Tugas Kecil 2

WEKA

IF3170 Inteligensi Buatan

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Results

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Incorrectly Classified Instances   6   42.8571 %
Kappa statistic   -0.0244
Mean absolute error   0.4374
Root mean squared error   0.4916
Relative absolute error   91.8631 %
Root relative squared error   99.6492 %
Coverage of cases (0.95 level)   100   %
Mean rel. region size (0.95 level)   100   %
Total Number of Instances   14

- GUI

=== Run information ===

Scheme: weka.classifiers.bayes.NaiveBayes
Relation: weather.symbolic
Instances: 14
Attributes: 5
          outlook
          temperature
          humidity
          windy
          play
Test mode: 10-fold cross-validation

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

Naive Bayes Classifier

          Class
Attribute   yes   no
          (0.63) (0.38)
===========================
outlook
 sunny   3.0   4.0
 overcast   5.0   1.0

```
 rainy        4.0   3.0
 [total]      12.0  8.0


temperature
 hot          3.0   3.0
 mild         5.0   3.0
 cool         4.0   2.0
 [total]      12.0  8.0


humidity
 high         4.0   5.0
 normal       7.0   2.0
 [total]      11.0  7.0


windy
 TRUE         4.0   4.0
 FALSE        7.0   3.0
 [total]      11.0  7.0
```

Time taken to build model: 0 seconds

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

Correctly Classified Instances   8   57.1429 %
Incorrectly Classified Instances   6   42.8571 %
Kappa statistic   -0.0244
Mean absolute error   0.4374
Root mean squared error   0.4916
Relative absolute error   91.8631 %
Root relative squared error   99.6492 %
Coverage of cases (0.95 level)   100   %
Mean rel. region size (0.95 level) 100   %
Total Number of Instances   14

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0,778	0,800	0,636	0,778	0,700	-0,026	0,578	0,697	yes
	0,200	0,222	0,333	0,200	0,250	-0,026	0,578	0,557	no
Weighted Avg.	0,571	0,594	0,528	0,571	0,539	-0,026	0,578	0,647	

=== Confusion Matrix ===

```
 a b   <-- classified as
 7 2 | a = yes
 4 1 | b = no
```

Full training

- Implementasi

```
Results


Correctly Classified Instances        13          92.8571 %
Incorrectly Classified Instances      1           7.1429 %
Kappa statistic                0.8372
Mean absolute error              0.2917
Root mean squared error           0.3392
Relative absolute error         62.8233 %
Root relative squared error       70.7422 %
Coverage of cases (0.95 level)      100     %
Mean rel. region size (0.95 level)   100     %
Total Number of Instances          14
```

- GUI

```
=== Run information ===


Scheme:     weka.classifiers.bayes.NaiveBayes
Relation:    weather.symbolic
Instances:   14
Attributes: 5
        outlook
        temperature
        humidity
        windy
        play
Test mode:   evaluate on training data


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


Naive Bayes Classifier


        Class
Attribute      yes    no
       (0.63) (0.38)
===========================
outlook
```

```
 sunny      3.0   4.0
 overcast    5.0   1.0
 rainy      4.0   3.0
 [total]     12.0  8.0


temperature
 hot       3.0   3.0
 mild      5.0   3.0
 cool      4.0   2.0
 [total]     12.0  8.0


humidity
 high       4.0   5.0
 normal      7.0   2.0
 [total]     11.0  7.0


windy
 TRUE       4.0   4.0
 FALSE      7.0   3.0
 [total]     11.0  7.0




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        13         92.8571 %
Incorrectly Classified Instances      1          7.1429 %
Kappa statistic              0.8372
Mean absolute error            0.2917
Root mean squared error          0.3392
Relative absolute error          62.8233 %
Root relative squared error        70.7422 %
Coverage of cases (0.95 level)      100    %
Mean rel. region size (0.95 level)   100    %
Total Number of Instances         14


=== Detailed Accuracy By Class ===


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

1,000	0,200	0,900	1,000	0,947	0,849	0,922	0,947	yes
0,800	0,000	1,000	0,800	0,889	0,849	0,911	0,911	no
Weighted Avg. 0,929	0,129	0,936	0,929	0,926	0,849	0,918	0,934	

=== Confusion Matrix ===

