0.06) (0.13) (0.05) (0.08) (0.1)

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animal

aardvark 2.0 1.0 1.0 1.0 1.0 1.0 1.0

antelope 2.0 1.0 1.0 1.0 1.0 1.0 1.0

bass 1.0 1.0 1.0 2.0 1.0 1.0 1.0

bear 2.0 1.0 1.0 1.0 1.0 1.0 1.0

boar 2.0 1.0 1.0 1.0 1.0 1.0 1.0

buffalo 2.0 1.0 1.0 1.0 1.0 1.0 1.0

calf 2.0 1.0 1.0 1.0 1.0 1.0 1.0

carp 1.0 1.0 1.0 2.0 1.0 1.0 1.0

catfish 1.0 1.0 1.0 2.0 1.0 1.0 1.0

cavy 2.0 1.0 1.0 1.0 1.0 1.0 1.0

cheetah 2.0 1.0 1.0 1.0 1.0 1.0 1.0

chicken 1.0 2.0 1.0 1.0 1.0 1.0 1.0

chub 1.0 1.0 1.0 2.0 1.0 1.0 1.0

clam 1.0 1.0 1.0 1.0 1.0 1.0 2.0

crab 1.0 1.0 1.0 1.0 1.0 1.0 2.0

crayfish 1.0 1.0 1.0 1.0 1.0 1.0 2.0

crow 1.0 2.0 1.0 1.0 1.0 1.0 1.0

deer 2.0 1.0 1.0 1.0 1.0 1.0 1.0

dogfish 1.0 1.0 1.0 2.0 1.0 1.0 1.0

dolphin 2.0 1.0 1.0 1.0 1.0 1.0 1.0

dove 1.0 2.0 1.0 1.0 1.0 1.0 1.0

duck 1.0 2.0 1.0 1.0 1.0 1.0 1.0

elephant 2.0 1.0 1.0 1.0 1.0 1.0 1.0

flamingo 1.0 2.0 1.0 1.0 1.0 1.0 1.0

flea 1.0 1.0 1.0 1.0 1.0 2.0 1.0

frog 1.0 1.0 1.0 1.0 3.0 1.0 1.0

fruitbat 2.0 1.0 1.0 1.0 1.0 1.0 1.0

giraffe 2.0 1.0 1.0 1.0 1.0 1.0 1.0

girl 2.0 1.0 1.0 1.0 1.0 1.0 1.0

gnat 1.0 1.0 1.0 1.0 1.0 2.0 1.0

goat 2.0 1.0 1.0 1.0 1.0 1.0 1.0

gorilla 2.0 1.0 1.0 1.0 1.0 1.0 1.0

gull 1.0 2.0 1.0 1.0 1.0 1.0 1.0

haddock 1.0 1.0 1.0 2.0 1.0 1.0 1.0

hamster 2.0 1.0 1.0 1.0 1.0 1.0 1.0

hare 2.0 1.0 1.0 1.0 1.0 1.0 1.0

hawk 1.0 2.0 1.0 1.0 1.0 1.0 1.0

herring 1.0 1.0 1.0 2.0 1.0 1.0 1.0

honeybee 1.0 1.0 1.0 1.0 1.0 2.0 1.0

housefly 1.0 1.0 1.0 1.0 1.0 2.0 1.0

kiwi 1.0 2.0 1.0 1.0 1.0 1.0 1.0

ladybird 1.0 1.0 1.0 1.0 1.0 2.0 1.0

lark 1.0 2.0 1.0 1.0 1.0 1.0 1.0

leopard 2.0 1.0 1.0 1.0 1.0 1.0 1.0

lion 2.0 1.0 1.0 1.0 1.0 1.0 1.0

lobster 1.0 1.0 1.0 1.0 1.0 1.0 2.0

lynx 2.0 1.0 1.0 1.0 1.0 1.0 1.0

mink 2.0 1.0 1.0 1.0 1.0 1.0 1.0

mole 2.0 1.0 1.0 1.0 1.0 1.0 1.0

mongoose 2.0 1.0 1.0 1.0 1.0 1.0 1.0

moth 1.0 1.0 1.0 1.0 1.0 2.0 1.0

newt 1.0 1.0 1.0 1.0 2.0 1.0 1.0

octopus 1.0 1.0 1.0 1.0 1.0 1.0 2.0

opossum 2.0 1.0 1.0 1.0 1.0 1.0 1.0

oryx 2.0 1.0 1.0 1.0 1.0 1.0 1.0

ostrich 1.0 2.0 1.0 1.0 1.0 1.0 1.0

parakeet 1.0 2.0 1.0 1.0 1.0 1.0 1.0

penguin 1.0 2.0 1.0 1.0 1.0 1.0 1.0

pheasant 1.0 2.0 1.0 1.0 1.0 1.0 1.0

