040190030 Ömer Bahadır Gökmen

1. K-Means

=== Run information ===

Scheme: weka.clusterers.SimpleKMeans -init 1 -max-candidates 100 -periodic-pruning 10000 -min-density 2.0 -t1 -1.25 -t2 -1.0 -N 3 -A "weka.core.ManhattanDistance -R first-last" -I 500 -num-slots 1 -S 10

kMeans
======

Number of iterations: 8
Sum of within cluster distances: 48.45244821092278

Initial starting points (k-means++)

Cluster 0: 6.1,2.9,4.7,1.4
Cluster 1: 4.9,3.1,1.5,0.1
Cluster 2: 5.8,2.7,3.9,1.2

Missing values globally replaced with mean/mode

Final cluster centroids:

		Cluster#		
Attribute	Full Data	0	1	2
	(150.0)	(55.0)	(50.0)	(45.0)
sepal_length	5.8	6.7	5	5.7
sepal_width	3	3	3.4	2.7
petal_length	4.35	5.4	1.5	4.2
petal_width	1.3	1.9	0.2	1.3

Time taken to build model (full training data) : 0.01 seconds

=== Model and evaluation on training set ===

Clustered Instances

0 55 (37%)
1 50 (33%)
2 45 (30%)

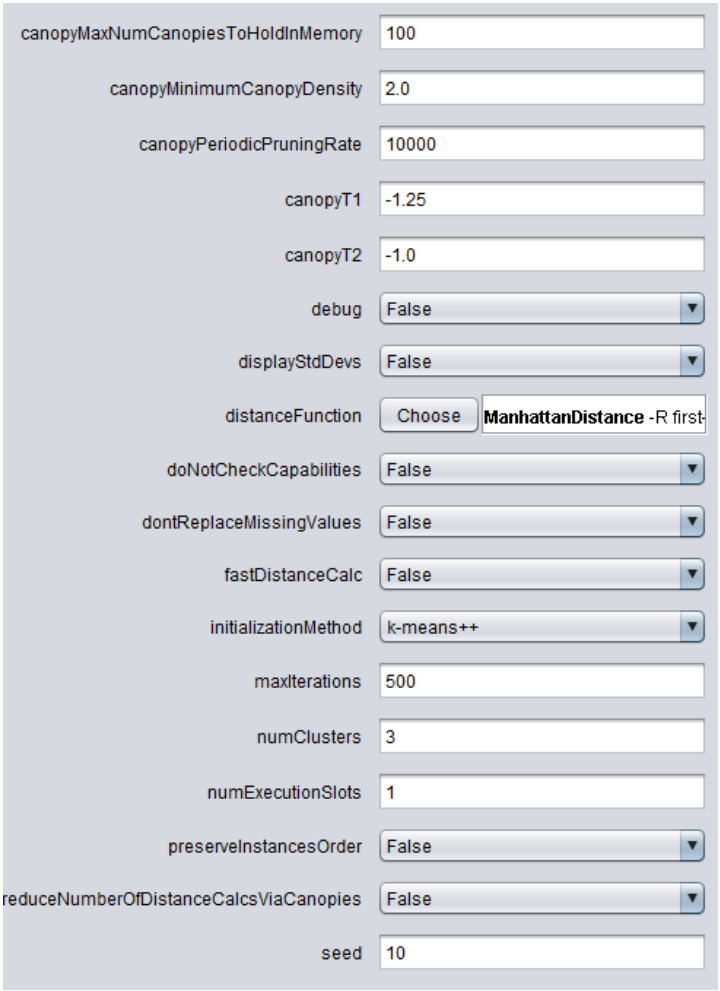
040190030 Ömer Bahadır Gökmen

Class attribute: class
Classes to Clusters:

```
 0  1  2  <-- assigned to cluster
 0 50  0 | Iris-setosa
10  0 40 | Iris-versicolor
45  0  5 | Iris-virginica
```