```
 a b   <-- classified as
 9 0 | a = yes
 1 4 | b = no
```

Neural Networks (Multilayer Perception)

10-fold cross validation

- Implementasi

Results

Correctly Classified Instances	10	71.4286 %
Incorrectly Classified Instances	4	28.5714 %
Kappa statistic	0.3778	
Mean absolute error	0.287	
Root mean squared error	0.5268	
Relative absolute error	60.2616 %	
Root relative squared error	106.7798 %	
Coverage of cases (0.95 level)	71.4286 %	
Mean rel. region size (0.95 level)	50 %	
Total Number of Instances	14	

- GUI

```
=== Run information ===


Scheme:     weka.classifiers.functions.MultilayerPerceptron -L 0.3 -M 0.2 -N 500 -V 0 -S 0 -E 20 -H a
Relation:   weather.symbolic
Instances:  14
Attributes: 5
        outlook
        temperature
        humidity
        windy
        play
Test mode:  10-fold cross-validation


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

```
Sigmoid Node 0
    Inputs    Weights
    Threshold    -4.597967080790812
    Node 2    2.433270074007242
    Node 3    2.0546443732203774
    Node 4    1.364159803860347
    Node 5    2.6974766889493536
    Node 6    3.9083227090643557
Sigmoid Node 1
    Inputs    Weights
    Threshold    4.60125196001115
    Node 2    -2.404522637307116
    Node 3    -2.053274495614413
    Node 4    -1.3799864297539497
    Node 5    -2.756274547604192
    Node 6    -3.877948258791869
Sigmoid Node 2
    Inputs    Weights
    Threshold    -0.15507980215013525
    Attrib outlook=sunny    -1.3234644779136855
    Attrib outlook=overcast    1.660267528039988
    Attrib outlook=rainy    -0.32078025528655973
    Attrib temperature=hot    -0.28731224569818364
    Attrib temperature=mild    1.1811903600979567
    Attrib temperature=cool    -0.7853150475848839
    Attrib humidity    2.808930687905
    Attrib windy    1.9190213581350706
Sigmoid Node 3
    Inputs    Weights
    Threshold    -0.18031675012278095
    Attrib outlook=sunny    -1.152451401022834
    Attrib outlook=overcast    1.5760227701429672
    Attrib outlook=rainy    -0.3257840027922377
    Attrib temperature=hot    -0.2760307631136812
    Attrib temperature=mild    1.0450876279343024
    Attrib temperature=cool    -0.6318819517738499
    Attrib humidity    2.450477460387541
    Attrib windy    1.6782512926468698
Sigmoid Node 4
    Inputs    Weights
    Threshold    -0.3554146745674961
    Attrib outlook=sunny    -0.46574052680925
    Attrib outlook=overcast    1.4382073898080858
    Attrib outlook=rainy    -0.6194183985830626
    Attrib temperature=hot    -0.0670794406887235
```

Attrib temperature=mild   0.6337484752708609
      Attrib temperature=cool   -0.20814280117719502
      Attrib humidity   1.9824665847930494
      Attrib windy   0.9946423645131898
Sigmoid Node 5
    Inputs   Weights
    Threshold   -0.06888405078498423
    Attrib outlook=sunny   -1.398206421909648
    Attrib outlook=overcast   1.8084944112736527
    Attrib outlook=rainy   -0.3199726960276289
    Attrib temperature=hot   -0.30358216357714296
    Attrib temperature=mild   1.2908528760310658
    Attrib temperature=cool   -0.8921466424329773
    Attrib humidity   3.1090049574873406
    Attrib windy   2.0747113212966855
Sigmoid Node 6
    Inputs   Weights
    Threshold   0.04399369934901502
    Attrib outlook=sunny   -1.801821342790139
    Attrib outlook=overcast   2.254454702444456
    Attrib outlook=rainy   -0.4009571750650124
    Attrib temperature=hot   -0.41558677311306425
    Attrib temperature=mild   1.5891702859476848
    Attrib temperature=cool   -1.2545441906677204
    Attrib humidity   4.11931066616433
    Attrib windy   2.7408510063872638
Class yes
    Input
    Node 0
Class no
    Input
    Node 1

Time taken to build model: 0.03 seconds

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

Correctly Classified Instances   10   71.4286 %
Incorrectly Classified Instances   4   28.5714 %
Kappa statistic   0.3778
Mean absolute error   0.287
Root mean squared error   0.5268
Relative absolute error   60.2616 %