pike 1.0 1.0 1.0 2.0 1.0 1.0 1.0

piranha 1.0 1.0 1.0 2.0 1.0 1.0 1.0

pitviper 1.0 1.0 2.0 1.0 1.0 1.0 1.0

platypus 2.0 1.0 1.0 1.0 1.0 1.0 1.0

polecat 2.0 1.0 1.0 1.0 1.0 1.0 1.0

pony 2.0 1.0 1.0 1.0 1.0 1.0 1.0

porpoise 2.0 1.0 1.0 1.0 1.0 1.0 1.0

puma 2.0 1.0 1.0 1.0 1.0 1.0 1.0

pussycat 2.0 1.0 1.0 1.0 1.0 1.0 1.0

raccoon 2.0 1.0 1.0 1.0 1.0 1.0 1.0

reindeer 2.0 1.0 1.0 1.0 1.0 1.0 1.0

rhea 1.0 2.0 1.0 1.0 1.0 1.0 1.0

scorpion 1.0 1.0 1.0 1.0 1.0 1.0 2.0

seahorse 1.0 1.0 1.0 2.0 1.0 1.0 1.0

seal 2.0 1.0 1.0 1.0 1.0 1.0 1.0

sealion 2.0 1.0 1.0 1.0 1.0 1.0 1.0

seasnake 1.0 1.0 2.0 1.0 1.0 1.0 1.0

seawasp 1.0 1.0 1.0 1.0 1.0 1.0 2.0

skimmer 1.0 2.0 1.0 1.0 1.0 1.0 1.0

skua 1.0 2.0 1.0 1.0 1.0 1.0 1.0

slowworm 1.0 1.0 2.0 1.0 1.0 1.0 1.0

slug 1.0 1.0 1.0 1.0 1.0 1.0 2.0

sole 1.0 1.0 1.0 2.0 1.0 1.0 1.0

sparrow 1.0 2.0 1.0 1.0 1.0 1.0 1.0

squirrel 2.0 1.0 1.0 1.0 1.0 1.0 1.0

starfish 1.0 1.0 1.0 1.0 1.0 1.0 2.0

stingray 1.0 1.0 1.0 2.0 1.0 1.0 1.0

swan 1.0 2.0 1.0 1.0 1.0 1.0 1.0

termite 1.0 1.0 1.0 1.0 1.0 2.0 1.0

toad 1.0 1.0 1.0 1.0 2.0 1.0 1.0

tortoise 1.0 1.0 2.0 1.0 1.0 1.0 1.0

tuatara 1.0 1.0 2.0 1.0 1.0 1.0 1.0

tuna 1.0 1.0 1.0 2.0 1.0 1.0 1.0

vampire 2.0 1.0 1.0 1.0 1.0 1.0 1.0

vole 2.0 1.0 1.0 1.0 1.0 1.0 1.0

vulture 1.0 2.0 1.0 1.0 1.0 1.0 1.0

wallaby 2.0 1.0 1.0 1.0 1.0 1.0 1.0

wasp 1.0 1.0 1.0 1.0 1.0 2.0 1.0

wolf 2.0 1.0 1.0 1.0 1.0 1.0 1.0

worm 1.0 1.0 1.0 1.0 1.0 1.0 2.0

wren 1.0 2.0 1.0 1.0 1.0 1.0 1.0

[total] 141.0 120.0 105.0 113.0 104.0 108.0 110.0

hair

false 3.0 21.0 6.0 14.0 5.0 5.0 11.0

true 40.0 1.0 1.0 1.0 1.0 5.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

feathers

false 42.0 1.0 6.0 14.0 5.0 9.0 11.0

true 1.0 21.0 1.0 1.0 1.0 1.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

eggs

false 41.0 1.0 2.0 1.0 1.0 1.0 2.0

true 2.0 21.0 5.0 14.0 5.0 9.0 10.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

milk

false 1.0 21.0 6.0 14.0 5.0 9.0 11.0

true 42.0 1.0 1.0 1.0 1.0 1.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

airborne

false 40.0 5.0 6.0 14.0 5.0 3.0 11.0

true 3.0 17.0 1.0 1.0 1.0 7.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

