AutoML Modeling Report

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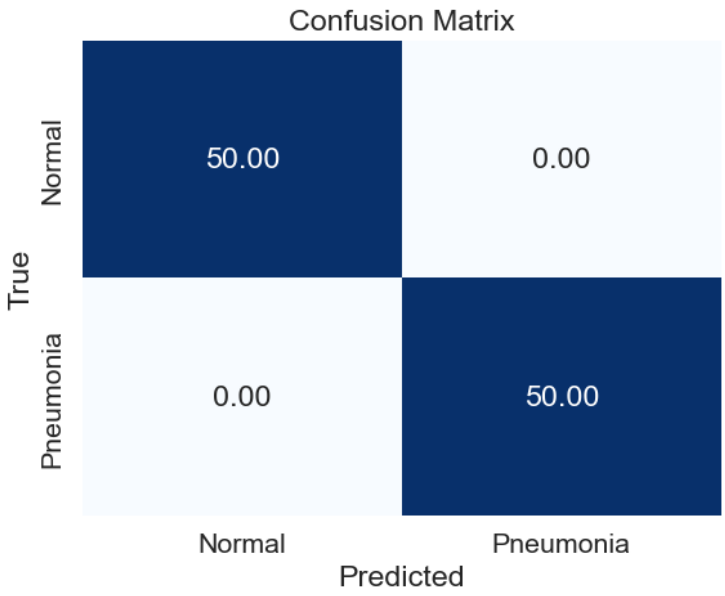
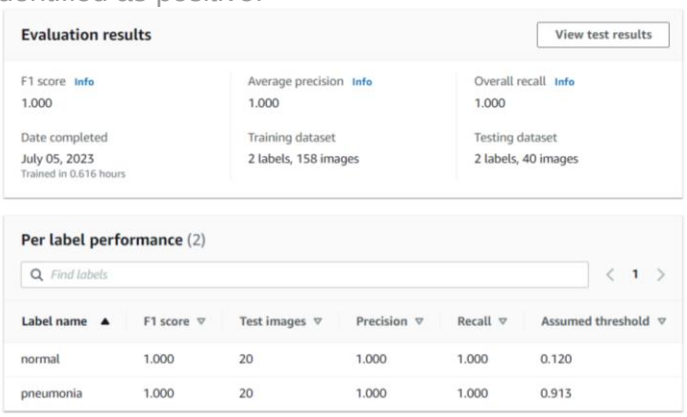
Binary Classifier with Clean/Balanced Data

Train/Test Split How much data was used for training? How much data was used for testing?	out of the total dataset 200 images 100 for normal and the other 100 for pneumonia, 158 images were used for training and 40 images for testing
Confusion Matrix What does each of the sections in the confusion matrix describe? What values did you observe (include a screenshot)? What is the true positive rate for the “pneumonia” class? What is the false positive rate for the “normal” class?	confusion matrix It is a two-dimensional matrix that shows a classification model's true and predicted values. The rows of the matrix represent the actual values, while the columns represent the predicted values. The four sections of the confusion matrix are TP, FP, TN, and FN. Normal True positive: category correctly classifies the input as a positive and the values observed are 50% False positive:0% True negative: correctly classifies the input. as a negative False negative: 0%



Precision and Recall
What does precision measure? What does recall measure? What precision and recall did the model achieve (report the values for a score threshold of 0.5)?

Precision: The fraction of positive predictions that are positive.
Recall: The fraction of actual positives that are correctly identified as positive.



