

Contraceptive Method Choice

Pre Processing Method:

ClassBalancer – To balance weightage between classes.

Classification Models:

KNN

Where K=1

The screenshot shows the Weka Explorer interface with the 'Classify' tab selected. The classifier chosen is 'IBk -K 1 -W 0 -A "weka.core.neighboursearch.LinearNNSearch -A "weka.core.EuclideanDistance -R first-last"'. The test options are set to 'Cross-validation' with 10 folds. The result list on the left shows several runs, with the most recent one (00:11:45 - lazy.IBk) selected. The classifier output on the right displays the following summary statistics:

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

Correctly Classified Instances      1090.9427           74.0626 %
Incorrectly Classified Instances    382.0573           25.9374 %
Kappa statistic                    0.6109
Mean absolute error                 0.1754
Root mean squared error             0.4031
Relative absolute error             39.4568 %
Root relative squared error         85.5126 %
Total Number of Instances          1473
```

Below the summary, a table shows the 'Detailed Accuracy By Class':

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
1	0.765	0.114	0.771	0.765	0.768	0.652	0.833	0.716	1
2	0.706	0.113	0.757	0.706	0.730	0.603	0.807	0.702	2
3	0.751	0.162	0.699	0.751	0.724	0.580	0.821	0.652	3
Weighted Avg.	0.741	0.130	0.742	0.741	0.741	0.612	0.820	0.690	

Finally, the 'Confusion Matrix' is shown:

```
=== Confusion Matrix ===

  a    b    c  <-- classified as
375.47 42.15 73.38 |   a = 1
 58.98 346.5 85.52 |   b = 2
 52.85 69.18 368.97 |   c = 3
```

The status bar at the bottom indicates 'OK' and 'Log'.

SVM:

Weka Explorer

Preprocess | **Classify** | Cluster | Associate | Select attributes | Visualize

Classifier

Choose: **J48 -C 0.25 -M 2**

Test options

☐ Use training set
☐ Supplied test set (Set...)
☒ Cross-validation Folds: **10**
☐ Percentage split %: **66**
 More options...

(Nom) Contraceptive_method_used

Start Stop

Result list (right-click for options)

- 00:11:09 - lazy.IBk
- 00:11:17 - lazy.IBk
- 00:11:25 - lazy.IBk
- 00:11:38 - lazy.IBk
- 00:11:45 - lazy.IBk
- 00:13:00 - trees.J48
- 00:13:56 - functions.SMO

Classifier output

```

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

Correctly Classified Instances      719.8056      48.8666 %
Incorrectly Classified Instances    753.1944      51.1334 %
Kappa statistic                    0.233
Mean absolute error                 0.3762
Root mean squared error             0.477
Relative absolute error             84.6548 %
Root relative squared error         101.1922 %
Total Number of Instances          1473

=== Detailed Accuracy By Class ===

          TP Rate  FP Rate  Precision  Recall  F-Measure  MCC      ROC Area  PRC Area  Cla
          0.423    0.157    0.574    0.423    0.487      0.291    0.677    0.474    1
          0.568    0.291    0.494    0.568    0.528      0.268    0.675    0.450    2
          0.476    0.319    0.427    0.476    0.450      0.152    0.602    0.391    3
Weighted Avg.    0.489    0.256    0.498    0.489    0.488      0.237    0.651    0.438

=== Confusion Matrix ===
  a    b    c  <-- classified as
207.64 120.21 163.15 |    a = 1
 61.93 278.68 150.4  |    b = 2
 92.24 165.27 233.49 |    c = 3
  
```

Status: OK Log x 0

Decision Tree:

Weka Explorer

Preprocess | **Classify** | Cluster | Associate | Select attributes | Visualize

Classifier

Choose: **J48 -C 0.25 -M 2**

Test options

☐ Use training set
☐ Supplied test set (Set...)
☒ Cross-validation Folds: **10**
☐ Percentage split %: **66**
 More options...

(Nom) Contraceptive_method_used

Start Stop

Result list (right-click for options)

- 00:11:09 - lazy.IBk
- 00:11:17 - lazy.IBk
- 00:11:25 - lazy.IBk
- 00:11:38 - lazy.IBk
- 00:11:45 - lazy.IBk
- 00:13:00 - trees.J48

Classifier output

```

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

Correctly Classified Instances      1011.2622      68.6532 %
Incorrectly Classified Instances    461.7378      31.3468 %
Kappa statistic                    0.5298
Mean absolute error                 0.2494
Root mean squared error             0.4017
Relative absolute error             56.1259 %
Root relative squared error         85.2061 %
Total Number of Instances          1473

=== Detailed Accuracy By Class ===

          TP Rate  FP Rate  Precision  Recall  F-Measure  MCC      ROC Area  PRC Area  Cla
          0.715    0.132    0.730    0.715    0.723      0.586    0.852    0.763    1
          0.685    0.148    0.698    0.685    0.691      0.539    0.821    0.698    2
          0.659    0.189    0.635    0.659    0.647      0.466    0.792    0.635    3
Weighted Avg.    0.687    0.157    0.688    0.687    0.687      0.530    0.822    0.698

=== Confusion Matrix ===
  a    b    c  <-- classified as
351.27  55.42  84.31 |    a = 1
 53.08 336.18 101.74 |    b = 2
 76.87  90.32 323.81 |    c = 3
  
```

Status: OK Log x 0

ANN:

The screenshot shows the Weka Explorer interface with the 'Classify' tab selected. The classifier chosen is 'MultilayerPerceptron -L 0.3 -M 0.2 -N 500 -V 0 -S 0 -E 20 -H a'. The 'Test options' section shows 'Cross-validation' with 'Folds' set to 10. The 'Result list' on the left shows a list of models, with '00:15:16 - functions.MultilayerPerceptron' selected. The 'Classifier output' pane displays the following results:

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

Correctly Classified Instances	935.7208	63.5248 %
Incorrectly Classified Instances	537.2792	36.4752 %
Kappa statistic	0.4529	
Mean absolute error	0.2811	
Root mean squared error	0.4197	
Relative absolute error	63.2438 %	
Root relative squared error	89.0377 %	
Total Number of Instances	1473	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.665	0.139	0.705	0.665	0.684	0.534	0.813	0.716	1
	0.631	0.209	0.602	0.631	0.616	0.417	0.782	0.633	2
	0.611	0.200	0.605	0.611	0.608	0.410	0.767	0.617	3
Weighted Avg.	0.635	0.182	0.637	0.635	0.636	0.454	0.787	0.655	

=== Confusion Matrix ===

	a	b	c	<-- classified as
326.29	86.65	78.06		a = 1
63.4	309.64	117.96		b = 2
73.03	118.19	299.79		c = 3

The 'Status' bar at the bottom shows 'OK' and a 'Log' button.

KNN has higher accuracy than all the mentioned models.