aquatic

false 36.0 15.0 5.0 1.0 1.0 9.0 5.0

true 7.0 7.0 2.0 14.0 5.0 1.0 7.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

predator

false 20.0 12.0 2.0 5.0 2.0 8.0 3.0

true 23.0 10.0 5.0 10.0 4.0 2.0 9.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

toothed

false 2.0 21.0 2.0 1.0 1.0 9.0 11.0

true 41.0 1.0 5.0 14.0 5.0 1.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

backbone

false 1.0 1.0 1.0 1.0 1.0 9.0 11.0

true 42.0 21.0 6.0 14.0 5.0 1.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

breathes

false 1.0 1.0 2.0 14.0 1.0 1.0 8.0

true 42.0 21.0 5.0 1.0 5.0 9.0 4.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

venomous

false 42.0 21.0 4.0 13.0 4.0 7.0 9.0

true 1.0 1.0 3.0 2.0 2.0 3.0 3.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

fins

false 38.0 21.0 6.0 1.0 5.0 9.0 11.0

true 5.0 1.0 1.0 14.0 1.0 1.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

legs

mean 2.6927 1.6 1.28 0 3.2 6.4 3.68

std. dev. 0.9638 0.2667 1.5677 0.2667 0.2667 0.2667 3.2829

weight sum 41 20 5 13 4 8 10

precision 1.6 1.6 1.6 1.6 1.6 1.6 1.6

tail

false 7.0 1.0 1.0 1.0 4.0 9.0 10.0

true 36.0 21.0 6.0 14.0 2.0 1.0 2.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

domestic

false 34.0 18.0 6.0 13.0 5.0 8.0 11.0

true 9.0 4.0 1.0 2.0 1.0 2.0 1.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

catsize

false 10.0 15.0 5.0 10.0 5.0 9.0 10.0

true 33.0 7.0 2.0 5.0 1.0 1.0 2.0

[total] 43.0 22.0 7.0 15.0 6.0 10.0 12.0

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 96 95.0495 %

Incorrectly Classified Instances 5 4.9505 %

Kappa statistic 0.9352

Mean absolute error 0.0153

Root mean squared error 0.098

Relative absolute error 6.9784 %

Root relative squared error 29.693 %

Total Number of Instances 101

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.951 0.000 1.000 0.951 0.975 0.959 1.000 1.000 mammal

1.000 0.000 1.000 1.000 1.000 1.000 1.000 1.000 bird

0.400 0.000 1.000 0.400 0.571 0.623 0.994 0.925 reptile

1.000 0.034 0.813 1.000 0.897 0.886 1.000 1.000 fish

1.000 0.021 0.667 1.000 0.800 0.808 1.000 1.000 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. 0.950 0.005 0.963 0.950 0.947 0.943 1.000 0.996

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**Simple Logistic**

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

SimpleLogistic:

Class mammal :

-4.57 +

[milk=true] \* 10.9

Class bird :

-4.56 +

[feathers=true] \* 10.81

Class reptile :

-2.44 +

[animal=slowworm] \* 2.51 +

[animal=tortoise] \* 3.25 +

[animal=tuatara] \* 2.77 +

[venomous=true] \* 1.85 +

[tail=true] \* 1.63

Class fish :

-1.71 +

[breathes=true] \* -3.08 +

[fins=true] \* 6.3

Class amphibian :

-3.22 +

[animal=frog] \* 4.86 +

[animal=newt] \* 2.99 +

[animal=toad] \* 3.1 +

[aquatic=true] \* 1.62

Class insect :

-0.97 +

[airborne=true] \* 2.49 +

[predator=true] \* -1.75 +

[backbone=true] \* -2.33 +

[legs] \* 0.54

Class invertebrate :

2.92 +

[animal=scorpion] \* 2.78 +

[animal=slug] \* 1.39 +

[backbone=true] \* -4.06 +

[breathes=true] \* -1.96

Time taken to build model: 0.25 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 95 94.0594 %