Cluster 0 <-- Iris-virginica
Cluster 1 <-- Iris-setosa
Cluster 2 <-- Iris-versicolor

Incorrectly clustered instances : 15.0 **10** **%**



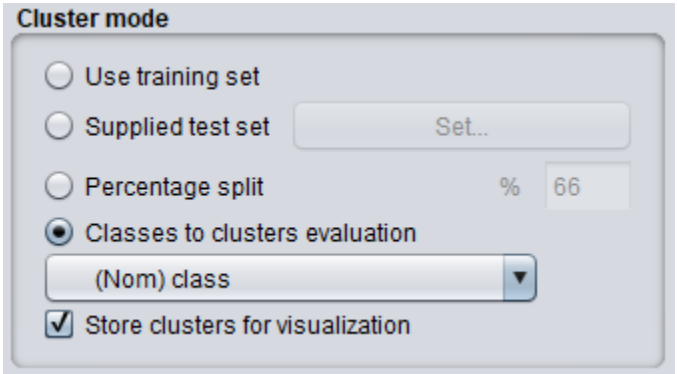
Canopy değerleri başlatma methodu olarak canopy kullanılmadığı için bir etkisi olmadı.

DistanceFunction: Manhattan algoritmasını seçtim çünkü boyut arttıkça manhattan algoritması euclidian'a göre daha başarılı sonuç vermektedir.

InitializationMethod:

k-means++ seçtim. Random seçimine göre daha iyi bir başlangıç yöntemi.

numClusters:3



040190030 Ömer Bahadır Gökmen

2. Random Forest

=== Run information ===

Scheme: weka.classifiers.trees.RandomForest -P 100 -I 100 -num-slots 1 -K 0 -M 1.0 -V 0.001 -S 1
Test mode: 10-fold cross-validation

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

RandomForest

Bagging with 100 iterations and base learner

weka.classifiers.trees.RandomTree -K 0 -M 1.0 -V 0.001 -S 1 -do-not-check-capabilities

Time taken to build model: 0.05 seconds

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

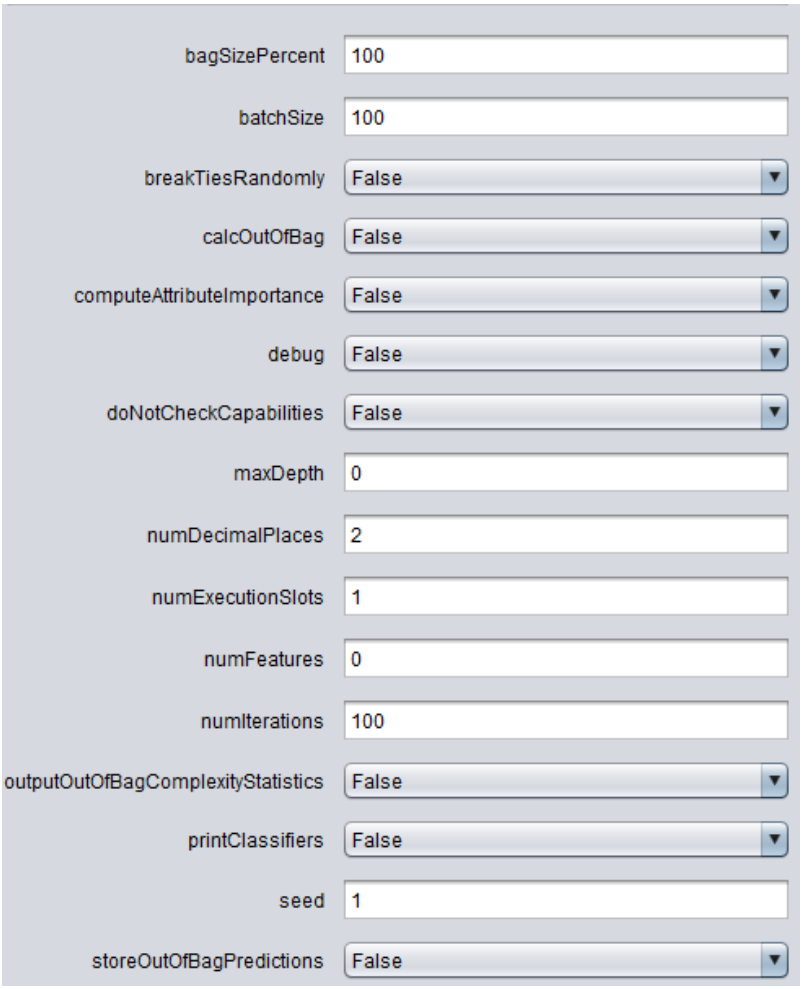
Correctly Classified Instances	143	95.3333 %
Incorrectly Classified Instances	7	**4.6667 %**
Kappa statistic	0.93	
Mean absolute error	0.0408	
Root mean squared error	0.1621	
Relative absolute error	9.19 %	
Root relative squared error	34.3846 %	
Total Number of Instances	150	