Root relative squared error   106.7798 %
Coverage of cases (0.95 level)   71.4286 %
Mean rel. region size (0.95 level)   50   %
Total Number of Instances   14

=== Detailed Accuracy By Class ===

         TP Rate FP Rate Precision Recall F-Measure MCC   ROC Area PRC Area Class
         0,778   0,400   0,778   0,778   0,778   0,378   0,778   0,885   yes
         0,600   0,222   0,600   0,600   0,600   0,378   0,778   0,698   no
Weighted Avg. 0,714 0,337 0,714   0,714   0,714   0,378   0,778   0,818

=== Confusion Matrix ===

 a b <-- classified as
 7 2 | a = yes
 2 3 | b = no

Full training
- Implementasi

Results

Correctly Classified Instances   14   100   %
Incorrectly Classified Instances   0   0   %
Kappa statistic   1
Mean absolute error   0.0245
Root mean squared error   0.0354
Relative absolute error   5.2713 %
Root relative squared error   7.3845 %
Coverage of cases (0.95 level)   100   %
Mean rel. region size (0.95 level)   60.7143 %
Total Number of Instances   14

- GUI

=== Run information ===

Scheme: weka.classifiers.functions.MultilayerPerceptron -L 0.3 -M 0.2 -N 500 -V 0 -S 0 -E 20 -H a
Relation: weather.symbolic
Instances: 14
Attributes: 5
        outlook
        temperature
        humidity

windy
           play
Test mode: evaluate on training data

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

Sigmoid Node 0
    Inputs   Weights
    Threshold   -4.597967080790812
    Node 2   2.433270074007242
    Node 3   2.0546443732203774
    Node 4   1.364159803860347
    Node 5   2.6974766889493536
    Node 6   3.9083227090643557
Sigmoid Node 1
    Inputs   Weights
    Threshold   4.60125196001115
    Node 2   -2.404522637307116
    Node 3   -2.053274495614413
    Node 4   -1.3799864297539497
    Node 5   -2.756274547604192
    Node 6   -3.877948258791869
Sigmoid Node 2
    Inputs   Weights
    Threshold   -0.15507980215013525
    Attrib outlook=sunny   -1.3234644779136855
    Attrib outlook=overcast   1.660267528039988
    Attrib outlook=rainy   -0.32078025528655973
    Attrib temperature=hot   -0.28731224569818364
    Attrib temperature=mild   1.1811903600979567
    Attrib temperature=cool   -0.7853150475848839
    Attrib humidity   2.808930687905
    Attrib windy   1.9190213581350706
Sigmoid Node 3
    Inputs   Weights
    Threshold   -0.18031675012278095
    Attrib outlook=sunny   -1.152451401022834
    Attrib outlook=overcast   1.5760227701429672
    Attrib outlook=rainy   -0.3257840027922377
    Attrib temperature=hot   -0.2760307631136812
    Attrib temperature=mild   1.0450876279343024
    Attrib temperature=cool   -0.6318819517738499
    Attrib humidity   2.45047746038754
    Attrib windy   1.6782512926468698
Sigmoid Node 4

Inputs   Weights
    Threshold   -0.3554146745674961
    Attrib outlook=sunny   -0.46574052680925
    Attrib outlook=overcast   1.4382073898080858
    Attrib outlook=rainy   -0.6194183985830626
    Attrib temperature=hot   -0.0670794406887235
    Attrib temperature=mild   0.6337484752708609
    Attrib temperature=cool   -0.20814280117719502
    Attrib humidity   1.9824665847930494
    Attrib windy   0.9946423645131898
Sigmoid Node 5
    Inputs   Weights
    Threshold   -0.06888405078498423
    Attrib outlook=sunny   -1.398206421909648
    Attrib outlook=overcast   1.8084944112736527
    Attrib outlook=rainy   -0.3199726960276289
    Attrib temperature=hot   -0.30358216357714296
    Attrib temperature=mild   1.2908528760310658
    Attrib temperature=cool   -0.8921466424329773
    Attrib humidity   3.1090049574873406
    Attrib windy   2.0747113212966855
Sigmoid Node 6
    Inputs   Weights
    Threshold   0.04399369934901502
    Attrib outlook=sunny   -1.801821342790139
    Attrib outlook=overcast   2.254454702444456
    Attrib outlook=rainy   -0.4009571750650124
    Attrib temperature=hot   -0.41558677311306425
    Attrib temperature=mild   1.5891702859476848
    Attrib temperature=cool   -1.2545441906677204
    Attrib humidity   4.11931066616433
    Attrib windy   2.7408510063872638
Class yes
    Input
    Node 0
Class no
    Input
    Node 1