Per label performance (2)

Find labels

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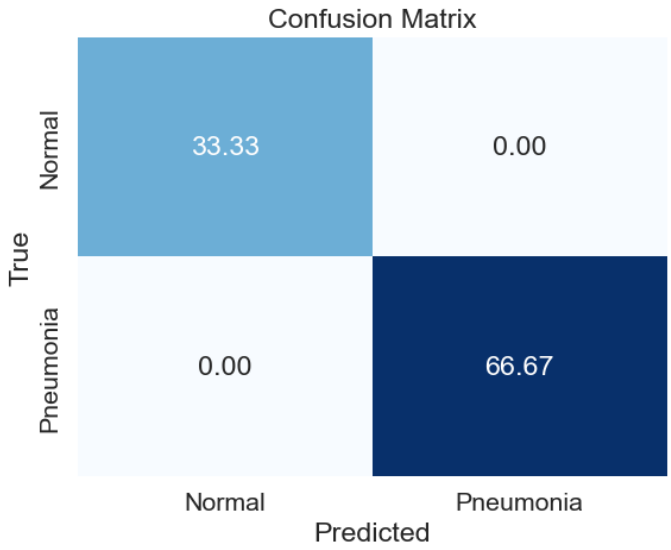
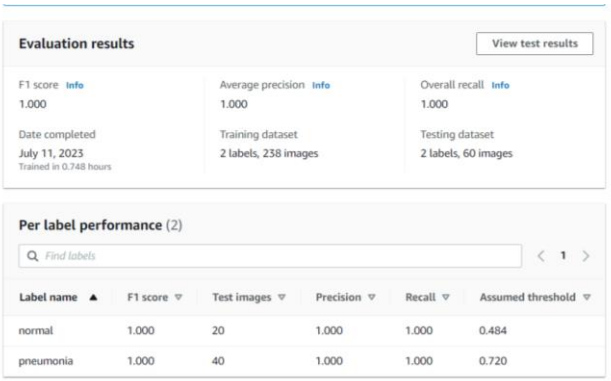
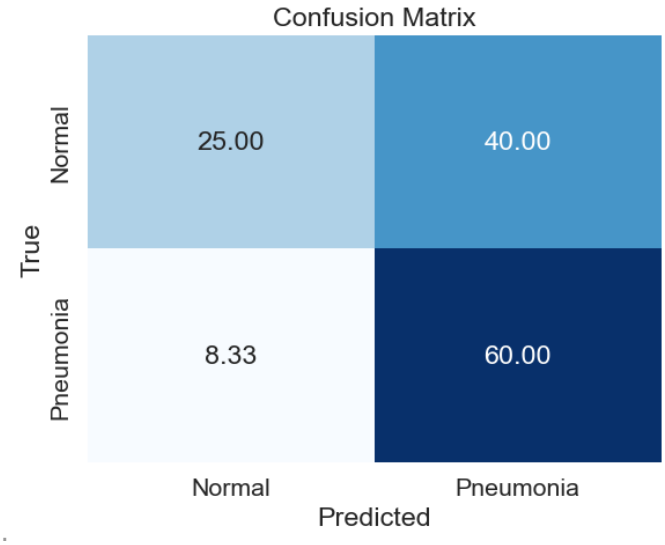
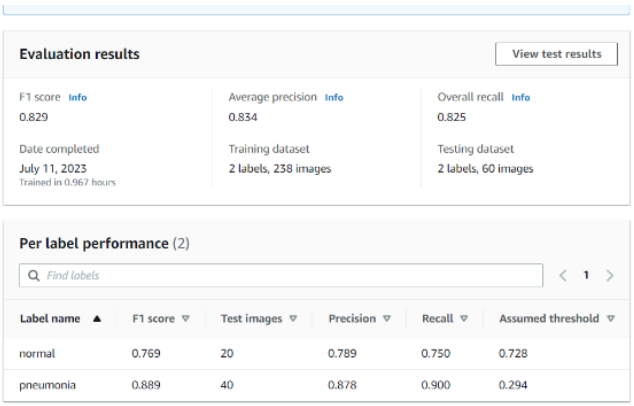
Label name	F1 score	Test images	Precision	Recall	Assumed threshold
normal	1.000	20	1.000	1.000	0.120
pneumonia	1.000	20	1.000	1.000	0.913

