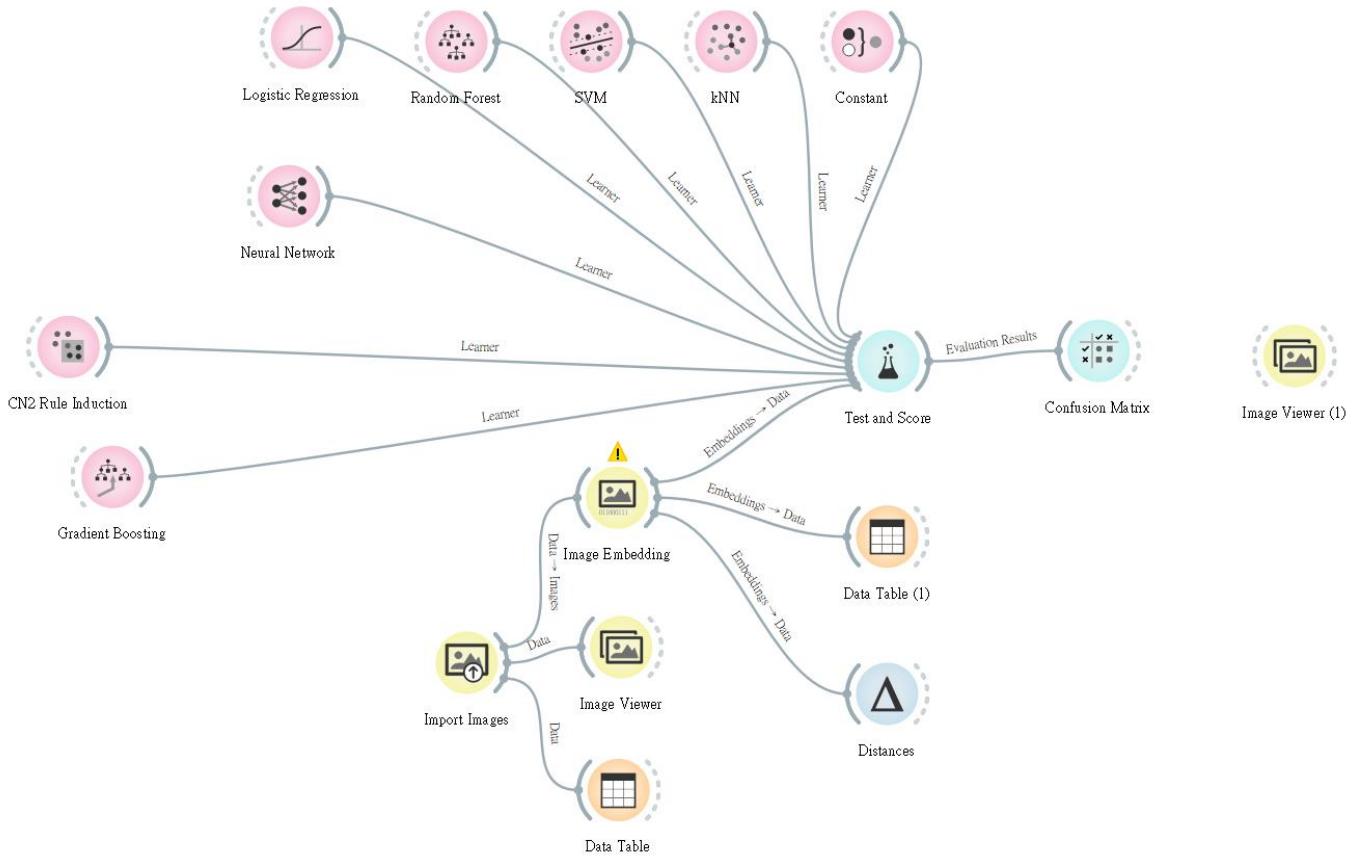


Test and Score - Orange

Cross validation
Number of folds: 5
Stratified
Cross validation by feature
Random sampling
Repeat train/test: 10
Training set size: 66 %
Stratified
Leave one out
Test on train data
Test on test data

Evaluation results for target (None, show average over classes)

Model	AUC	CA	F1	Prec	Recall	MCC
Constant	0.494	0.259	0.106	0.067	0.259	0.000
kNN	0.981	0.875	0.875	0.884	0.875	0.844
SVM	0.994	0.918	0.919	0.921	0.918	0.897
Random Forest	0.971	0.873	0.872	0.876	0.873	0.839
Logistic Regression	0.995	0.932	0.932	0.932	0.932	0.914
Neural Network	0.994	0.932	0.932	0.932	0.932	0.914
CN2 Rule Induction	0.873	0.712	0.710	0.714	0.712	0.634
Gradient Boosting	0.984	0.905	0.904	0.904	0.905	0.879

