

ORIGINAL Article

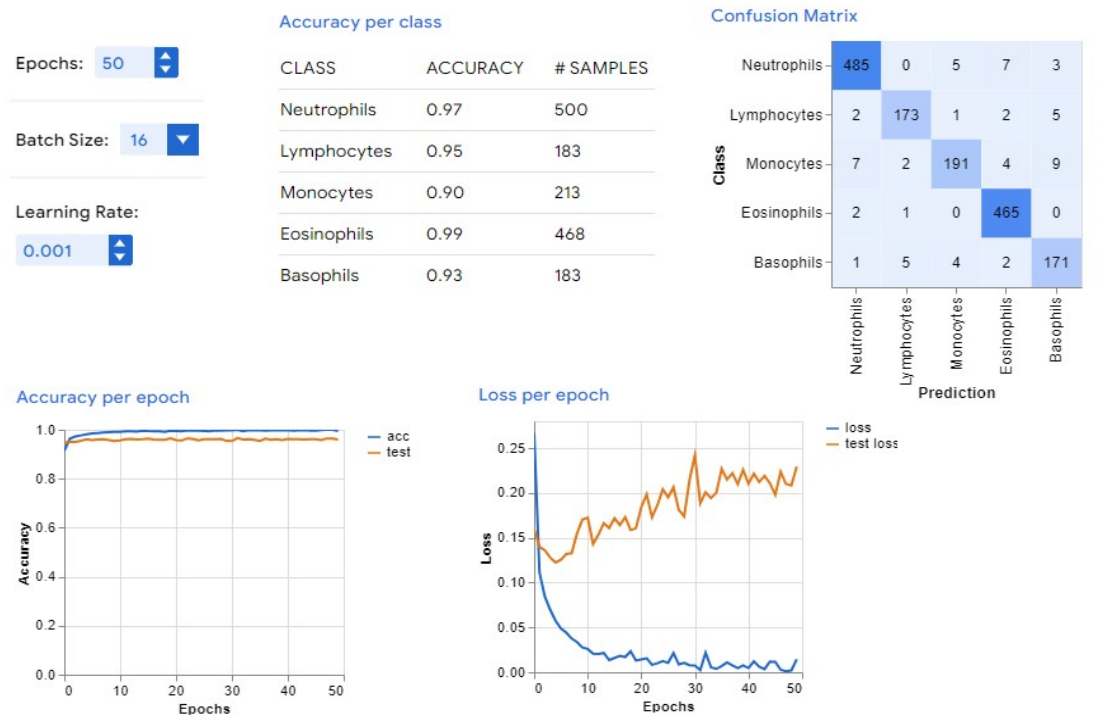
SUPPLEMENTARY INFORMATION

Empowering healthcare professionals with no-code artificial intelligence platforms for model development, a practical demonstration for pathology