Incorrectly Classified Instances 6 5.9406 %

Kappa statistic 0.9216

Mean absolute error 0.0221

Root mean squared error 0.1159

Relative absolute error 10.1017 %

Root relative squared error 35.1368 %

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

0.600 0.010 0.750 0.600 0.667 0.656 0.990 0.826 reptile

1.000 0.011 0.929 1.000 0.963 0.958 1.000 1.000 fish

0.750 0.000 1.000 0.750 0.857 0.862 0.997 0.950 amphibian

0.750 0.022 0.750 0.750 0.750 0.728 0.983 0.849 insect

0.900 0.022 0.818 0.900 0.857 0.842 0.988 0.906 invertebrate

Weighted Avg. 0.941 0.006 0.941 0.941 0.939 0.935 0.997 0.968

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**Logitboost**

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

LogitBoost: Base classifiers and their weights:

Iteration 1

Class 1 (type=mammal)

Decision Stump

Classifications

milk = true : 3.0000000000000004

milk != true : -1.1666666666666643

milk is missing : 1.3940042826552426

Class 2 (type=bird)

Decision Stump

Classifications

feathers = true : 2.9999999999999996

feathers != true : -1.1666666666666687

feathers is missing : 0.3563968668407317

Class 3 (type=reptile)

Decision Stump

Classifications

animal = pitviper : 3.0

animal != pitviper : -0.7974683544303794

animal is missing : -0.7151702786377704

Class 4 (type=fish)

Decision Stump

Classifications

fins = true : 2.5145631067961167

fins != true : -1.166666666666665

fins is missing : -0.09859154929577432

Class 5 (type=amphibian)

Decision Stump

Classifications

animal = frog : 3.0

animal != frog : -0.975409836065571

animal is missing : -0.800940438871471

Class 6 (type=insect)

Decision Stump

Classifications

legs <= 5.5 : -1.1666666666666679

legs > 5.5 : 2.264705882352938

legs is missing : -0.4701492537313435

Class 7 (type=invertebrate)

Decision Stump

Classifications

backbone = false : 1.9361702127659577

backbone != false : -1.1666666666666676

backbone is missing : -0.316326530612246

Iteration 2

Class 1 (type=mammal)

Decision Stump

Classifications

milk = true : 1.2910208187124812

milk != true : -1.0696642066001336

milk is missing : 0.6421371864485672

Class 2 (type=bird)

Decision Stump

Classifications

feathers = true : 1.184168606820619

feathers != true : -1.0617470351917102

feathers is missing : 0.05156917171535267

Class 3 (type=reptile)

Decision Stump

Classifications

animal = seasnake : 2.9999999999999996

animal != seasnake : -0.260978636192184

animal is missing : -0.0758167861686691

Class 4 (type=fish)

Decision Stump

Classifications

breathes = true : -1.2057328701091916

breathes != true : 0.9400160919588901

breathes is missing : -0.24704733717780714

Class 5 (type=amphibian)

Decision Stump

Classifications

animal = newt : 3.0

animal != newt : -0.6151934682704403

animal is missing : -0.3707037470155178

Class 6 (type=insect)

Decision Stump

Classifications

airborne = false : -0.8950916752936567

airborne != false : 1.3788489910501474

airborne is missing : -0.14796196033102202

Class 7 (type=invertebrate)

Decision Stump

Classifications

breathes = true : -0.8429339766034871

breathes != true : 1.2351007644857264

breathes is missing : -0.1882335979013153

Iteration 3

Class 1 (type=mammal)

Decision Stump

Classifications

milk = false : -1.0586810351311056

milk != false : 1.051362336327094

milk is missing : 0.30033451471885475

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0548578325107063

feathers != false : 1.0604866694916397

feathers is missing : 0.06934765995182271

Class 3 (type=reptile)

Decision Stump

Classifications

tail = false : -1.132847284187251

tail != false : 0.8475962004171926

tail is missing : 0.21717310138243667

Class 4 (type=fish)

Decision Stump

Classifications

fins = false : -1.0546166044591294

fins != false : 0.7189494731450371

fins is missing : -0.051128831851258986

Class 5 (type=amphibian)

Decision Stump

Classifications

animal = toad : 3.0

animal != toad : -0.6118988218467469

animal is missing : -0.1317242619638553

Class 6 (type=insect)

Decision Stump

Classifications

tail = true : -1.2002893006363167

tail != true : 0.5730955870573807

tail is missing : -0.18270214940226842

Class 7 (type=invertebrate)

Decision Stump

Classifications

legs <= 7.0 : -0.35551554477478825

legs > 7.0 : 2.0873071729049637

legs is missing : -0.10688512543126341

Iteration 4

Class 1 (type=mammal)

Decision Stump

Classifications

milk = false : -1.0247207579662834

milk != false : 1.0327489638339804

milk is missing : 0.39968616969159837

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.024112872308973

feathers != false : 1.017839619303311

feathers is missing : 0.01654602842284283

Class 3 (type=reptile)