Compare models by: Area under ROC curve
Negligible diff.: 0.1

	Constant	kNN	SVM	Random Forest	Logistic Regr...	Neural Netw...	CN2 Rule Ind...	Gradient Boo...
Constant		0.000	0.000	0.000	0.000	0.000	0.000	0.000
kNN	1.000		0.027	0.864	0.016	0.019	0.999	0.144
SVM	1.000	0.973		0.995	0.420	0.504	1.000	0.979
Random Forest	1.000	0.136	0.005		0.011	0.008	0.999	0.034
Logistic Regression	1.000	0.984	0.580	0.989		0.708	1.000	0.979
Neural Network	1.000	0.981	0.496	0.992	0.292		1.000	0.982
CN2 Rule Induction	1.000	0.001	0.000	0.001	0.000	0.000		0.000
Gradient Boosting	1.000	0.856	0.021	0.966	0.021	0.018	1.000	

p(Constant > Logistic Regression) = 0.000

Table shows probabilities that the score for the model in the row is higher than that of the model in the column. Small numbers show the probability that the difference is negligible.

441 | - | 441 | 8×441

Q: Why linear regression can't use for classification?

A:

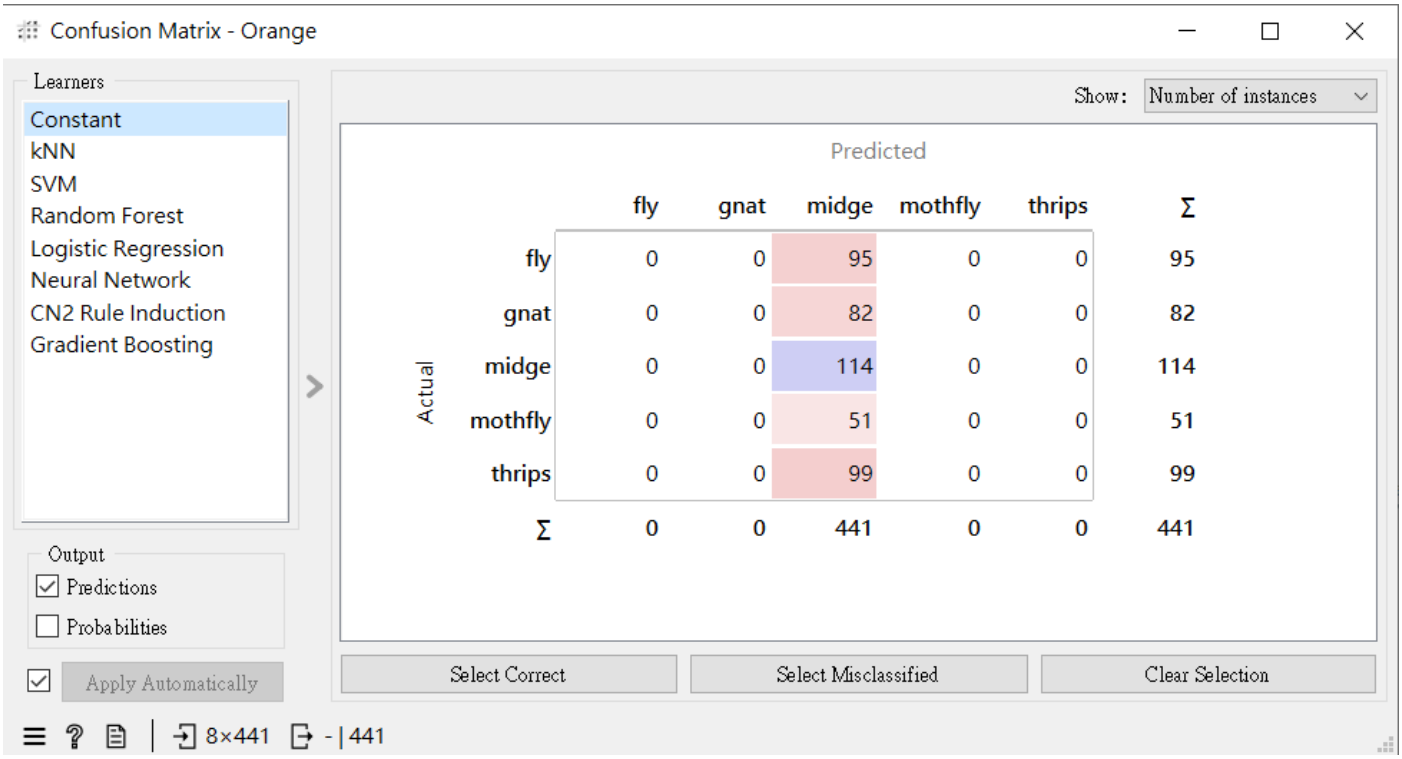
1. Output Range:
   Linear regression predictions can extend beyond the range [0,1], which is not suitable for binary classification tasks where the output is typically a probability between 0 and 1. For classification problems, we are often interested in predicting probabilities. Linear regression does not naturally provide probabilities as it is not bounded between 0 and 1.

