MILESTONE-4

[Inferences about each model on all evaluation parameter]

1. **LOGISTIC REGRESSION:**

Evaluation Parameters

	precision	recall	f1-score	support
0	0.34	0.93	0.50	15
1	0.99	0.81	0.89	142
accuracy			0.82	157
macro avg	0.67	0.87	0.70	157
weighted avg	0.93	0.82	0.85	157

class 1: Loan Approval
class 0: Loan Disapproval

Inferences:

1. The model appears to perform better at predicting class 1 (Loan Approval) compared to class 0 (Loan Disapproval), as indicated by higher precision, recall, and F1-score for class 1.
2. The recall for class 0 is high (0.93), which suggests that the model can identify a significant portion of actual instances of class 0.
3. However, the precision for class 0 is relatively low (0.34), indicating that when the model predicts class 0, it has a higher chance of making false positive predictions.
4. The weighted average F1-score (0.85) suggests a reasonable overall performance of the model, considering the class imbalance.

The model's performance could potentially benefit from further fine-tuning of hyperparameters.

2. **DECISION TREE CLASSIFIER:**

Evaluation Parameter

	precision	recall	f1-score	support
0	0.49	0.49	0.49	41
1	0.82	0.82	0.82	116
accuracy			0.73	157
macro avg	0.65	0.65	0.65	157
weighted avg	0.73	0.73	0.73	157

Inferences:

1. The model seems to have a balanced performance between precision and recall for both classes, as indicated by similar precision and recall values for each class.
2. The accuracy of 0.73 indicates a decent overall performance of the model, but it might not provide the complete picture due to class imbalance.
3. The higher F1-score for class 1 (0.82) suggests that the model is performing better at identifying instances of class 1 compared to class 0.
4. The weighted average F1-score of 0.73 suggests that the model performs reasonably well overall, considering the class distribution.

3. RANDOM FOREST CLASSIFIER:

Evaluation Parameters

	precision	recall	f1-score	support
0	0.37	0.52	0.43	29
1	0.88	0.80	0.84	128
accuracy			0.75	157
macro avg	0.62	0.66	0.63	157
weighted avg	0.78	0.75	0.76	157

Inferences:

1. The model seems to have a relatively higher precision for class 1 compared to class 0, suggesting that its predictions for class 1 are more reliable.
2. The recall for class 1 (0.80) indicates that the model captures a significant portion of actual instances of class 1. However, the recall for class 0 (0.52) is somewhat lower, implying that the model's ability to identify class 0 instances is moderate.
3. The F1-score for class 1 (0.84) suggests a good balance between precision and recall for this class. However, the F1-score for class 0 (0.43) indicates that there might be a trade-off between precision and recall for this class.
4. The accuracy of 0.75 suggests that the model can classify correctly for most instances.

4. XG BOOST CLASSIFIER:

Evaluation parameters

	precision	recall	f1-score	support
0	0.41	0.50	0.45	34
1	0.85	0.80	0.83	123
accuracy			0.74	157
macro avg	0.63	0.65	0.64	157
weighted avg	0.76	0.74	0.75	157

Inferences:

1. The model has a trade-off between precision and recall, where it has relatively higher values for class 1 compared to class 0.
2. The recall for class 1 (0.80) suggests that the model effectively captures around 80% of the actual instances of class 1. However, the recall for class 0 (0.50) is moderate, indicating that the model's ability to identify class 0 instances is moderate.
3. The F1-scores provide a balanced measure of the model's performance, with class 1 having a higher F1-score (0.83) compared to class 0 (0.45).
4. The accuracy of 0.74 indicates that the model can classify correctly for most instances.
5. The macro average F1-score (0.64) and weighted average F1-score (0.75) provide a sense of the model's overall performance across classes.

5. ADA BOOST CLASSIFIER:

Evaluation Parameter

	precision	recall	f1-score	support
0	0.39	0.57	0.46	28
1	0.90	0.81	0.85	129
accuracy			0.76	157
macro avg	0.64	0.69	0.66	157
weighted avg	0.81	0.76	0.78	157

Inferences:

1. The model shows a trade-off between precision and recall, where it has relatively higher values for class 1 compared to class 0.
2. The recall for class 1 (0.81) suggests that the model captures a significant portion of the actual instances of class 1. The recall for class 0 (0.57) indicates that the model's ability to identify class 0 instances is moderate.
3. The F1-scores provide a balanced measure of the model's performance, with class 1 having a higher F1-score (0.85) compared to class 0 (0.46).
4. The accuracy of 0.76 indicates that the model can classify correctly for most instances.
5. The macro average F1-score (0.66) and weighted average F1-score (0.78) provide a sense of the model's overall performance across classes.

6. KNEIGHBORS CLASSIFIER

Evaluation Parameter

	precision	recall	f1-score	support
0	0.07	0.21	0.11	14
1	0.91	0.73	0.81	143
accuracy			0.69	157
macro avg	0.49	0.47	0.46	157
weighted avg	0.83	0.69	0.75	157

Inferences:

1. The precision-recall trade-off is quite evident, with class 1 having a much higher precision and recall compared to class 0.
2. The recall for class 1 (0.73) suggests that the model captures a significant portion of the actual instances of class 1. However, the recall for class 0 (0.21) indicates that the model's ability to identify class 0 instances is quite limited.
3. The F1-scores provide a balanced measure of the model's performance, with class 1 having a higher F1-score (0.81) compared to class 0 (0.11).
4. The accuracy of 0.69 suggests that the model performs reasonably well, but it's important to note the class imbalance.
5. The macro average F1-score (0.46) and weighted average F1-score (0.75) provide a sense of the model's overall performance across classes.

7. SUPPORT VECTOR MACHINE CLASSIFIER

	precision	recall	f1-score	support
0	0.34	0.93	0.50	15
1	0.99	0.81	0.89	142
accuracy			0.82	157
macro avg	0.67	0.87	0.70	157
weighted avg	0.93	0.82	0.85	157

Inferences:

1. The model shows a significant trade-off between precision and recall, with class 1 having a much higher precision and class 0 having a much higher recall.
2. The recall for class 0 (0.93) suggests that the model captures a significant portion of the actual instances of class 0. However, the recall for class 1 (0.81) indicates that the model's ability to identify class 1 instances is somewhat lower.
3. The F1-scores provide a balanced measure of the model's performance, with class 1 having a higher F1-score (0.89) compared to class 0 (0.50).
4. The accuracy of 0.82 suggests that the model performs well, but it's important to consider the class imbalance.
5. The macro average F1-score (0.70) and weighted average F1-score (0.85) provide a sense of the model's overall performance across classes.

As always, further analysis, experimentation, and fine-tuning of the model could be beneficial to enhance model performance.

Submitted By
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