Time taken to build model: 0.11 seconds

=== Evaluation on training set ===

Time taken to test model on training data: 0 seconds

```
=== Summary ===

Correctly Classified Instances        14           100     %
Incorrectly Classified Instances       0             0     %
Kappa statistic                    1
Mean absolute error               0.0245
Root mean squared error            0.0354
Relative absolute error           5.2713 %
Root relative squared error       7.3845 %
Coverage of cases (0.95 level)      100     %
Mean rel. region size (0.95 level)    60.7143 %
Total Number of Instances          14


=== 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     yes
        1,000    0,000    1,000     1,000    1,000     1,000   1,000    1,000     no
Weighted Avg.  1,000    0,000    1,000     1,000    1,000     1,000   1,000    1,000


=== Confusion Matrix ===

 a b   <-- classified as
 9 0 | a = yes
 0 5 | b = no
```

J48 tree

10-fold cross validation

- ■ Implementasi

```
Number of leaves: 5
Size of the tree: 8




Results



Correctly Classified Instances        7            50     %
Incorrectly Classified Instances      7            50     %
Kappa statistic                   -0.0426
Mean absolute error               0.4167
Root mean squared error            0.5984
Relative absolute error           87.5   %
```

Root relative squared error	121.2987 %	
Coverage of cases (0.95 level)	78.5714 %	
Mean rel. region size (0.95 level)	64.2857 %	
Total Number of Instances	14	

- GUI

```
=== Run information ===


Scheme:      weka.classifiers.trees.J48 -C 0.25 -M 2
Relation:    weather.symbolic
Instances:   14
Attributes:  5
          outlook
          temperature
          humidity
          windy
          play
Test mode:   10-fold cross-validation


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


J48 pruned tree
------------------

outlook = sunny
|   humidity = high: no (3.0)
|   humidity = normal: yes (2.0)
outlook = overcast: yes (4.0)
outlook = rainy
|   windy = TRUE: no (2.0)
|   windy = FALSE: yes (3.0)


Number of Leaves  :      5


Size of the tree :          8



Time taken to build model: 0 seconds


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


Correctly Classified Instances         7               50    %
Incorrectly Classified Instances       7               50    %
Kappa statistic                     -0.0426
Mean absolute error                 0.4167
```

```
Root mean squared error              0.5984
Relative absolute error         87.5   %
Root relative squared error       121.2987 %
Coverage of cases (0.95 level)       78.5714 %
Mean rel. region size (0.95 level)     64.2857 %
Total Number of Instances          14


=== Detailed Accuracy By Class ===


        TP Rate  FP Rate  Precision  Recall  F-Measure  MCC     ROC Area  PRC Area  Class
        0,556    0,600    0,625      0,556   0,588      -0,043  0,633     0,758     yes
        0,400    0,444    0,333      0,400   0,364      -0,043  0,633     0,457     no
Weighted Avg.  0,500  0,544  0,521    0,500   0,508      -0,043  0,633     0,650


=== Confusion Matrix ===

 a b  <-- classified as
 5 4 | a = yes
 3 2 | b = no
```

Full training

- Implementasi

```
Number of leaves: 5
Size of the tree: 8




Results




Correctly Classified Instances        14          100     %
Incorrectly Classified Instances      0           0     %
Kappa statistic               1
Mean absolute error           0
Root mean squared error         0
Relative absolute error         0     %
Root relative squared error      0     %
Coverage of cases (0.95 level)       100     %
Mean rel. region size (0.95 level)    50     %
Total Number of Instances          14
```

