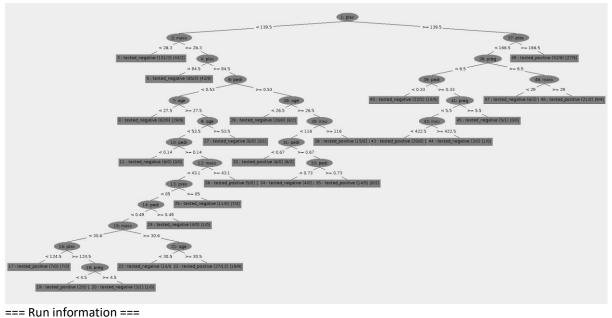
Considering the diabetes.arff dataset,

REP Tree with 10 cross-validation folds



Scheme:weka.classifiers.trees.REPTree -M 2 -V 0.001 -N 3 -S 1 -L -1 Relation: pima_diabetes Instances: 768 Attributes: 9 preg plas pres skin insu mass pedi age class

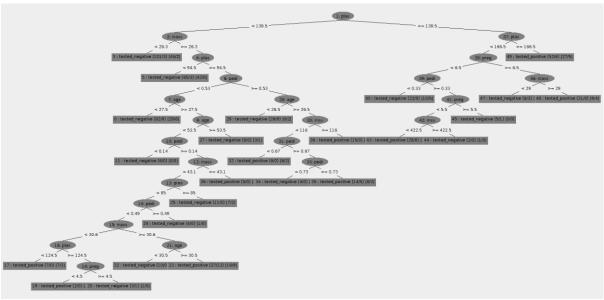
Test mode:10-fold cross-validation

| | | | | | | | plas >= 124.5

```
=== Classifier model (full training set) ===
REPTree
========
plas < 139.5
mass < 26.3 : tested_negative (101/3) [44/2]
| mass >= 26.3
| | plas < 94.5 : tested_negative (65/3) [42/8]
| | plas >= 94.5
| age < 27.5 : tested_negative (62/9) [29/6]
    | age >= 27.5
    | pedi < 0.14 : tested_negative (6/0) [0/0]
        | pedi >= 0.14
    | | | | mass < 43.1
    | | | | | mass < 30.6
| | | | | | | | | plas < 124.5 : tested_positive (7/0) [7/3]
```

```
| | | | | | | | preg >= 4.5 : tested_negative (3/1) [1/0]
           | | | | mass >= 30.6
           | | | | age < 30.5 : tested_negative (10/0) [3/0]
           | | | | age >= 30.5 : tested_positive (27/12) [19/9]
         | | | | pedi >= 0.49 : tested_negative (4/0) [1/0]
    | | | | | pres >= 85 : tested_negative (11/0) [7/2]
  | | | | mass >= 43.1 : tested_positive (5/0) [1/1]
  | | | pedi >= 0.53
    | age < 26.5 : tested_negative (26/8) [8/2]
    | age >= 26.5
    | | insu < 116
    | | | pedi < 0.67 : tested positive (6/0) [6/2]
| \ | \ | \ | \ | \ |  pedi >= 0.67
| | | | | pedi < 0.73 : tested_negative (4/0) [3/0]
    | | | | pedi >= 0.73 : tested_positive (14/5) [8/2]
| | | | insu >= 116 : tested_positive (15/0) [12/8]
plas >= 139.5
| plas < 166.5
| | preg < 6.5
| | pedi < 0.33 : tested_negative (22/5) [10/5]
  | | pedi >= 0.33
| | | | insu < 422.5 : tested_positive (28/8) [13/6]
| | | | insu >= 422.5 : tested_negative (2/0) [1/0]
| | | preg >= 5.5 : tested_negative (5/1) [0/0]
| preg >= 6.5
| | mass < 29 : tested_negative (6/3) [1/0]
| | mass >= 29 : tested_positive (21/0) [9/4]
| plas >= 166.5 : tested positive (52/6) [27/5]
Size of the tree: 49
Time taken to build model: 0.05 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances
                            578
                                      75.2604 %
Incorrectly Classified Instances 190
                                       24.7396 %
Kappa statistic
                       0.438
Mean absolute error
                           0.3272
Root mean squared error
                             0.4289
Relative absolute error
                           71.9842 %
                            89.9782 %
Root relative squared error
Total Number of Instances
                            768
=== Detailed Accuracy By Class ===
       TP Rate FP Rate Precision Recall F-Measure ROC Area Class
       0.846  0.422  0.789  0.846  0.817
                                            0.766 tested negative
       0.578 0.154
                      0.668 0.578 0.62
                                           0.766 tested_positive
Weighted Avg. 0.753 0.328 0.747 0.753 0.748
                                                  0.766
=== Confusion Matrix ===
 a b <-- classified as
423 77 | a = tested negative
113 155 | b = tested_positive
```