=== 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	Iris-setosa
	0.940	0.040	0.922	0.940	0.931	0.896	0.991	0.984	Iris-versicolor
	0.920	0.030	0.939	0.920	0.929	0.895	0.991	0.982	Iris-virginica
W. Avg.	0.953	0.023	0.953	0.953	0.953	0.930	0.994	0.989	

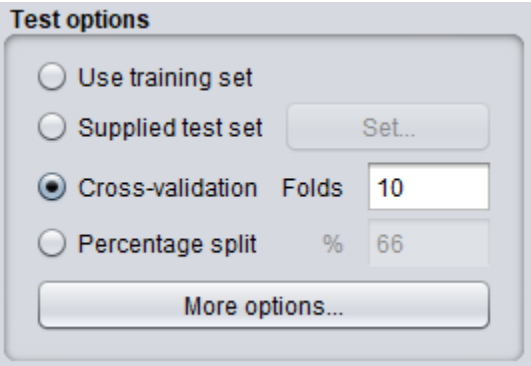
=== Confusion Matrix ===

a	b	c	<-- classified as
50	0	0	a = Iris-setosa
0	47	3	b = Iris-versicolor
0	4	46	c = Iris-virginica



bagSizePercent:100 aldım yani, bagging işleminde verinin tamamını işleme katar.
BatchSize :100(default)
maxDepth:0, yani ağaçların uzunluğu limitsiz
numIterations:100, Rf'teki ağaç sayısı

Test için verinin bölünmesi: Cross-validation 10.



3. ADA Boost

=== Run information ===

Scheme: weka.classifiers.meta.AdaBoostM1 -P 100 -S 1 -I 10 -W weka.classifiers.trees.DecisionStump
Test mode: 10-fold cross-validation

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

AdaBoostM1: Base classifiers and their weights:

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-versicolor
petal_length is missing : Iris-setosa

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
0.0 0.5 0.5
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.3333333333333333 0.3333333333333333 0.3333333333333333

Weight: 0.69

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-virginica
petal_length is missing : Iris-virginica

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
0.0 0.3333333333333333 0.6666666666666667
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.25 0.25 0.5000000000000001

Weight: 1.1

Decision Stump

Classifications

petal_width <= 1.75 : Iris-versicolor
petal_width > 1.75 : Iris-virginica
petal_width is missing : Iris-versicolor

Class distributions

petal_width <= 1.75
Iris-setosa Iris-versicolor Iris-virginica
0.24154589371980675 0.7101449275362319 0.04830917874396136
petal_width > 1.75
Iris-setosa Iris-versicolor Iris-virginica
0.0 0.032258064516129024 0.967741935483871
petal_width is missing
Iris-setosa Iris-versicolor Iris-virginica
0.16666666666666666 0.5 0.33333333333333337