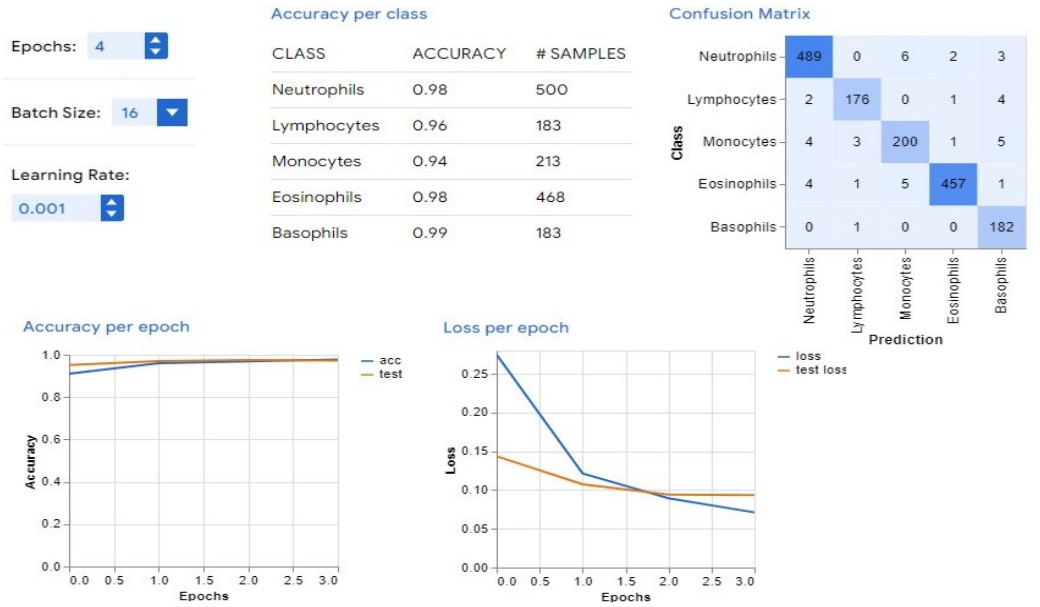
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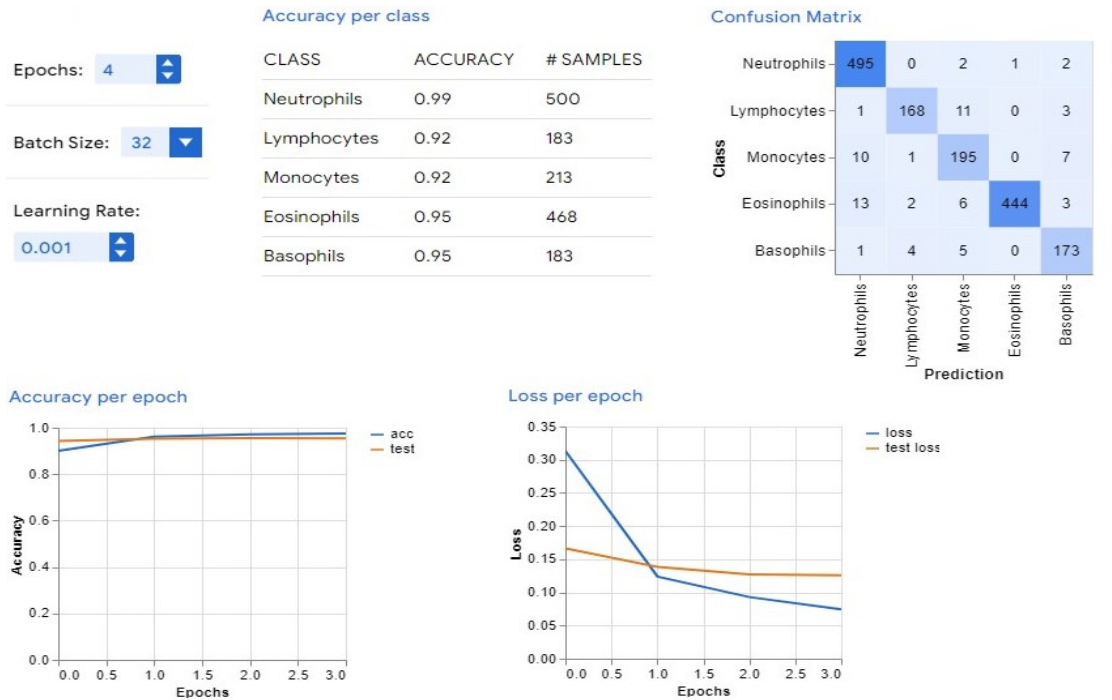
SUPPLEMENTARY FIGURES



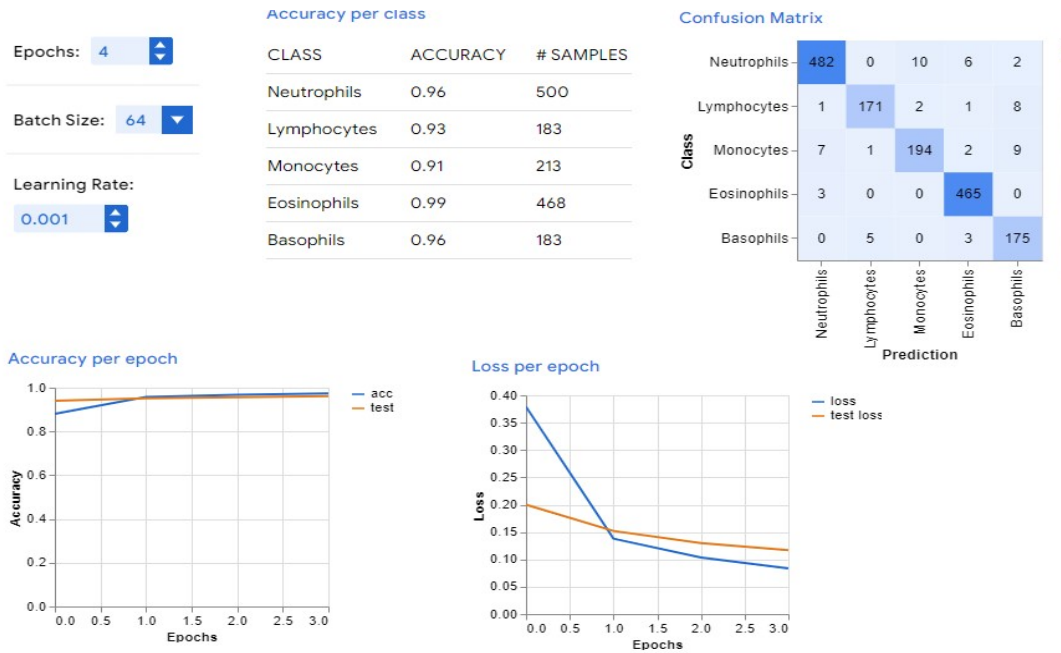
Suppl. Figure 1. Development of an AI model for classification of white blood cells. The system hyperparameters that are shown on the top left are based on the default numbers of the Teachable Machine. The accuracy per class and the confusion matrix show the performance of the AI model on the test set. The rows of the matrix represent the actual classes, and the columns represent the predicted classes. The diagonal elements of the matrix show the number of instances that were correctly classified, and the off-diagonal elements show the number of instances that were misclassified. The accuracy per epoch shows the accuracy of the AI model on the test set as a function of the number of epochs. The loss per epoch shows the loss of the AI model on the test set as a function of the number of epochs.