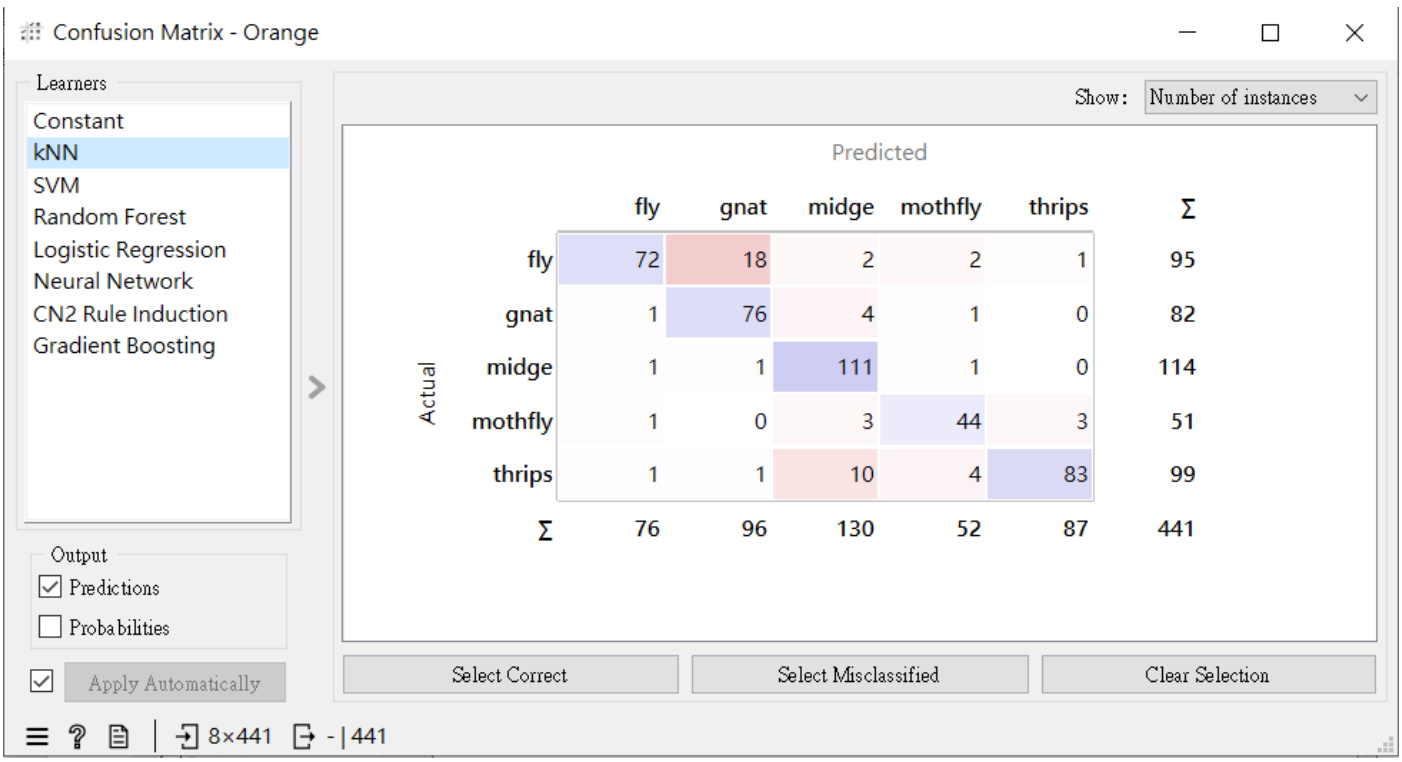
2. Sensitive to Outliers:
   Linear regression is sensitive to outliers. In classification tasks, especially those with imbalanced classes, this sensitivity can lead to skewed predictions.

3. Assumption of Linearity:
   Linear regression assumes a linear relationship between the dependent and independent variables. In many classification tasks, this relationship is non-linear, which makes linear regression an ineffective tool.

4. Loss Function:
   The loss function used in linear regression (mean squared error) is not the best choice for classification problems. Classification tasks are better served by loss functions that focus on probabilities and class separations, like cross-entropy.

Other methods like logistic regression, which is specifically designed for classification problems, are preferred. Logistic regression provides outputs between 0 and 1, interprets these outputs as probabilities, and uses a loss function suited for binary outcomes.


