Google Teachable Machine

Motivation

The primary objective of this task is to learn how computer vision and its already existing models work. I have used a Teachable Machine platform provided by Google. It is free to use and very simple to understand. The following steps I have taken while going through the project:

Dataset and Training

First, I downloaded an open source chest x-ray dataset from Kaggle, the link of that dataset is as followed: https://www.kaggle.com/datasets/tolgadincer/labeled-chest-xray-images

My plan is to learn supervised learning based classification, which is a type of machine learning that uses labeled data to train the model. Labeled data meaning an associated target class with each instance of dataset. So, for above dataset, we have overall two classes: Normal and Pneumonia.

As a second step, I have created a project on the Google Teachable Machine and upload 500 images for each class (to avoid the data imbalance issue), as shown in Figure 1.

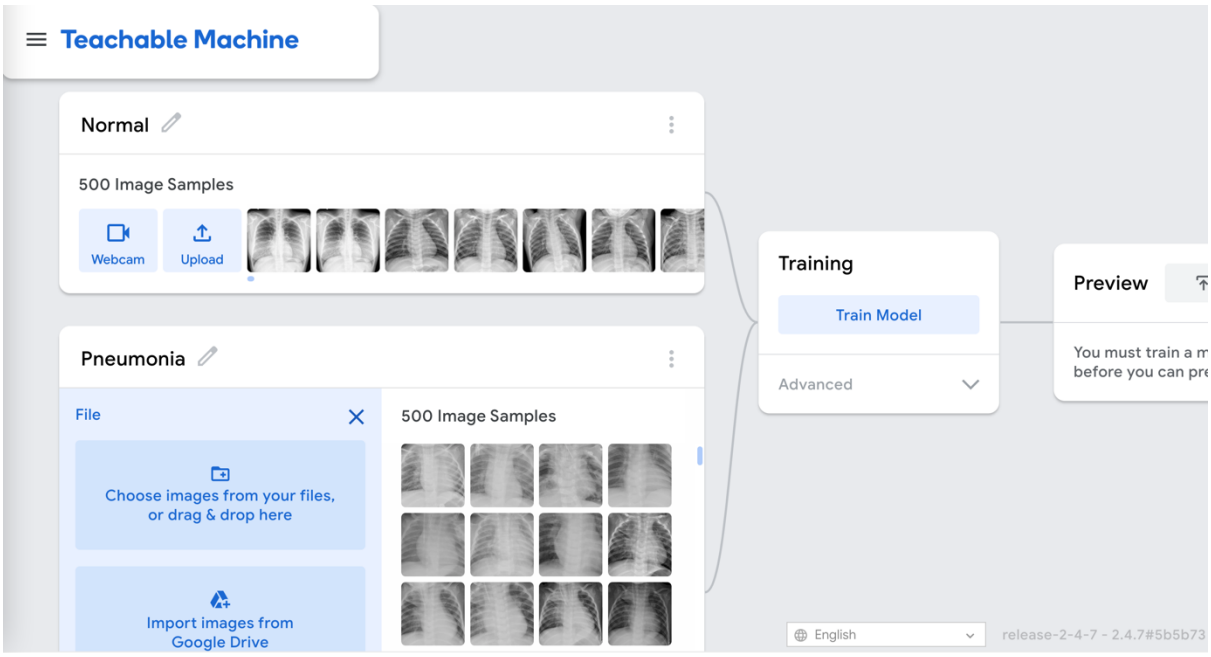

Fig. 1: Uploading the images.

Afterwards, I configure the few settings before training the model. That includes set the epochs iterations to 10, batch size 16 and learning rate 0.001, shown in Figure 2.