- GUI

```
=== Run information ===


Scheme:      weka.classifiers.trees.J48 -C 0.25 -M 2
Relation:   weather.symbolic
Instances:   14
```

```
Attributes:   5
         outlook
         temperature
         humidity
         windy
         play
Test mode:   evaluate on training data

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

J48 pruned tree
------------------

outlook = sunny
|   humidity = high: no (3.0)
|   humidity = normal: yes (2.0)
outlook = overcast: yes (4.0)
outlook = rainy
|   windy = TRUE: no (2.0)
|   windy = FALSE: yes (3.0)


Number of Leaves  :      5

Size of the tree :          8



Time taken to build model: 0.02 seconds

=== Evaluation on training set ===

Time taken to test model on training data: 0.02 seconds

=== Summary ===

Correctly Classified Instances          14             100     %
Incorrectly Classified Instances         0               0     %
Kappa statistic                   1
Mean absolute error               0
Root mean squared error            0
Relative absolute error           0     %
Root relative squared error        0     %
Coverage of cases (0.95 level)       100     %
Mean rel. region size (0.95 level)     50     %
Total Number of Instances            14
```

=== 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	yes
	1,000	0,000	1,000	1,000	1,000	1,000	1,000	1,000	no
Weighted Avg.	1,000	0,000	1,000	1,000	1,000	1,000	1,000	1,000	

=== Confusion Matrix ===

```
 a b  <-- classified as
 9 0 | a = yes
 0 5 | b = no
```

K-nearest neighbour

10-fold cross validation

- Implementasi

Results

Correctly Classified Instances	8	57.1429 %
Incorrectly Classified Instances	6	42.8571 %
Kappa statistic	0.0667	
Mean absolute error	0.4911	
Root mean squared error	0.5985	
Relative absolute error	103.137 %	
Root relative squared error	121.313 %	
Coverage of cases (0.95 level)	85.7143 %	
Mean rel. region size (0.95 level)	89.2857 %	
Total Number of Instances	14	

- GUI

=== Run information ===

Scheme: weka.classifiers.lazy.IBk -K 1 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\""
Relation: weather.symbolic
Instances: 14
Attributes: 5
         outlook
         temperature
         humidity
         windy
         play
Test mode: 10-fold cross-validation

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

IB1 instance-based classifier
using 1 nearest neighbour(s) for classification


Time taken to build model: 0 seconds

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

Correctly Classified Instances          8            57.1429 %
Incorrectly Classified Instances        6            42.8571 %
Kappa statistic                    0.0667
Mean absolute error                0.4911
Root mean squared error            0.5985
Relative absolute error            103.137 %
Root relative squared error        121.313 %
Coverage of cases (0.95 level)     85.7143 %
Mean rel. region size (0.95 level)     89.2857 %
Total Number of Instances          14

=== Detailed Accuracy By Class ===

          TP Rate  FP Rate  Precision  Recall  F-Measure  MCC     ROC Area  PRC Area  Class
          0,667    0,600    0,667      0,667   0,667      0,067   0,500     0,703     yes
          0,400    0,333    0,400      0,400   0,400      0,067   0,456     0,396     no
Weighted Avg.  0,571  0,505  0,571     0,571   0,571      0,067   0,484     0,593

=== Confusion Matrix ===

 a b   <-- classified as
 6 3 | a = yes
 3 2 | b = no
```

Full training

- Implementasi

```
Results



Correctly Classified Instances         14           100     %
Incorrectly Classified Instances        0            0       %
Kappa statistic                    1
```

Mean absolute error	0.0625
Root mean squared error	0.0625
Relative absolute error	13.4615 %
Root relative squared error	13.0347 %
Coverage of cases (0.95 level)	100 %
Mean rel. region size (0.95 level)	100 %
Total Number of Instances	14

- GUI

```
=== Run information ===


Scheme:       weka.classifiers.lazy.IBk -K 1 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A
\"weka.core.EuclideanDistance -R first-last\""
Relation:    weather.symbolic
Instances:   14
Attributes:  5
          outlook
          temperature
          humidity
          windy
          play
Test mode:    evaluate on training data


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


IB1 instance-based classifier
using 1 nearest neighbour(s) for classification



Time taken to build model: 0 seconds


=== Evaluation on training set ===


Time taken to test model on training data: 0.02 seconds


=== Summary ===


Correctly Classified Instances        14              100     %
Incorrectly Classified Instances       0               0     %
Kappa statistic                  1
Mean absolute error                 0.0625
Root mean squared error              0.0625
Relative absolute error            13.4615 %
Root relative squared error         13.0347 %
Coverage of cases (0.95 level)        100     %
Mean rel. region size (0.95 level)    100     %
```