Confusion Matrix - Orange
Learners
Constant
kNN
SVM
Random Forest
Logistic Regression
Neural Network
CN2 Rule Induction
Gradient Boosting
Show: Number of instances
Predicted
fly gnat midge mothfly thrips Σ
Actual
fly 0 0 95 0 0 95
gnat 0 0 82 0 0 82
midge 0 0 114 0 0 114
mothfly 0 0 51 0 0 51
thrips 0 0 99 0 0 99
Σ 0 0 441 0 0 441
Output
Predictions
Probabilities
Apply Automatically
Select Correct
Select Misclassified
Clear Selection
8×441
- | 441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kNN
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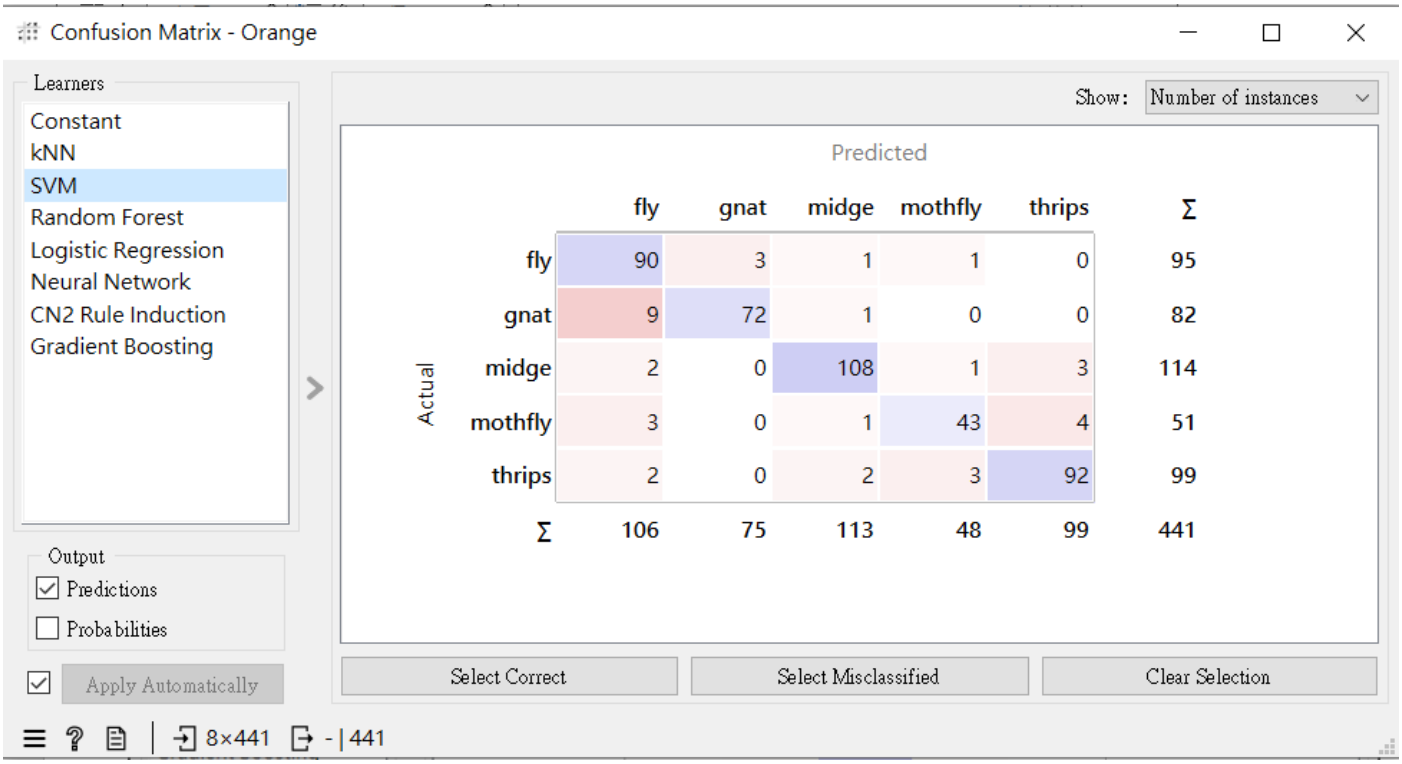
Gradient Boosting
Show: Number of instances
Predicted
fly gnat midge mothfly thrips Σ
Actual
fly 72 18 2 2 1 95
gnat 1 76 4 1 0 82
midge 1 1 111 1 0 114
mothfly 1 0 3 44 3 51
thrips 1 1 10 4 83 99
Σ 76 96 130 52 87 441
Output
Predictions
Probabilities
Apply Automatically
Select Correct
Select Misclassified
Clear Selection
8×441
- | 441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Show: Number of instances
Predicted