Decision Stump

Classifications

animal = slowworm : 1.6187507654424542

animal != slowworm : -0.24835249221021277

animal is missing : -0.039265702716135414

Class 4 (type=fish)

Decision Stump

Classifications

breathes = false : 0.6177134511454934

breathes != false : -1.038935764925412

breathes is missing : 0.014497722523582213

Class 5 (type=amphibian)

Decision Stump

Classifications

aquatic = false : -1.0794736513989274

aquatic != false : 0.8138333160135671

aquatic is missing : -0.02694156140243801

Class 6 (type=insect)

Decision Stump

Classifications

predator = false : 0.47429747258114846

predator != false : -1.0962336659434475

predator is missing : -0.2631490466530993

Class 7 (type=invertebrate)

Decision Stump

Classifications

backbone = false : 0.5173481010595788

backbone != false : -1.0517340177762726

backbone is missing : 0.07833920768654713

Iteration 5

Class 1 (type=mammal)

Decision Stump

Classifications

milk = false : -1.0147946857369583

milk != false : 1.006807005168154

milk is missing : 0.261518264327342

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0146974386809753

feathers != false : 1.00626770507106

feathers is missing : 0.00990725468758773

Class 3 (type=reptile)

Decision Stump

Classifications

animal = tortoise : 1.4098464448820067

animal != tortoise : -0.21695642819415495

animal is missing : 0.0762027662000444

Class 4 (type=fish)

Decision Stump

Classifications

fins = true : 0.779889894860747

fins != true : -1.028064580166235

fins is missing : -0.10475528614121422

Class 5 (type=amphibian)

Decision Stum0070

Classifications

aquatic = true : 0.20419568427215273

aquatic != true : -1.044854726752252

aquatic is missing : -0.2064547993409064

Class 6 (type=insect)

Decision Stump

Classifications

legs <= 5.5 : -1.0826251495415664

legs > 5.5 : 0.7703577585352607

legs is missing : 0.16752577656857237

Class 7 (type=invertebrate)

Decision Stump

Classifications

breathes = false : 0.7920081192200041

breathes != false : -0.5399608681736096

breathes is missing : -0.11948459258025743

Iteration 6

Class 1 (type=mammal)

Decision Stump

Classifications

milk = true : 1.0052452751958403

milk != true : -1.007424549789058

milk is missing : 0.2843952730804161

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.007446745732746

feathers != false : 1.0018146156434402

feathers is missing : -0.13603701031439502

Class 3 (type=reptile)

Decision Stump

Classifications

animal = tuatara : 1.1738594996329408

animal != tuatara : -0.2961150447562279

animal is missing : -0.027322176309188068

Class 4 (type=fish)

Decision Stump

Classifications

fins = false : -1.0103478347304555

fins != false : 0.6924646285572791

fins is missing : 0.13631645883640078

Class 5 (type=amphibian)

Decision Stump

Classifications

animal = newt : 1.0788088439717245

animal != newt : -0.49404599650064324

animal is missing : -0.19943683031311438

Class 6 (type=insect)

Decision Stump

Classifications

aquatic = true : -1.0923006685092704

aquatic != true : 0.23821553945739457

aquatic is missing : -0.1402947134105211

Class 7 (type=invertebrate)

Decision Stump

Classifications

backbone = false : 0.3770345782242322

backbone != false : -1.031999703770244

backbone is missing : 0.11869238128962264

Iteration 7

Class 1 (type=mammal)

Decision Stump

Classifications

milk = true : 1.0045346427492452

milk != true : -1.0015797116974288

milk is missing : 0.4571972549259405

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0015901004420495

feathers != false : 1.000594503507636

feathers is missing : -0.13883888340827935

Class 3 (type=reptile)

Decision Stump

Classifications

tail = false : -1.0181482954835683

tail != false : 0.39370784994778457

tail is missing : -0.030075569135593463

Class 4 (type=fish)

Decision Stump

Classifications

eggs = false : -1.0084422986018582

eggs != false : 0.40503000229710195

eggs is missing : -0.04203796504241547

Class 5 (type=amphibian)

Decision Stump

Classifications

legs <= 3.0 : -1.0154738226421456

legs > 3.0 : 0.3494102874230535

legs is missing : -0.13801987239779284

Class 6 (type=insect)

