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| AutoML Modeling Report |  |

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Binary Classifier with Clean/Balanced Data

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| **Train/Test Split**  How much data was used for training? How much data was used for testing? | Graphical user interface, application  Description automatically generatedTable  Description automatically generated |
| **Confusion Matrix**  What do each of the cells 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? | True positives are the correct classification of pneumonia while false positive is the incorrect classification of pneumonia.  True negatives are the correct classification of classes without pneumonia while the false positive is the incorrect classification of classes without pneumonia.  In the confusion matrix, it shows the model was better at classifying pneumonia diseased lungs than healthy lungs.Chart, waterfall chart  Description automatically generated |
| **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 measures the ratio of true positives to the predicted values.  Recall measures the ratio of true positives to actual positives.Graphical user interface  Description automatically generated |
| **Score Threshold**  When you increase the threshold what happens to precision? What happens to recall? Why? | Increase in threshold leads to increase in precision as is approaches 1 while the recall approaches 0.  Chart, line chart  Description automatically generated |

Binary Classifier with Clean/Unbalanced Data

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| **Train/Test Split**  How much data was used for training? How much data was used for testing? | Graphical user interface, application  Description automatically generatedTable  Description automatically generated |
| **Confusion Matrix**  How has the confusion matrix been affected by the unbalanced data? Include a screenshot of the new confusion matrix. | It improved the performance level of the model in classifying the healthy lungs in the confusion matrix with no effect on the pneumonia classification.  Chart, waterfall chart  Description automatically generated |
| **Precision and Recall**  How have the model’s precision and recall been affected by the unbalanced data (report the values for a score threshold of 0.5)? | There was significant improvement on the precision and recall of the model.  Graphical user interface  Description automatically generated with low confidence |
| **Unbalanced Classes**  From what you have observed, how do unbalanced classed affect a machine learning model? | Unbalanced data introduces bias which impacts the accuracy of the model. With the increase in accuracy, the recall on both didn’t change.  Chart, line chart  Description automatically generatedChart, line chart  Description automatically generated |

Binary Classifier with Dirty/Balanced Data

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| **Confusion Matrix**  How has the confusion matrix been affected by the dirty data? Include a screenshot of the new confusion matrix. | The model performed poorly as seen in the diagram.  Chart, waterfall chart  Description automatically generated |
| **Precision and Recall**  How have the model’s precision and recall been affected by the dirty data (report the values for a score threshold of 0.5)? Of the binary classifiers, which has the highest precision? Which has the highest recall? | The precision and recall values went to a very low value of 47.7%. The highest precision and recall values were observed with clean and unbalanced data.  Chart  Description automatically generated with low confidence |
| **Dirty Data**  From what you have observed, how does dirty data affect a machine learning model? | The model clearly struggled to find patterns among classes as the labels/classes are mixed up. Model sees same patterns in both labels and hence performs poorly. |

3-Class Model

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| **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? Why might you do to try to remedy the model’s “confusion”? Include a screenshot of the new confusion matrix. | By intuition, the bacterial and viral classes are likely to be confused. But the model was able to classify the viral pneumonia class accurately with false positives in bacterial class and the normal class.  To remedy this, I would change the labelling to exclude the pneumonia metadata.  Table  Description automatically generated with low confidence |
| **Precision and Recall**  What are the model’s precision and recall? How are these values calculated (report the values for a score threshold of 0.5)? | A picture containing chart  Description automatically generated  Sum of ratio = 60/70 + 100/150 + 80/80 = 2.52  Number of classes = 3  Precision = 0.84 = 84%  Recall ratio = 60/100 + 100/100 + 80/100 = 2.4  Number of classes = 3  Recall = 2.4/3 = 0.80 = 80% |
| **F1 Score**  What is this model’s F1 score? | F1 = 80.701% |