Actual
fly gnat midge mothfly thrips Σ
fly 90 3 1 1 0 95
gnat 9 72 1 0 0 82
midge 2 0 108 1 3 114
mothfly 3 0 1 43 4 51
thrips 2 0 2 3 92 99
Σ 106 75 113 48 99 441
Select Correct
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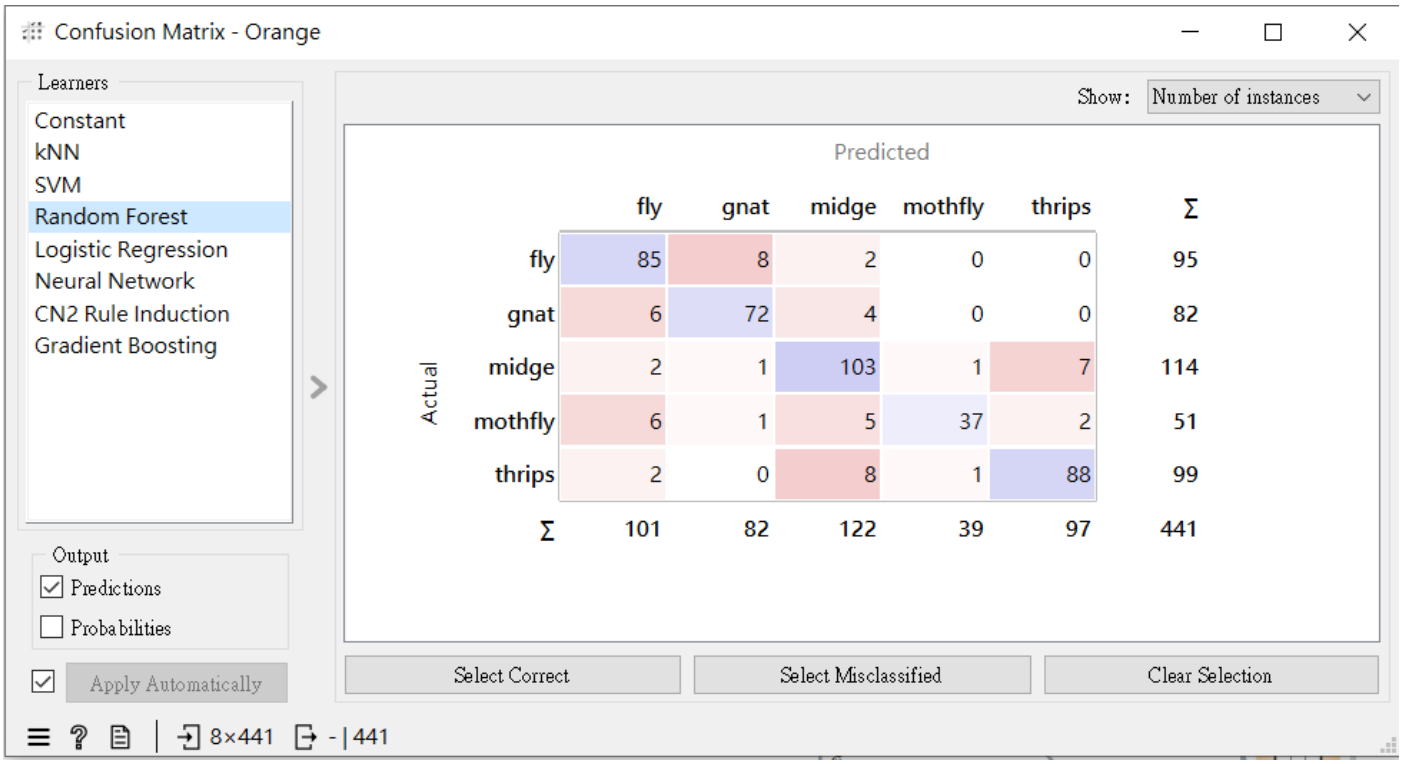
Clear Selection
8×441
- | 441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fly gnat midge mothfly thrips Σ
fly 85 8 2 0 0 95
gnat 6 72 4 0 0 82
midge 2 1 103 1 7 114
mothfly 6 1 5 37 2 51
thrips 2 0 8 1 88 99