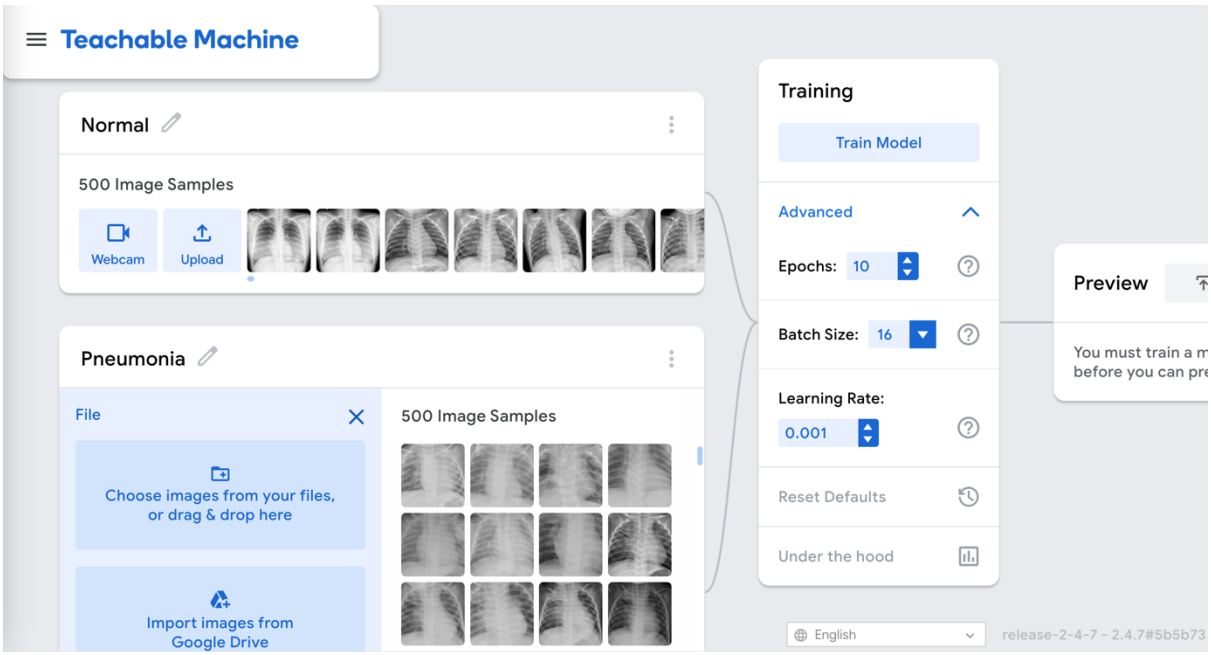

Fig. 2: Setting up the parameters.

After completing the training, when we test the model with unseen data it shows accurate results for few images of Pneumonia. However, do not shows accurate results for Normal class, as shown in Figure 3(a and b).

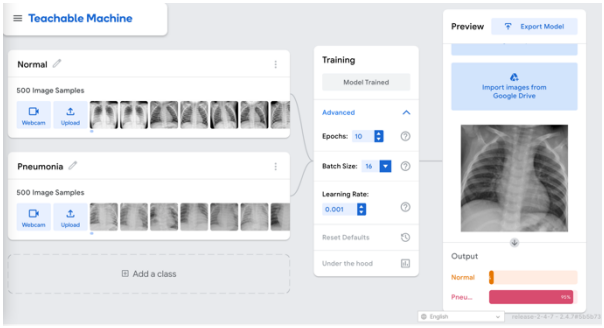

Fig. 3 (a): Test with Normal Class.

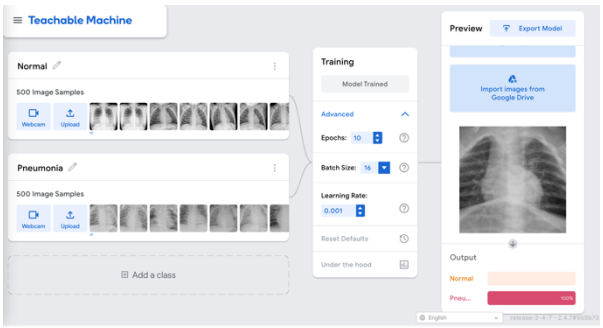

Fig. 3 (b): Test with Pneumonia Class.

Updating the parameters

Then I have updated the parameters for the training process by increasing the epochs to 30 batch size to 8. The training process were a bit show this time, but the testing results still has error in classifying the objects. So, I increased the epochs iterations to 50 and keep the batch size 16 as a default setting. Consequently, I have a good result, my model start classifying objects correctly on unseen data, as illustrates in Figure 4 (a and b).

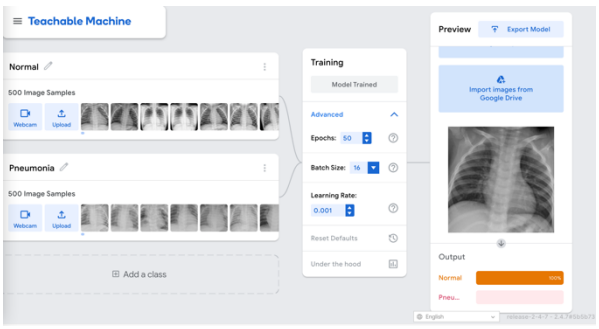

Fig. 4 (a): Test with Normal Class.