Binary Classifier with Clean/Unbalanced Data

Train/Test Split How much data was used for training? How much data was used for testing?	Dataset 2 training labels, 238 training images, 2 test labels, and 60 test images.
Confusion Matrix How has the confusion matrix been affected by the unbalanced data? Include a screenshot of the new confusion matrix summary	The confusion matrix did not change much. The number of true positives has decreased. Slightly and the number of false negatives slightly increased to reach 66.67%. 
Precision and Recall How have the model's precision and recall been affected by the unbalanced data?	
Unbalanced Classes From what you have observed, how do unbalanced classes affect a machine-learning model?	From what I learned through this course, unbalanced classed datasets caused Biased Predictions, Evaluation Metrics Misleading, and Model Overfitting in the ML model

Binary Classifier with Dirty/Balanced Data

Confusion Matrix How has the confusion matrix been affected by the dirty data? Include a screenshot of the new confusion matrix information.	Dataset: 2 training labels, 238 training images, 2 test labels, and 60 test images.  The above image shows that the model has not predicted all the test cases correctly. It has correctly classified 60% of pneumonia cases, and 25% of normal cases but has incorrectly classified 8.33% of pneumonia cases as normal and 40% of normal cases as pneumonia. This is because a few of the images were incorrectly labeled in the training dataset. Thus, the model learned incorrect features for the classes and predicted them based on them. Another reason can be that some images in the test dataset can have the wrong label and while the model predicted them correctly, it has still been marked incorrectly in the confusion matrix.

Precision and Recall How have the model's precision and recall been affected by the dirty data? Of the binary classifiers, which has the highest precision? Which has the highest recall?	the value of both precision and recall changed after making changes in the dataset for this case, from what I've observed the highest precision and recall produced by clean data (balanced)  **Evaluation results** View test results F1 score Info 0.829 · Average precision Info 0.834 · Overall recall Info 0.825 Date completed July 11, 2023 Trained in 0.967 hours · Training dataset 2 labels, 238 images · Testing dataset 2 labels, 60 images **Per label performance** (2) Find labels · 1 Label name · F1 score · Test images · Precision · Recall · Assumed threshold normal 0.769 20 0.789 0.750 0.728 pneumonia 0.889 40 0.878 0.900 0.294
Dirty Data From what you have observed, how does dirty data affect a machine-learning model?	From what I learned through this course, Dirty data refers to data that is inaccurate, incomplete, inconsistent or contains errors, outliers, or other anomalies. In this case, the dataset was Misclassified, which can have significant impacts on the performance and accuracy of a machine learning model

3-Class Model

Confusion Matrix Summarize the 3-class confusion matrix. Which classes is the model most likely to confuse? Which class(es) is the model most likely to get right? What might you do to try to remedy the model's "confusion"? Include a screenshot of the new confusion matrix information.	Dataset: 3 training labels, 237 training images, 3 test labels, and 60 test images. Based on the confusion matrix the class that is most likely to get right is normal. While the model is likely to confuse viral pneumonia and bacterial pneumonia. Furthermore, for the ML model to identify the patterns in images for accurate predictions, we may need to increase the number of photos in the training dataset for each class.

	Predicted Normal	Predicted Viral Pneumonia	Predicted Bacterial Pneumonia
True Normal	33.33	1.67	0.0
True Viral Pneumonia	66.67	30.0	66.67
True Bacterial Pneumonia	66.67	70.0	33.33

Precision and Recall What are the model's precision and recall? How are these values calculated?	In the last case with a 3-class confusion matrix, the precision and recall values turn out to be 91% and 90.5%. Moreover, in the scenario of 3 × 3, to calculate the value of precision and recall, their values are calculated initially (for each class), which is followed by taking an average of those values. By doing so, the overall values of precision and recall can be determined.
F1 Score What is this model's F1 score?	The F1 score of this model turns out to be 0.974(The F1 score formula = 2 x precision x recall / (precision + recall))