Weight: 1.32

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-versicolor
petal_length is missing : Iris-setosa

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
2.4541772123292936E-17 0.5536309127248501 0.44636908727514996
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.3968253968253968 0.33393610608800484 0.2692384970865984

Weight: 1.0

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-virginica
petal_length is missing : Iris-virginica

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
4.876852104094113E-17 0.31364408378939285 0.6863559162106071
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.27151498487764564 0.22848501512235284 0.5000000000000016

Weight: 1.22

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-versicolor

petal_length is missing : Iris-versicolor

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
-1.2574765214077044E-17 0.6067682992755968 0.3932317007244033
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.17596222380612905 0.4999999999999999 0.32403777619387103

Weight: 0.74

Decision Stump

Classifications

petal_length <= 4.85 : Iris-versicolor
petal_length > 4.85 : Iris-virginica
petal_length is missing : Iris-virginica

Class distributions

petal_length <= 4.85
Iris-setosa Iris-versicolor Iris-virginica
0.2517002096709582 0.660989158028418 0.08731063230062384
petal_length > 4.85
Iris-setosa Iris-versicolor Iris-virginica
1.379474925594973E-17 0.058064332648205416 0.9419356673517946
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.1301568472386974 0.3698431527613032 0.49999999999999944

Weight: 1.37

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-virginica
petal_length is missing : Iris-virginica

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
-2.17703546955402E-18 0.4168896637524031 0.5831103362475969
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.32003984920368916 0.28346835863050734 0.39649179216580344

Weight: 0.93

Decision Stump

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-versicolor
petal_length is missing : Iris-versicolor

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
3.621292691813958E-17 0.6437704901626135 0.35622950983738655
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.2233256919345557 0.4999999999999997 0.2766743080654446

Weight: 0.96

Decision Stump

040190030 Ömer Bahadır Gökmen

Classifications

petal_length <= 2.45 : Iris-setosa
petal_length > 2.45 : Iris-virginica
petal_length is missing : Iris-virginica

Class distributions

petal_length <= 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.0 0.0 0.0
petal_length > 2.45
Iris-setosa Iris-versicolor Iris-virginica
1.1378476401045689E-17 0.4087218990793083 0.5912781009206917
petal_length is missing
Iris-setosa Iris-versicolor Iris-virginica
0.15437422894330288 0.3456257710566977 0.4999999999999995

Weight: 0.64

Number of performed Iterations: 10

Time taken to build model: 0 seconds

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

Correctly Classified Instances	143	95.3333 %
Incorrectly Classified Instances	7	4.6667 %
Kappa statistic	0.93	
Mean absolute error	0.069	
Root mean squared error	0.1729	
Relative absolute error	15.5267 %	
Root relative squared error	36.6863 %	
Total Number of Instances	150	