REP Tree with 20 cross-validation folds

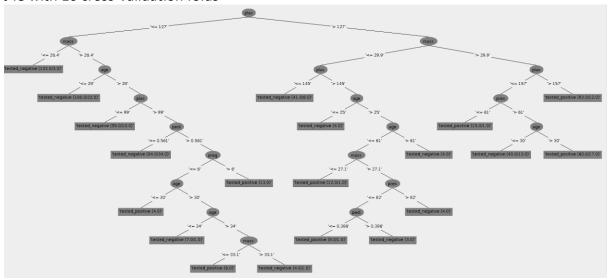


```
=== Run information ===
Scheme:weka.classifiers.trees.REPTree -M 2 -V 0.001 -N 3 -S 1 -L -1
Relation: pima_diabetes
Instances: 768
Attributes: 9
     preg
     plas
     pres
     skin
     insu
     mass
     pedi
     age
     class
Test mode:20-fold cross-validation
=== Classifier model (full training set) ===
REPTree
=========
plas < 139.5
| mass < 26.3 : tested_negative (101/3) [44/2]
| mass >= 26.3
  | plas < 94.5 : tested_negative (65/3) [42/8]
| | plas >= 94.5
| | | age < 27.5 : tested negative (62/9) [29/6]
| | | age >= 27.5
        | age < 53.5
          | pedi < 0.14 : tested_negative (6/0) [0/0]
   | | mass < 30.6
              | | | | | plas >= 124.5
| | | | | | | | | | preg < 4.5 : tested_positive (2/0) [1/0]
```

```
| | | | | | | | | | preg >= 4.5 : tested_negative (3/1) [1/0]
    | | | | | | mass >= 30.6
    | | | | | | age < 30.5 : tested_negative (10/0) [3/0]
         | | | | | age >= 30.5 : tested_positive (27/12) [19/9]
    | | | | | pedi >= 0.49 : tested_negative (4/0) [1/0]
         | | | | mass >= 43.1 : tested_positive (5/0) [1/1]
| | | | age >= 53.5 : tested_negative (8/0) [3/1]
| | pedi >= 0.53
| | | age < 26.5 : tested_negative (26/8) [8/2]
  | | age >= 26.5
         | insu < 116
    | \ | \ | \ | \ | \ |  pedi < 0.73 : tested negative (4/0) [3/0]
| | | | | pedi >= 0.73 : tested_positive (14/5) [8/2]
| | | | insu >= 116 : tested_positive (15/0) [12/8]
plas >= 139.5
| plas < 166.5
| | preg < 6.5
| | pedi < 0.33 : tested_negative (22/5) [10/5]
| | | pedi >= 0.33
| | | | insu < 422.5 : tested_positive (28/8) [13/6]
| | | | insu >= 422.5 : tested_negative (2/0) [1/0]
| | preg >= 6.5
| | mass < 29 : tested_negative (6/3) [1/0]
| | mass >= 29 : tested_positive (21/0) [9/4]
| plas >= 166.5 : tested_positive (52/6) [27/5]
Size of the tree: 49
Time taken to build model: 0.02 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances
                           556
                                     72.3958 %
Incorrectly Classified Instances 212
                                     27.6042 %
                       0.3741
Kappa statistic
Mean absolute error
                          0.3336
Root mean squared error
                            0.4393
Relative absolute error
                          73.3897 %
Root relative squared error
                           92.1634 %
Total Number of Instances
                           768
=== Detailed Accuracy By Class ===
      TP Rate FP Rate Precision Recall F-Measure ROC Area Class
       0.822  0.459  0.77  0.822  0.795  0.757  tested negative
       0.541 0.178
                     0.62  0.541  0.578  0.757  tested positive
Weighted Avg. 0.724 0.361 0.717 0.724 0.719 0.757
=== Confusion Matrix ===
 a b <-- classified as
411 89 | a = tested_negative
123 145 | b = tested positive
```

Both REP Trees produce the same decision tree as the algorithm is the same. The accuracy of classification is better in 10-fold REP tree (75.26%) compared to 20-fold REP tree (73.39%).

J48 with 10 cross-validation folds



```
=== Run information ===
```

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

Relation: pima diabetes

Instances: 768
Attributes: 9
preg
plas
pres
skin
insu
mass
pedi
age
class

Test mode:10-fold cross-validation

```
=== Classifier model (full training set) ===
J48 pruned tree
plas <= 127
mass <= 26.4: tested_negative (132.0/3.0)
mass > 26.4
| | age <= 28: tested_negative (180.0/22.0)
| age > 28
 | | plas <= 99: tested_negative (55.0/10.0)
 | | plas > 99
 | | pedi <= 0.561: tested_negative (84.0/34.0)
| | | | | age <= 34: tested_negative (7.0/1.0)
| | | | age > 34
| | | | | | mass <= 33.1: tested_positive (6.0)
```

```
| | | | | mass > 33.1: tested_negative (4.0/1.0)
plas > 127
| mass <= 29.9
| | plas <= 145: tested_negative (41.0/6.0)
 | plas > 145
| | age <= 25: tested negative (4.0)
| | age > 25
| | | | mass <= 27.1: tested_positive (12.0/1.0)
   | | mass > 27.1
    | | | | | pres > 82: tested negative (4.0)
| mass > 29.9
 | plas <= 157
| | age > 30: tested_positive (60.0/17.0)
| | plas > 157: tested_positive (92.0/12.0)
Number of Leaves: 20
Size of the tree: 39
Time taken to build model: 0.02 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances
                                73.8281 %
                        567
Incorrectly Classified Instances 201
                                26.1719 %
Kappa statistic
                   0.4164
Mean absolute error
                      0.3158
Root mean squared error
                       0.4463
Relative absolute error
                      69.4841 %
Root relative squared error
                      93.6293 %
Total Number of Instances
=== Detailed Accuracy By Class ===
     TP Rate FP Rate Precision Recall F-Measure ROC Area Class
      0.814  0.403  0.79  0.814  0.802  0.751 tested negative
      0.597  0.186  0.632  0.597  0.614  0.751 tested positive
Weighted Avg. 0.738 0.327 0.735 0.738 0.736 0.751
=== Confusion Matrix ===
 a b <-- classified as
407 93 | a = tested_negative
108 160 | b = tested positive
```

The J48 tree produces a much simpler tree compared to REP Tree but the accuracy is 73.83% which is lower than the REP Tree with same number of cross-validation folds. The accuracy of classification of REP Tree is usually expected to be higher than that of J48, as REP Tree uses reduced-error pruning in addition to the C4.5 algorithm used by J48 Tree.