```
Total Number of Instances        14

=== 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    yes
        1,000   0,000   1,000    1,000   1,000    1,000   1,000    1,000    no
Weighted Avg.  1,000   0,000   1,000    1,000   1,000    1,000   1,000    1,000

=== Confusion Matrix ===

 a b  <-- classified as
 9 0 | a = yes
 0 5 | b = no
```

Source Code

```java
package tucil2;

import java.io.File;
import java.io.IOException;
import java.util.Random;
import weka.classifiers.Classifier;
import weka.classifiers.Evaluation;
import weka.classifiers.bayes.NaiveBayes;
import weka.classifiers.functions.MultilayerPerceptron;
import weka.classifiers.lazy.IBk;
import weka.classifiers.trees.J48;
import weka.core.Instances;
import weka.core.converters.ArffLoader;
import weka.core.converters.ConverterUtils;
import weka.core.converters.ConverterUtils.DataSource;

public class Tucil2 {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) throws Exception {
        // TODO code application logic here
        Instances dataset = DataSource.read(args[0]);
        dataset.setClassIndex(dataset.numAttributes() - 1);
        if (args[1].equals("J48")) {
            String[] options = new String[4];
            options[0] = "-C";
            options[1] = "0.25";
            options[2] = "-M";
            options[3] = "2";
            J48 klas = new J48();
            klas.setOptions(options);
            klas.buildClassifier(dataset);
            System.out.println(klas.toSummaryString());
            //Evaluation Build
            Evaluation eval = new Evaluation(dataset);
            if (args[2].equals("cross")) {
                eval.crossValidateModel(klas, dataset, 10, new Random(1));
                System.out.println(eval.toSummaryString("\nResults\n\n", false));
            } else if (args[2].equals("fullset")) {
                Classifier cls = new J48();
                cls.buildClassifier(dataset);
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            eval.evaluateModel(cls, dataset);
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else {
            System.err.println("args 2 must be either cross or fullset only");
            System.exit(1);
        }
    } else if (args[1].equals("ibk")) {
        String[] options = new String[6];
        options[0] = "-K";
        options[1] = "1";
        options[2] = "-W";
        options[3] = "0";
        options[4] = "-A";
        options[5] = "weka.core.neighboursearch.LinearNNSearch -A \"weka.core.EuclideanDistance -R first-last\"";
        IBk klas = new IBk();
        klas.setOptions(options);
        klas.buildClassifier(dataset);
        //Evaluation Build
        Evaluation eval = new Evaluation(dataset);
        if (args[2].equals("cross")) {
            eval.crossValidateModel(klas, dataset, 10, new Random(1));
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else if (args[2].equals("fullset")) {
            Classifier cls = new IBk();
            cls.buildClassifier(dataset);
            eval.evaluateModel(cls, dataset);
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else {
            System.err.println("args 2 must be either cross or fullset only");
            System.exit(1);
        }
    } else if (args[1].equals("perceptron")) {
        MultilayerPerceptron klas = new MultilayerPerceptron();
        klas.buildClassifier(dataset);
        //Evaluation Build
        Evaluation eval = new Evaluation(dataset);
        if (args[2].equals("cross")) {
            eval.crossValidateModel(klas, dataset, 10, new Random(1));
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else if (args[2].equals("fullset")) {
            Classifier cls = new MultilayerPerceptron();
            cls.buildClassifier(dataset);
            eval.evaluateModel(cls, dataset);
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
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        } else {
            System.err.println("args 2 must be either cross or fullset only");
            System.exit(1);
        }
    } else if (args[1].equals("bayes")) {
        NaiveBayes klas = new NaiveBayes();
        klas.buildClassifier(dataset);
        //Evaluation Build
        Evaluation eval = new Evaluation(dataset);
        if (args[2].equals("cross")) {
            eval.crossValidateModel(klas, dataset, 10, new Random(1));
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else if (args[2].equals("fullset")) {
            Classifier cls = new NaiveBayes();
            cls.buildClassifier(dataset);
            eval.evaluateModel(cls, dataset);
            System.out.println(eval.toSummaryString("\nResults\n\n", false));
        } else {
            System.err.println("args 2 must be either cross or fullset only");
            System.exit(1);
        }
    } else {
        System.err.println("Valid args 1 are J48 / ibk / perceptron / bayes");
        System.exit(1);
    }
  }

}
```