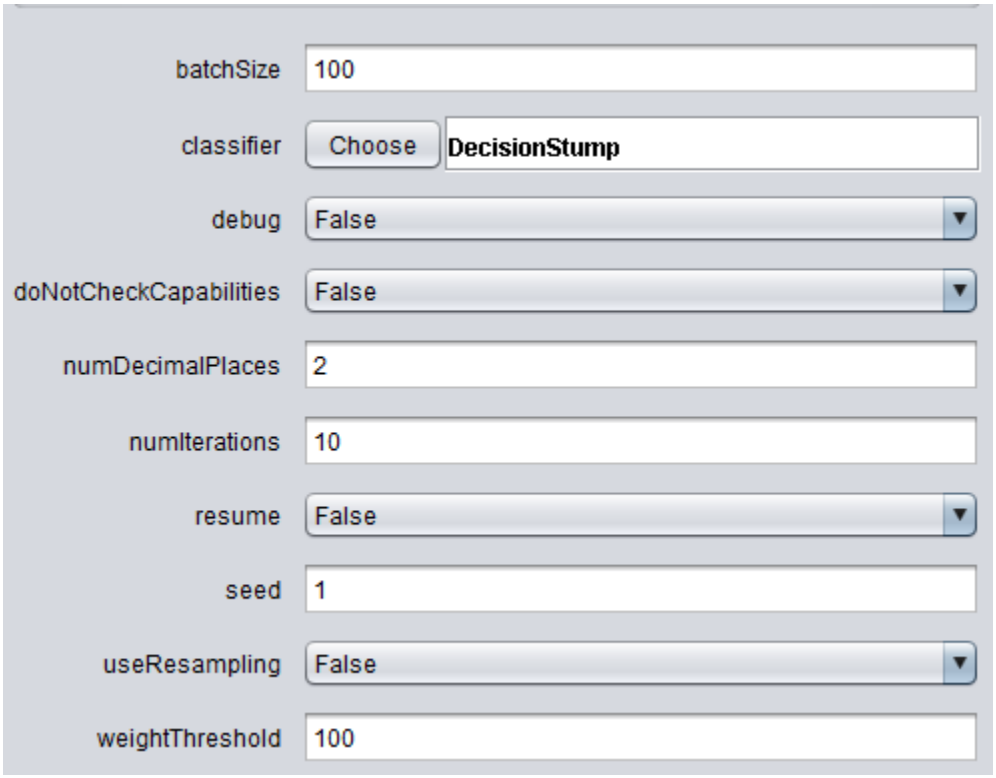
=== Detailed Accuracy By Class ===

	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	Iris-setosa
	0.900	0.020	0.957	0.900	0.928	0.894	0.963	0.894	Iris-versicolor
	0.960	0.050	0.906	0.960	0.932	0.897	0.965	0.922	Iris-virginica
W. Avg.	0.953	0.023	0.954	0.953	0.953	0.931	0.976	0.939	

040190030 Ömer Bahadır Gökmen

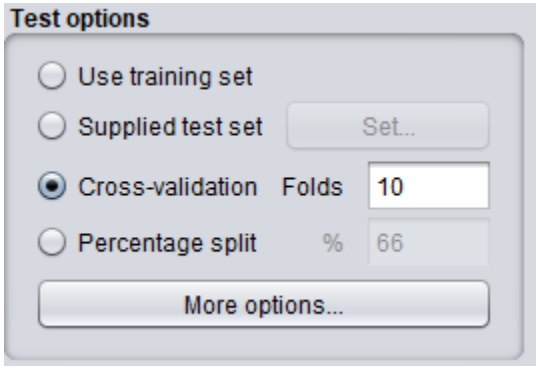
=== Confusion Matrix ===

```
 a  b  c   <-- classified as
50  0  0 |  a = Iris-setosa
 0 45  5 |  b = Iris-versicolor
 0  2 48 |  c = Iris-virginica
```



Classifier: DecisionStump, 1düğüm 2 yapraktan oluşan yapılardır. AdaBoost ile zayıf öğrenenler olarak DecisionStumpların kullanılması yaygındır.

numIterations:10, 10 tane decision stump üretilir ve bunların ağırlıkları çıkartılır.



4.

	k-means	Random Forest	Ada Boost
Yanlış Sınıflama Oranı	10%	4.6667 %	4.6667 %

K-Means

Clustered Instances

0 55 (37%)
1 50 (33%)
2 45 (30%)

Random Forest

=== Confusion Matrix ===

```
 a  b  c   <-- classified as
50  0  0 |  a = Iris-setosa
 0 47  3 |  b = Iris-versicolor
 0  4 46 |  c = Iris-virginica
```

Ada Boost

=== Confusion Matrix ===

```
 a  b  c   <-- classified as
50  0  0 |  a = Iris-setosa
 0 45  5 |  b = Iris-versicolor
 0  2 48 |  c = Iris-virginica
```

Adaboost ve Random Forest k-means'ten daha başarılı bir sonuç vermiştir.