Decision Stump

Classifications

legs <= 5.5 : -1.0565887506637595

legs > 5.5 : 0.6141430220003795

legs is missing : 0.14301652298942175

Class 7 (type=invertebrate)

Decision Stump

Classifications

legs <= 1.0 : 0.665611662695341

legs > 1.0 : -0.4526923337625516

legs is missing : -0.09216087817396258

Iteration 8

Class 1 (type=mammal)

Decision Stump

Classifications

milk = false : -1.00046505856492

milk != false : 1.0006727522637862

milk is missing : 0.45319272839971686

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0004689118709054

feathers != false : 1.0002567613802844

feathers is missing : 0.04364050222589782

Class 3 (type=reptile)

Decision Stump

Classifications

animal = seasnake : 1.0605317708535815

animal != seasnake : -0.36570562892991465

animal is missing : -0.047867312473544234

Class 4 (type=fish)

Decision Stump

Classifications

fins = false : -1.0029778335762565

fins != false : 0.8402760720572042

fins is missing : 0.1067061320007646

Class 5 (type=amphibian)

Decision Stump

Classifications

toothed = false : -1.007997164884953

toothed != false : 0.2655170695390851

toothed is missing : -0.28994374100527187

Class 6 (type=insect)

Decision Stump

Classifications

predator = false : 0.5326143134812333

predator != false : -0.8749724276758629

predator is missing : -0.31512216494124706

Class 7 (type=invertebrate)

Decision Stump

Classifications

predator = false : -0.47456746752082507

predator != false : 0.6280296396954755

predator is missing : 0.2795037657855883

Iteration 9

Class 1 (type=mammal)

Decision Stump

Classifications

milk = true : 1.000685061686467

milk != true : -1.0003003248091806

milk is missing : 0.4810442708092158

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0003032710493114

feathers != false : 1.0000863556479307

feathers is missing : -0.15145388818467964

Class 3 (type=reptile)

Decision Stump

Classifications

backbone = true : 0.5976774206281226

backbone != true : -1.0116597107582066

backbone is missing : 0.2828934383992915

Class 4 (type=fish)

Decision Stump

Classifications

fins = true : 0.7354119044662898

fins != true : -1.0009130930936168

fins is missing : 0.22551090663541035

Class 5 (type=amphibian)

Decision Stump

Classifications

aquatic = false : -1.011153401863028

aquatic != false : 0.25004952158752985

aquatic is missing : -0.22937193048720217

Class 6 (type=insect)

Decision Stump

Classifications

airborne = false : -0.6214511939255071

airborne != false : 1.0858571331907916

airborne is missing : -0.0772121790085

Class 7 (type=invertebrate)

Decision Stump

Classifications

airborne = false : 0.27020674120770577

airborne != false : -1.0912087091902458

airborne is missing : -0.05214412783679732

Iteration 10

Class 1 (type=mammal)

Decision Stump

Classifications

milk = false : -1.00007946293223

milk != false : 1.0005668468411102

milk is missing : 0.7560292971438611

Class 2 (type=bird)

Decision Stump

Classifications

feathers = false : -1.0000802694226034

feathers != false : 1.0000663625606907

feathers is missing : 0.30435720271077266

Class 3 (type=reptile)

Decision Stump

Classifications

animal = newt : -1.0174714851699374

animal != newt : 0.36400369215125966

animal is missing : 0.16513097050598277

Class 4 (type=fish)

Decision Stump

Classifications

breathes = false : 0.8154970763954291

breathes != false : -1.0005747059656445

breathes is missing : 0.4692570376609672

Class 5 (type=amphibian)

Decision Stump

Classifications

breathes = true : 0.6202916284257349

breathes != true : -1.0023582938314963

breathes is missing : 0.17146682429742977

Class 6 (type=insect)

Decision Stump

Classifications

legs <= 5.5 : -1.016876699484077

legs > 5.5 : 0.5126479226432765

legs is missing : 0.13703240510890588

Class 7 (type=invertebrate)

Decision Stump

Classifications

backbone = false : -0.04344843005118182

backbone != false : -1.0132392273880795

backbone is missing : -0.26638004809564736

Number of performed iterations: 10

Time taken to build model: 0.08 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 96 95.0495 %

Incorrectly Classified Instances 5 4.9505 %

Kappa statistic 0.9347

Mean absolute error 0.0177

Root mean squared error 0.1033

Relative absolute error 8.0739 %

Root relative squared error 31.3035 %

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

0.800 0.010 0.800 0.800 0.800 0.790 0.985 0.668 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 0.995 0.917 amphibian

