AutoML Modeling Report

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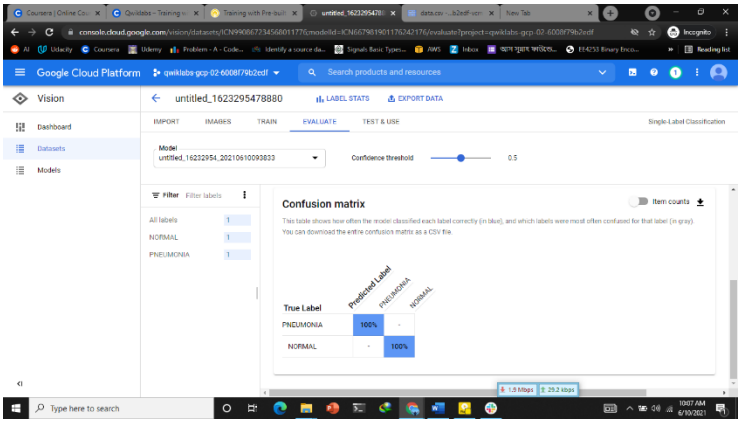
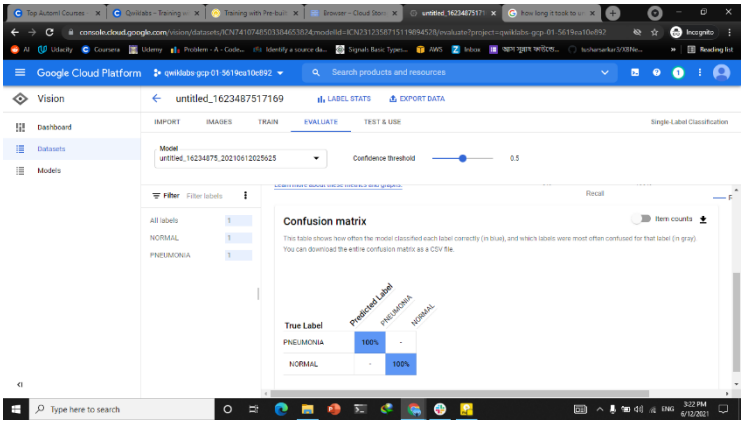
Binary Classifier with Clean/Balanced Data

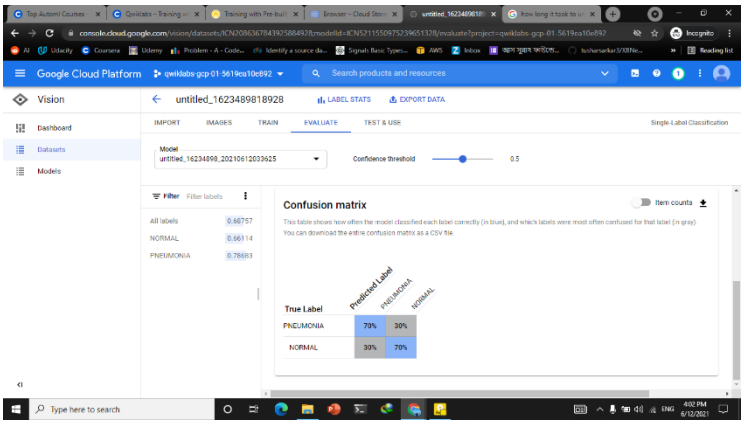
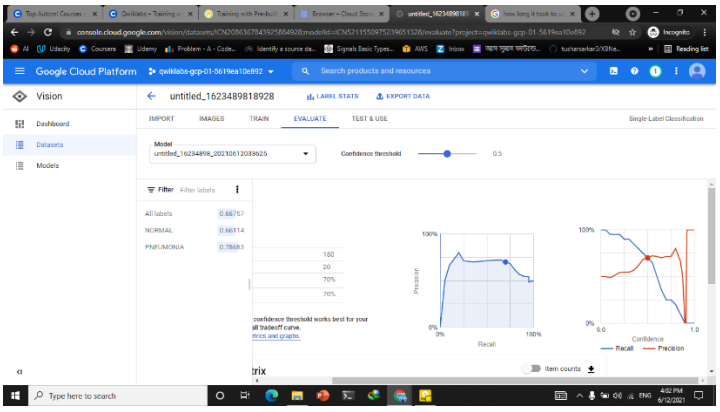
Train/Test Split How much data was used for training? How much data was used for testing?	Train: 80 Validation: 10 Test: 10
Confusion Matrix What do each of the cells in the confusion matrix describe? What values did you observe (include a screenshot)? What is the true positive rate for the “pneumonia” class? What is the false positive rate for the “normal” class?	**true positives (TP):** These are cases in which we predicted yes (they have the Pneumonia), and they do have the disease. **true negatives (TN):** We predicted no, and they don't have the Pneumonia. **false positives (FP):** We predicted yes, but they don't actually have the Pneumonia. (Also known as a "Type I error.") **false negatives (FN):** We predicted no, but they actually do have the Pneumonia. (Also known as a "Type II error.")  True Positive Rate for the “Pneumonia” class is: 100% False positive rate for the “normal” class is: Null