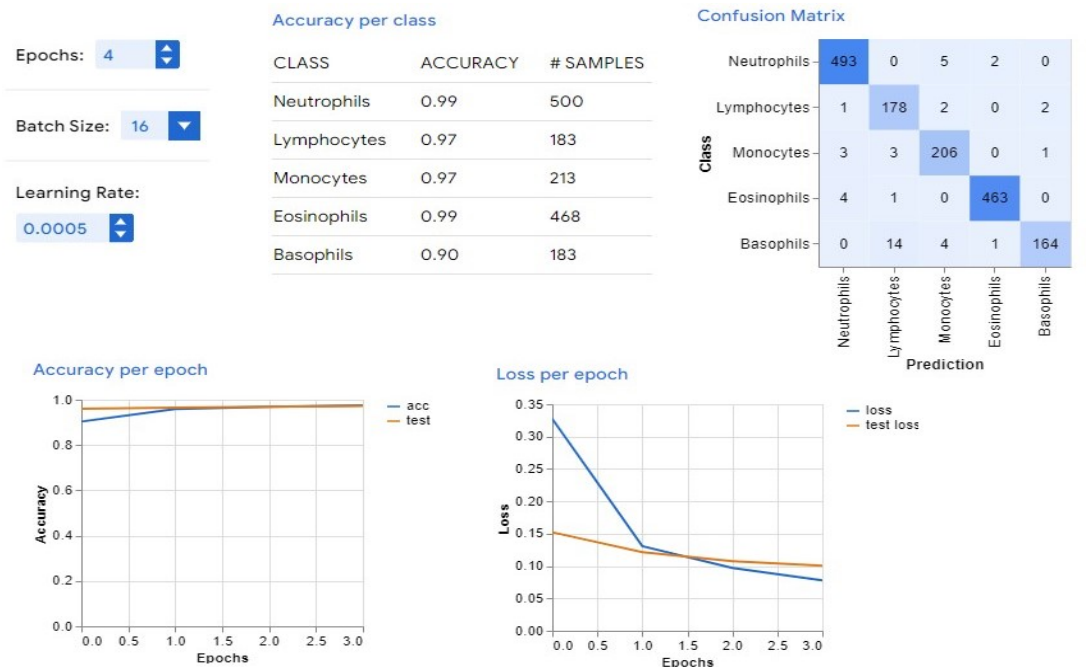
Suppl. Figure 2. The effect of the number of epochs on the performance of the AI model. The system hyperparameters are shown on the top left. The difference between this figure and Figure S1 is in a lower number of epochs for development of the algorithm (4 instead of 50).