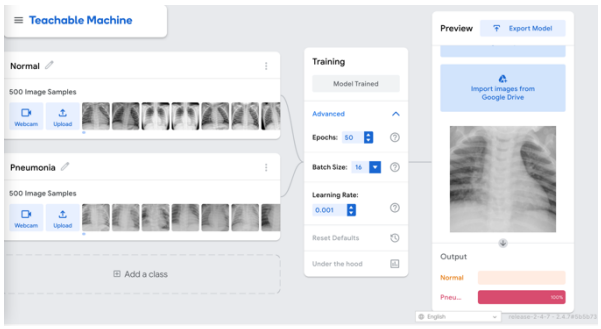

Fig. 4 (b): Test with Pneumonia Class.

I have also tested the same dataset for multi-class classification. Where I have sub-divided the Pneumonia class into Bacteria and Virus. As illustrates the Figure 5 (a, b, and c).

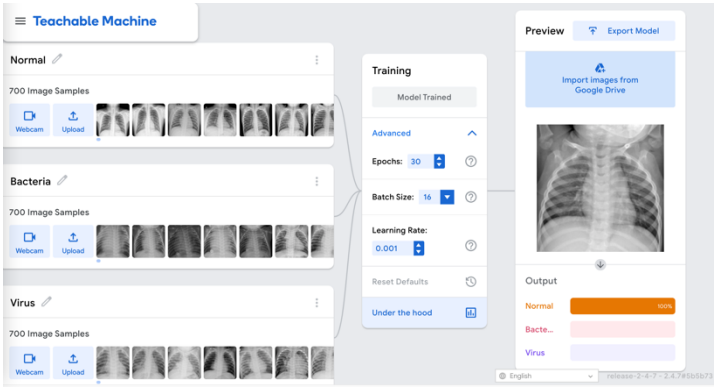

Fig. 5 (a): Test with Normal Class.

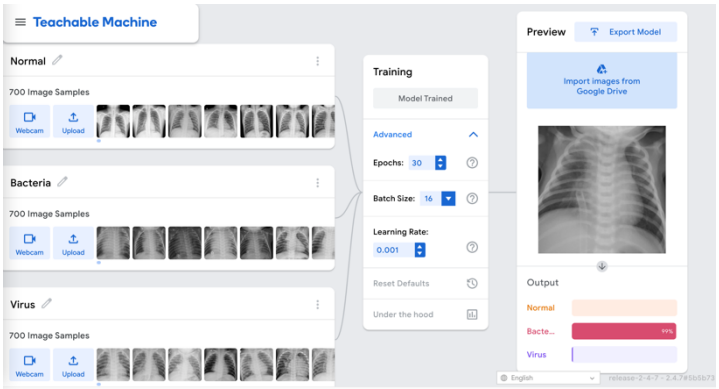

Fig. 5 (b): Test with Bacteria Class.

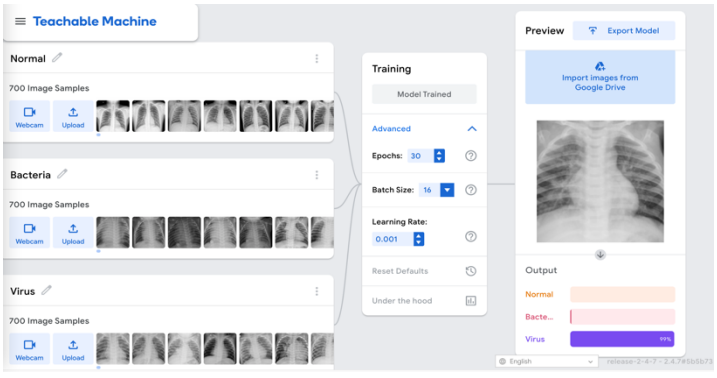

Fig. 5 (c): Test with Virus Class.

Conclusion

In this document, I have solved a problem of supervised learning classification on image dataset to recognize the disease from x-ray images. The motivation behind this is learn already available technologies and how artificial intelligence solve computer vision problems. I have also exported both models (binary class and multi class) to use for further processes and share on some online repository. These models also help the radiographers to access the x-ray images to identify the disease, especially during the overwhelming situation in hospitals like COVID-19.