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 ratio of correct positive predictions to the total predicted positives. Recall: The ratio of correct positive predictions to the total positives' examples. The model achieved Precision: 100% Recall: 100% When threshold is 0.5
Score Threshold When you increase the threshold what happens to precision? What happens to recall? Why?	**Precision is TP/(TP+FP)** *Both* TP and FP are reduced when you increase the threshold. If both decrease in proportion to the current precision (i.e., they are spread evenly at each confidence value), then precision will remain the same. **Recall is TP/(TP+FN)** Raising our classification threshold will cause the number of true positives to decrease or stay the same and will cause the number of false negatives to increase or stay the same. Thus, recall will either stay constant or decrease.

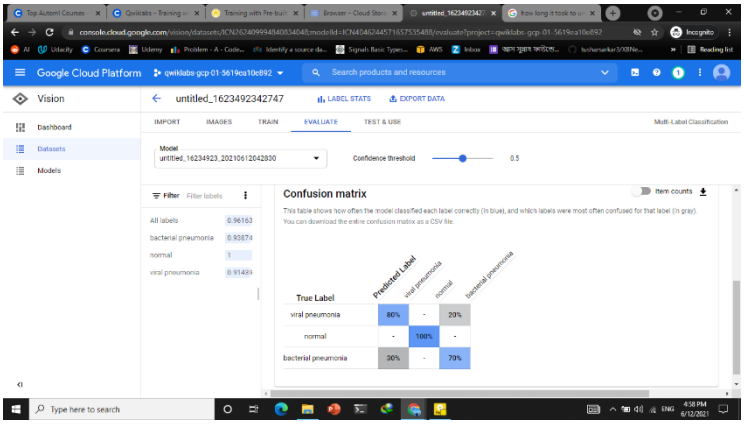
Binary Classifier with Clean/Unbalanced Data

Train/Test Split How much data was used for training? How much data was used for testing?	**Normal** • Train: 80 • Validation: 10 • Test: 10 **Pneumonia** • Train: 239 • Validation: 30 • Test: 30
Confusion Matrix How has the confusion matrix been affected by the unbalanced data? Include a screenshot of the new confusion matrix.	The confusion matrix has not been affected by the unbalanced data. It is same to previous classification. 
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)?	The model achieved Precision: 100% Recall: 100% When threshold is 0.5. Therefore, we can say the model's precision and recall have not been affected by the unbalanced data (this binary classification with unbalanced data) when score threshold of 0.5
Unbalanced Classes From what you have observed, how do unbalanced classed affect a machine learning model?	Imbalanced classifications pose a challenge for predictive modeling as most of the machine learning algorithms used for classification were designed around the assumption of an equal number of examples for each class. This results in models that have poor predictive performance, specifically for the minority class. Here, minority class is Normal training data. If we increase score of thresholds, I will not get anymore 100% precision and recall.

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.	As you see in the screenshot, the confusion matrix has been affected by the dirty data. We have now 30% type I error and 30% type II error. 
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?	Threshold: 0.5 Precision: 70% Recall: 70% Average Precision: 68.8% In this binary we see the precision and recall dramatically dropped. Of the binary classifiers, Binary Classifier with Clean/Balanced Data and Clean/Unbalanced Data have the precision. Binary Classifier with Clean/Balanced Data and Clean/Unbalanced Data have the highest recall. Both are report the values for a score of thresholds of 0.5
Dirty Data From what you have observed, how does dirty data affect a machine learning model?	If we look at the confidence graph we can easily understand that how dirty data affect 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? Why might you do to try to remedy the model's "confusion"? Include a screenshot of the new confusion matrix.	Summary: From the 3-class confusion matrix we get 100% True Positive for Normal Class. 80% True Positive for Viral Pneumonia and 70% True Positive for Bacterial Pneumonia. Bacterial Pneumonia class is the model most likely to confuse with Viral Pneumonia. Normal class is the model most likely to get right. To get higher average precision and recall we have to decrease the model's confusion. 
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)?	Precision: 85.71% Recall: 80% Precision = TP/(TP+FP) Recall = TP/(TP+FN) By these two-formula auto ml calculated precision and recall for all classes then make average by sum them and divided by 3.
F1 Score What is this model's F1 score?	F1 Score = 2 * Precision * Recall / (Precision + Recall) For this model F1 Score is 0.8276