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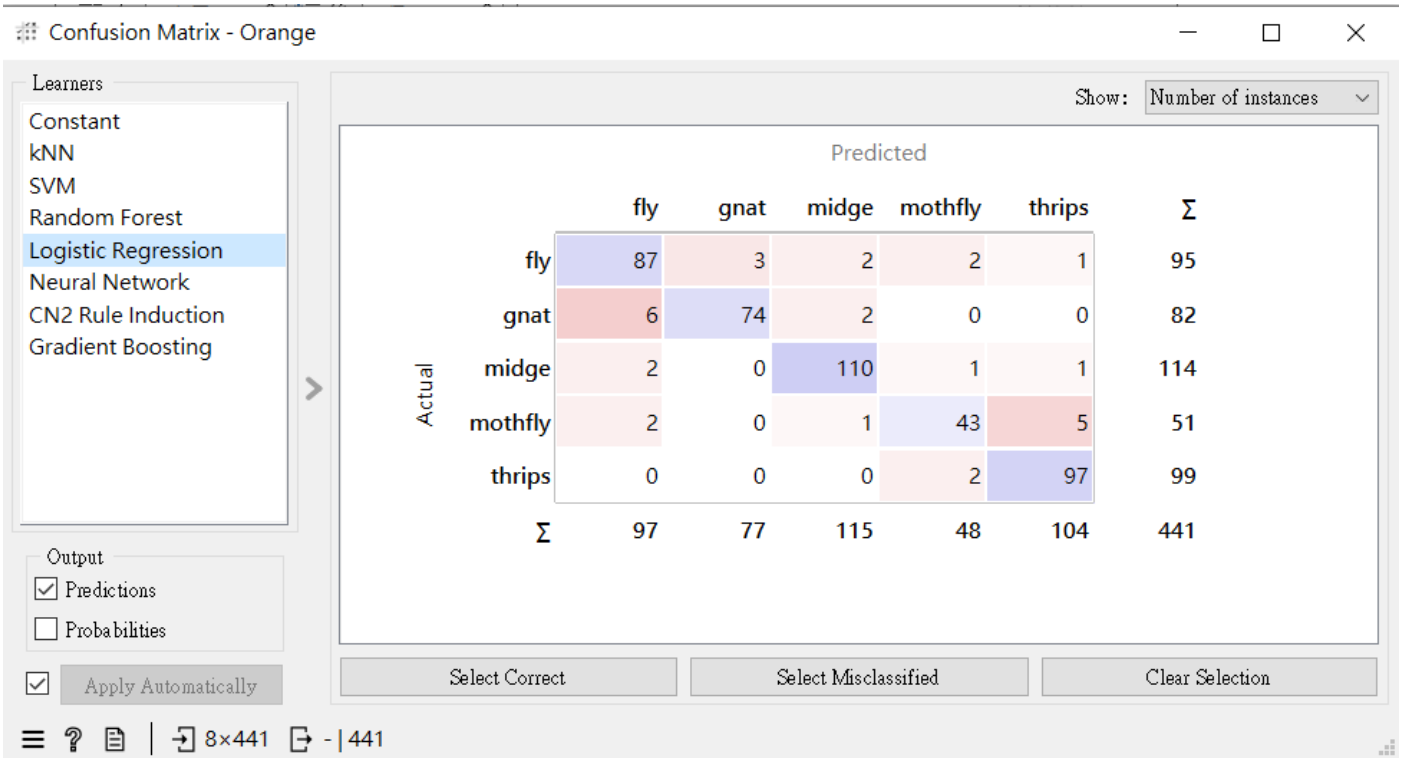
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Predicted
fly gnat midge mothfly thrips Σ
Actual
fly 87 3 2 2 1 95
gnat 6 74 2 0 0 82
midge 2 0 110 1 1 114
mothfly 2 0 1 43 5 51
thrips 0 0 0 2 97 99
Σ 97 77 115 48 104 441
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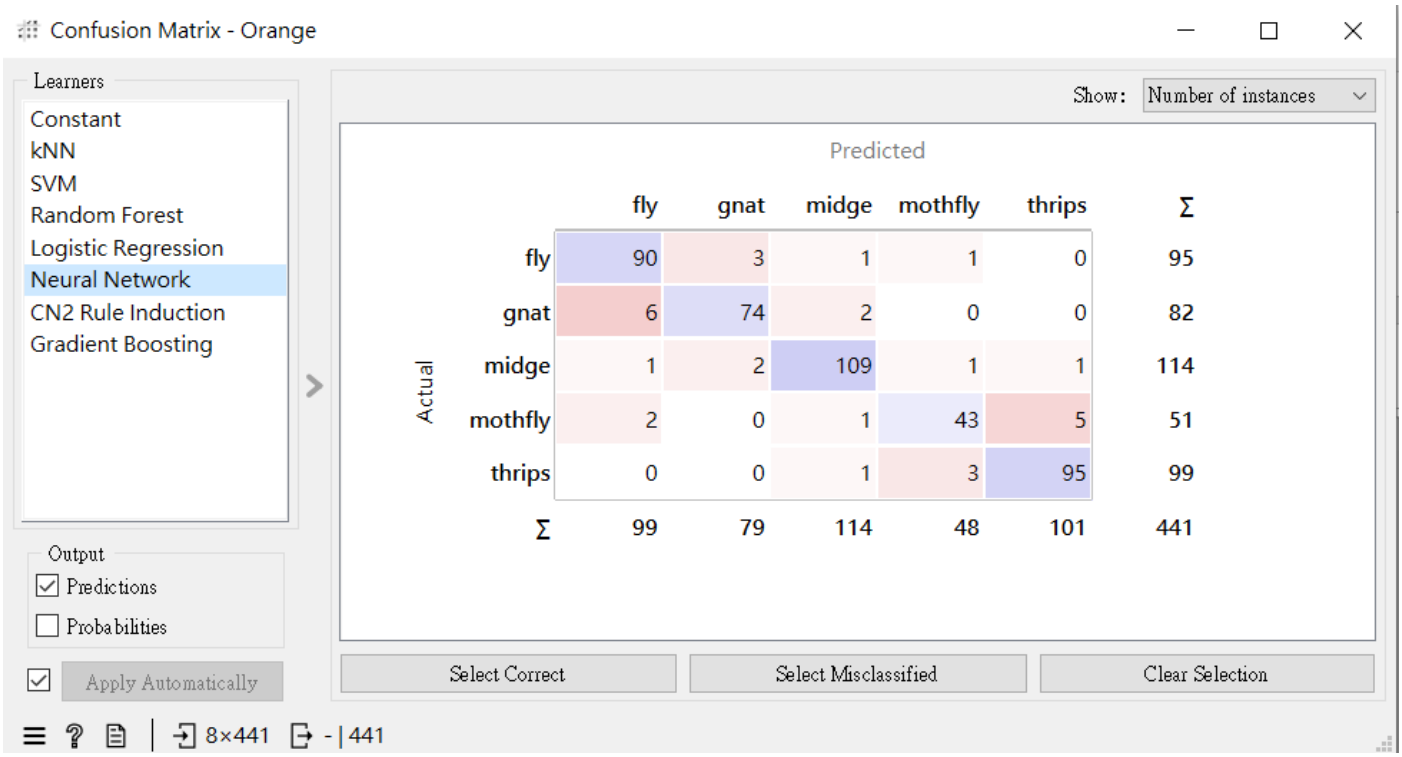
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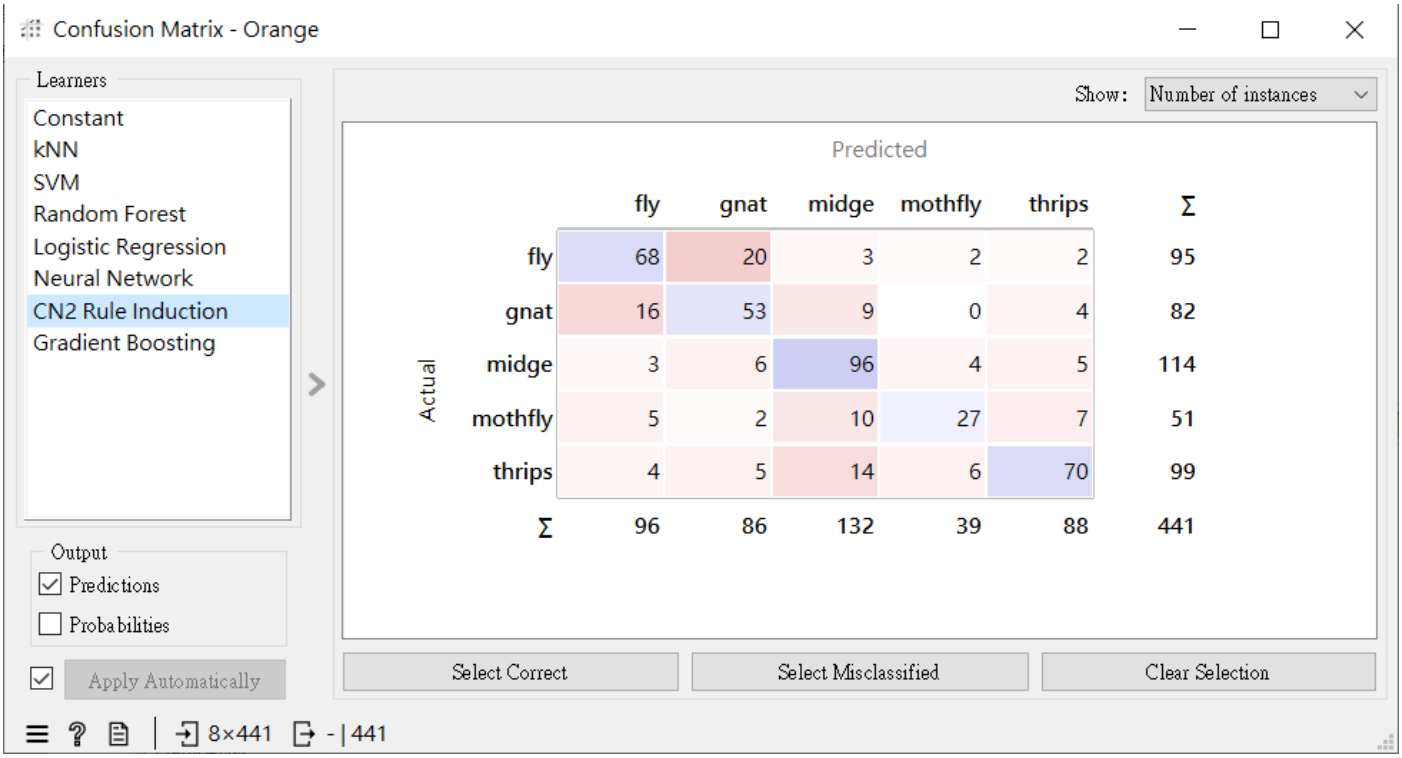