0.750 0.011 0.857 0.750 0.800 0.786 0.992 0.931 insect

0.900 0.033 0.750 0.900 0.818 0.800 0.996 0.967 invertebrate

Weighted Avg. 0.950 0.005 0.954 0.950 0.951 0.947 0.998 0.972

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**OneR**

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

animal:

aardvark -> mammal

antelope -> mammal

bass -> fish

bear -> mammal

boar -> mammal

buffalo -> mammal

calf -> mammal

carp -> fish

catfish -> fish

cavy -> mammal

cheetah -> mammal

chicken -> bird

chub -> fish

clam -> invertebrate

crab -> invertebrate

crayfish -> invertebrate

crow -> bird

deer -> mammal

dogfish -> fish

dolphin -> mammal

dove -> bird

duck -> bird

elephant -> mammal

flamingo -> bird

flea -> insect

frog -> amphibian

fruitbat -> mammal

giraffe -> mammal

girl -> mammal

gnat -> insect

goat -> mammal

gorilla -> mammal

gull -> bird

haddock -> fish

hamster -> mammal

hare -> mammal

hawk -> bird

herring -> fish

honeybee -> insect

housefly -> insect

kiwi -> bird

ladybird -> insect

lark -> bird

leopard -> mammal

lion -> mammal

lobster -> invertebrate

lynx -> mammal

mink -> mammal

mole -> mammal

mongoose -> mammal

moth -> insect

newt -> amphibian

octopus -> invertebrate

opossum -> mammal

oryx -> mammal

ostrich -> bird

parakeet -> bird

penguin -> bird

pheasant -> bird

pike -> fish

piranha -> fish

pitviper -> reptile

platypus -> mammal

polecat -> mammal

pony -> mammal

porpoise -> mammal

puma -> mammal

pussycat -> mammal

raccoon -> mammal

reindeer -> mammal

rhea -> bird

scorpion -> invertebrate

seahorse -> fish

seal -> mammal

sealion -> mammal

seasnake -> reptile

seawasp -> invertebrate

skimmer -> bird

skua -> bird

slowworm -> reptile

slug -> invertebrate

sole -> fish

sparrow -> bird

squirrel -> mammal

starfish -> invertebrate

stingray -> fish

swan -> bird

termite -> insect

toad -> amphibian

tortoise -> reptile

tuatara -> reptile

tuna -> fish

vampire -> mammal

vole -> mammal

vulture -> bird

wallaby -> mammal

wasp -> insect

wolf -> mammal

worm -> invertebrate

wren -> bird

(101/101 instances correct)

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 43 42.5743 %

Incorrectly Classified Instances 58 57.4257 %

Kappa statistic 0.045

Mean absolute error 0.1641

Root mean squared error 0.4051

Relative absolute error 74.8424 %

Root relative squared error 122.7774 %

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 0.967 0.414 1.000 0.586 0.117 0.517 0.414 mammal

0.000 0.000 ? 0.000 ? ? 0.500 0.198 bird

0.000 0.000 ? 0.000 ? ? 0.500 0.050 reptile

0.000 0.000 ? 0.000 ? ? 0.500 0.129 fish

0.500 0.000 1.000 0.500 0.667 0.700 0.750 0.520 amphibian

0.000 0.000 ? 0.000 ? ? 0.500 0.079 insect

0.000 0.000 ? 0.000 ? ? 0.500 0.099 invertebrate

Weighted Avg. 0.426 0.392 ? 0.426 ? ? 0.517 0.263

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**Random Tree**

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

RandomTree

==========

animal = aardvark : mammal (1/0)

animal = antelope : mammal (1/0)

animal = bass : fish (1/0)

animal = bear : mammal (1/0)

animal = boar : mammal (1/0)

animal = buffalo : mammal (1/0)

animal = calf : mammal (1/0)

animal = carp : fish (1/0)

animal = catfish : fish (1/0)

animal = cavy : mammal (1/0)

animal = cheetah : mammal (1/0)

animal = chicken : bird (1/0)

animal = chub : fish (1/0)

animal = clam : invertebrate (1/0)

animal = crab : invertebrate (1/0)

animal = crayfish : invertebrate (1/0)

animal = crow : bird (1/0)

animal = deer : mammal (1/0)

animal = dogfish : fish (1/0)

animal = dolphin : mammal (1/0)

animal = dove : bird (1/0)

