

# **Tugas Kecil 2**

## **WEKA**

**IF3170 Inteligensi Buatan**

Disusun Oleh :

Viktor Trimulya Buntoro / 13512038

Michael Alexander Wangsa / 13512046



**Program Studi Teknik Informatika - Institut Teknologi Bandung**

**Jl. Ganesha 10, Bandung 40132**

## Table of Contents

Hasil eksekusi task berdasarkan klasifikasi .....	2
Naive Bayes .....	2
10-fold cross validation .....	2
Full training .....	4
Neural Networks (Multilayer Perception).....	6
10-fold cross validation .....	6
Full training .....	9
J48 tree.....	12
10-fold cross validation .....	12
Full training .....	14
K-nearest neighbour .....	16
10-fold cross validation .....	16
Full training .....	17
Kesimpulan.....	19
Source Code .....	20

# Hasil eksekusi task berdasarkan klasifikasi

## Naive Bayes

### 10-fold cross validation

#### ▪ Implementasi

##### Results

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	

#### ▪ 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 2.450477460387541  
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: 0.11 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	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

## Kesimpulan

Implementasi kelas Java memberikan hasil yang sama dengan GUI weka.

## Source Code

```
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);
            }
        }
    }
}
```

```

        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));
    }
}

```

```

    } 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);
}
}
}

```