Evaluation Metrics for Classification

Evaluation metrics for classification help assess how well your classification model is performing.

These metrics vary depending on whether the problem is **binary**, **multiclass**, or **multilabel** classification

Below are the most common ones used in classification tasks:

- Accuracy
- Recall
- Precision
- F1-Measure
- Macro Average
- Weighed Average

Based on the above classification we are done evaluation for our algorithms (SVM, Decision Tree, Random Forest, Logistic Regression, KNN, Navie bayes) using grid search.

In Navie Bayes we have some classified theorems are there:

- MultinomialNB
- BernoulliNB
- CategoricalNB
- ComplementNB
- GaussianNB

Based on these all scenario we have created the model.

From those evaluation metrics we are going to select the best model.

Here is the screenshot of that Evaluation metrics:

Evaluation metrics	SVM	Decision Tree	Random Forest	Logistic Regression	KNN	MultinomialNB	BernoulliNB	CategoricalNB	ComplementNB	GaussianNB
what is the overall performance? (Accuracy)	0.91	0.9	0.93	0.88	0.92	0.49	0.8	0.67	0.49	0.91
What is the percentage of correctly classification of class 0 or not purchased to the total input of class 0 or not purchased in the test set (Recall)?	0.94	0.95	0.93	0.93	0.92	0.47	0.81	1	0.47	0.95
What is the percentage of correctly classification of class 1 or purchased to the total input of class 1 or purchased in the test set (Recall)?	0.86	0.82	0.92	0.8	0.92	0.51	0.78	0.1	0.51	0.84
what is the percentage of correct classification of class 0 or not purchased to sum of correctly and wrongly classified a class 0 or not-purchased in the test set (precision)?	0.92	0.9	0.95	0.89	0.95	0.62	0.86	0.66	0.62	0.91
what is the percentage of correct classification of class 1 or purchased to sum of correctly and wrongly classified a class 1 or purchased in the test set (precision)?	0.89	0.91	0.88	0.87	0.87	0.36	0.7	1	0.36	0.91
What is the overall performance of class 0 or not purchased (F1- Measure)?	0.93	0.93	0.94	0.91	0.93	0.54	0.84	0.79	0.54	0.93
What is the overall performance of class 0 or purchased (F1-Measure)?	0.88	0.86	0.9	0.83	0.89	0.42	0.74	0.19	0.42	0.87
what is the average performance of Recall?	0.9	0.88	0.92	0.86	0.92	0.49	0.79	0.55	0.49	0.89
what is the average performance of precision?	0.91	0.9	0.92	0.88	0.91	0.49	0.78	0.83	0.49	0.91
what is the average performance of F1-Measure?	0.9	0.89	0.92	0.87	0.91	0.48	0.79	0.49	0.48	0.9
What is the sum of product of proportion rate of each class (Recall)?	0.91	0.9	0.93	0.88	0.92	0.49	0.8	0.67	0.49	0.91
What is the sum of product of proportion rate of each class (precision)?	0.91	0.9	0.93	0.88	0.92	0.53	0.8	0.78	0.53	0.91
What is the sum of product of proportion rate of each class (F1-Measure)?	0.91	0.9	0.93	0.88	0.92	0.49	0.8	0.57	0.49	0.91

Based on the metric value the best model is **Random Forest**:

Evaluation Metrics	Random forest value
Accuracy	0.93
Recall 0 or not-purchased	0.93
Recall 1 or purchased	0.95
Precision 0 or not-purchased	0.95
Precision 1 or purchased	0.88
F1-Measure 0 or not-purchased	0.94
F1-Measure 1 or purchased	0.90