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fly 68 20 3 2 2 95
gnat 16 53 9 0 4 82
midge 3 6 96 4 5 114
mothfly 5 2 10 27 7 51
thrips 4 5 14 6 70 99
Σ 96 86 132 39 88 441
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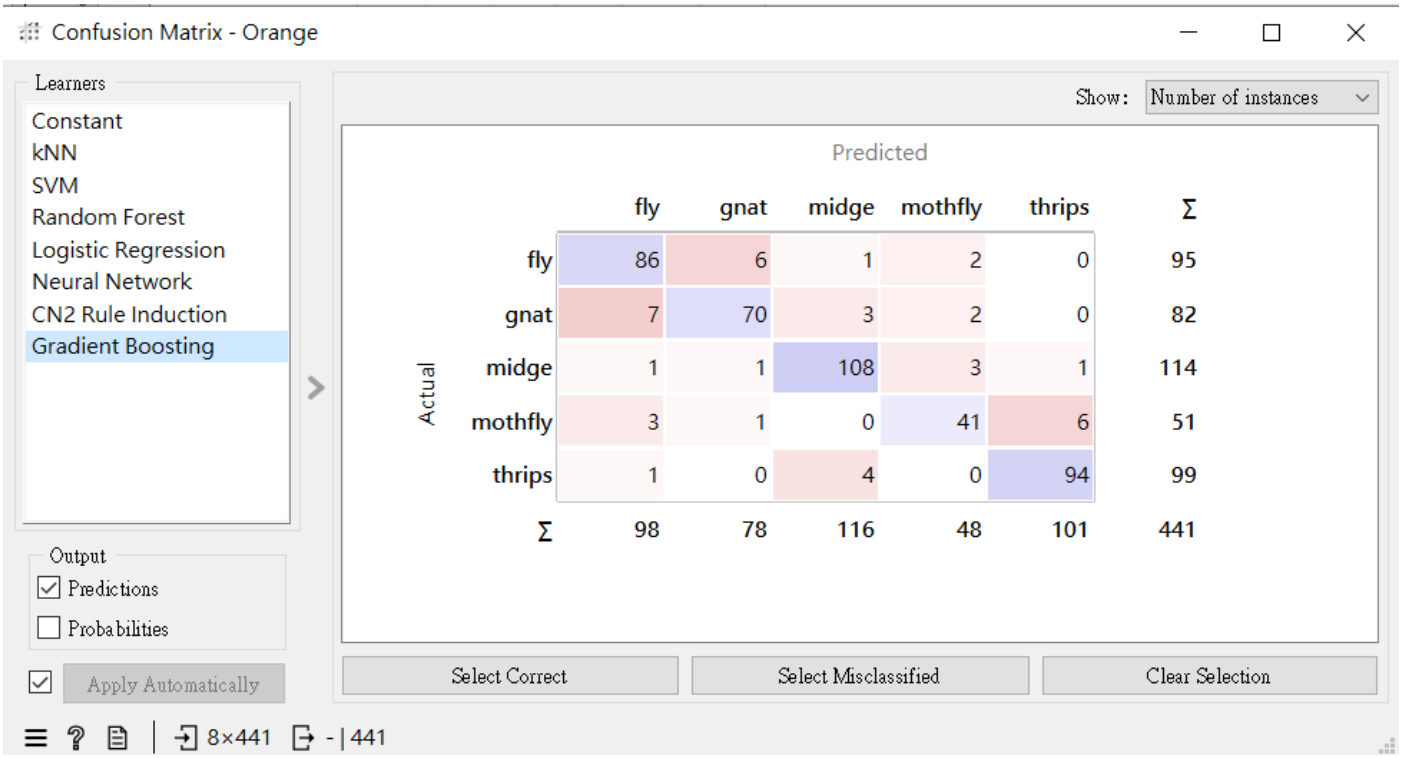
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fly 86 6 1 2 0 95
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midge 1 1 108 3 1 114
mothfly 3 1 0 41 6 51
thrips 1 0 4 0 94 99
Σ 98 78 116 48 101 441
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