animal = duck : bird (1/0)

animal = elephant : mammal (1/0)

animal = flamingo : bird (1/0)

animal = flea : insect (1/0)

animal = frog : amphibian (2/0)

animal = fruitbat : mammal (1/0)

animal = giraffe : mammal (1/0)

animal = girl : mammal (1/0)

animal = gnat : insect (1/0)

animal = goat : mammal (1/0)

animal = gorilla : mammal (1/0)

animal = gull : bird (1/0)

animal = haddock : fish (1/0)

animal = hamster : mammal (1/0)

animal = hare : mammal (1/0)

animal = hawk : bird (1/0)

animal = herring : fish (1/0)

animal = honeybee : insect (1/0)

animal = housefly : insect (1/0)

animal = kiwi : bird (1/0)

animal = ladybird : insect (1/0)

animal = lark : bird (1/0)

animal = leopard : mammal (1/0)

animal = lion : mammal (1/0)

animal = lobster : invertebrate (1/0)

animal = lynx : mammal (1/0)

animal = mink : mammal (1/0)

animal = mole : mammal (1/0)

animal = mongoose : mammal (1/0)

animal = moth : insect (1/0)

animal = newt : amphibian (1/0)

animal = octopus : invertebrate (1/0)

animal = opossum : mammal (1/0)

animal = oryx : mammal (1/0)

animal = ostrich : bird (1/0)

animal = parakeet : bird (1/0)

animal = penguin : bird (1/0)

animal = pheasant : bird (1/0)

animal = pike : fish (1/0)

animal = piranha : fish (1/0)

animal = pitviper : reptile (1/0)

animal = platypus : mammal (1/0)

animal = polecat : mammal (1/0)

animal = pony : mammal (1/0)

animal = porpoise : mammal (1/0)

animal = puma : mammal (1/0)

animal = pussycat : mammal (1/0)

animal = raccoon : mammal (1/0)

animal = reindeer : mammal (1/0)

animal = rhea : bird (1/0)

animal = scorpion : invertebrate (1/0)

animal = seahorse : fish (1/0)

animal = seal : mammal (1/0)

animal = sealion : mammal (1/0)

animal = seasnake : reptile (1/0)

animal = seawasp : invertebrate (1/0)

animal = skimmer : bird (1/0)

animal = skua : bird (1/0)

animal = slowworm : reptile (1/0)

animal = slug : invertebrate (1/0)

animal = sole : fish (1/0)

animal = sparrow : bird (1/0)

animal = squirrel : mammal (1/0)

animal = starfish : invertebrate (1/0)

animal = stingray : fish (1/0)

animal = swan : bird (1/0)

animal = termite : insect (1/0)

animal = toad : amphibian (1/0)

animal = tortoise : reptile (1/0)

animal = tuatara : reptile (1/0)

animal = tuna : fish (1/0)

animal = vampire : mammal (1/0)

animal = vole : mammal (1/0)

animal = vulture : bird (1/0)

animal = wallaby : mammal (1/0)

animal = wasp : insect (1/0)

animal = wolf : mammal (1/0)

animal = worm : invertebrate (1/0)

animal = wren : bird (1/0)

Size of the tree : 101

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 63 62.3762 %

Incorrectly Classified Instances 38 37.6238 %

Kappa statistic 0.4494

Mean absolute error 0.1386

Root mean squared error 0.2645

Relative absolute error 63.2046 %

Root relative squared error 80.1577 %

Total Number of Instances 101

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.976 0.400 0.625 0.976 0.762 0.587 0.907 0.860 mammal

0.600 0.160 0.480 0.600 0.533 0.406 0.814 0.458 bird

0.200 0.000 1.000 0.200 0.333 0.438 0.601 0.251 reptile

0.462 0.000 1.000 0.462 0.632 0.654 0.867 0.647 fish

0.750 0.010 0.750 0.750 0.750 0.740 0.903 0.585 amphibian

0.125 0.000 1.000 0.125 0.222 0.341 0.802 0.330 insect

0.000 0.000 ? 0.000 ? ? 0.780 0.229 invertebrate

Weighted Avg. 0.624 0.195 ? 0.624 ? ? 0.847 0.608

The most accurate model appears to have been Naïve Bayes, which I also would say was the easiest to read and understand what it was outputting, where it first had a chart of the animals and used 1 for if they weren’t the type of animal above and 2 for if they were, followed by a chart that showed how many of each type of animal was found to have the specific feature.