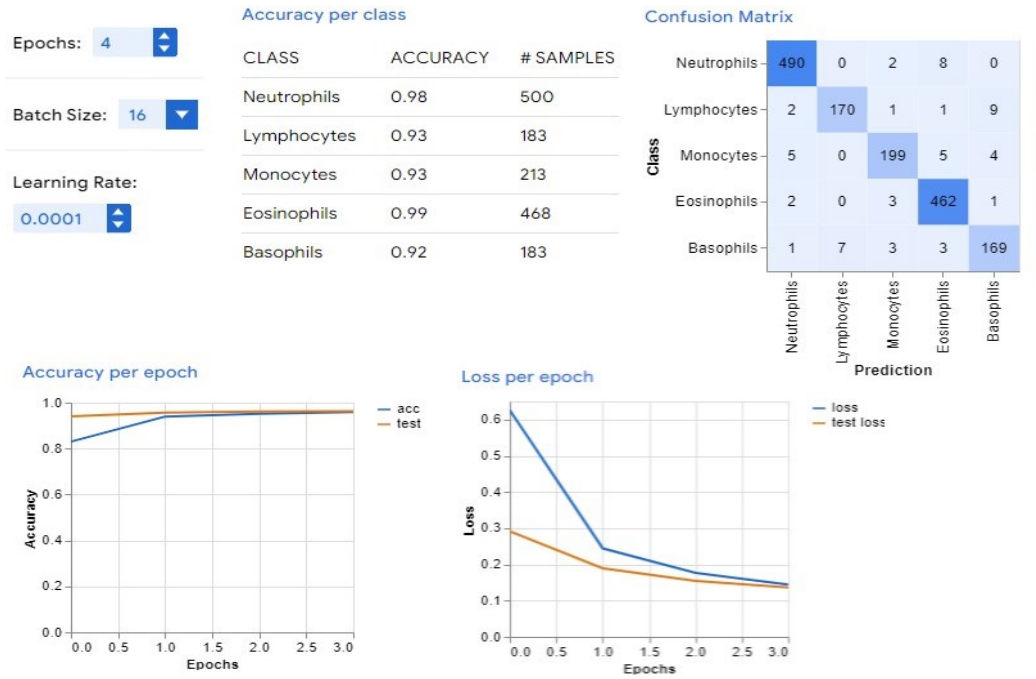
Suppl. Figure 3. The effect of the batch size on the performance of the AI model. The system hyperparameters are shown on the top left. The difference between this figure and Figure S2 is in the higher batch size for development of the algorithm (32 instead of 16).



Suppl. Figure 4. The effect of the batch size on the performance of the AI model. The system hyperparameters is shown on the top left. The difference between this figure and Figure S3 is in the higher batch size for development of the algorithm (64 instead of 32).



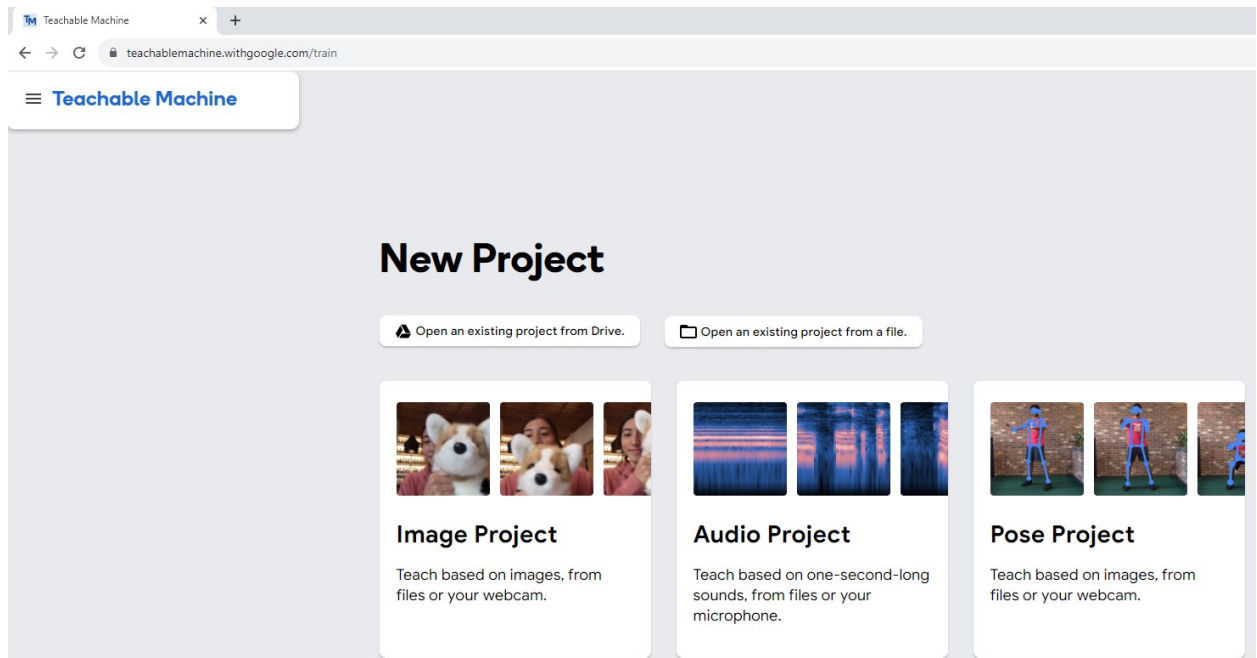
Suppl. Figure 5. The effect of learning rate on the performance of the AI model. The system hyperparameters is shown on the top left. The difference between this figure and Figure S2 is in the lower learning rate for development of the algorithm (0.0005 instead of 0.001).



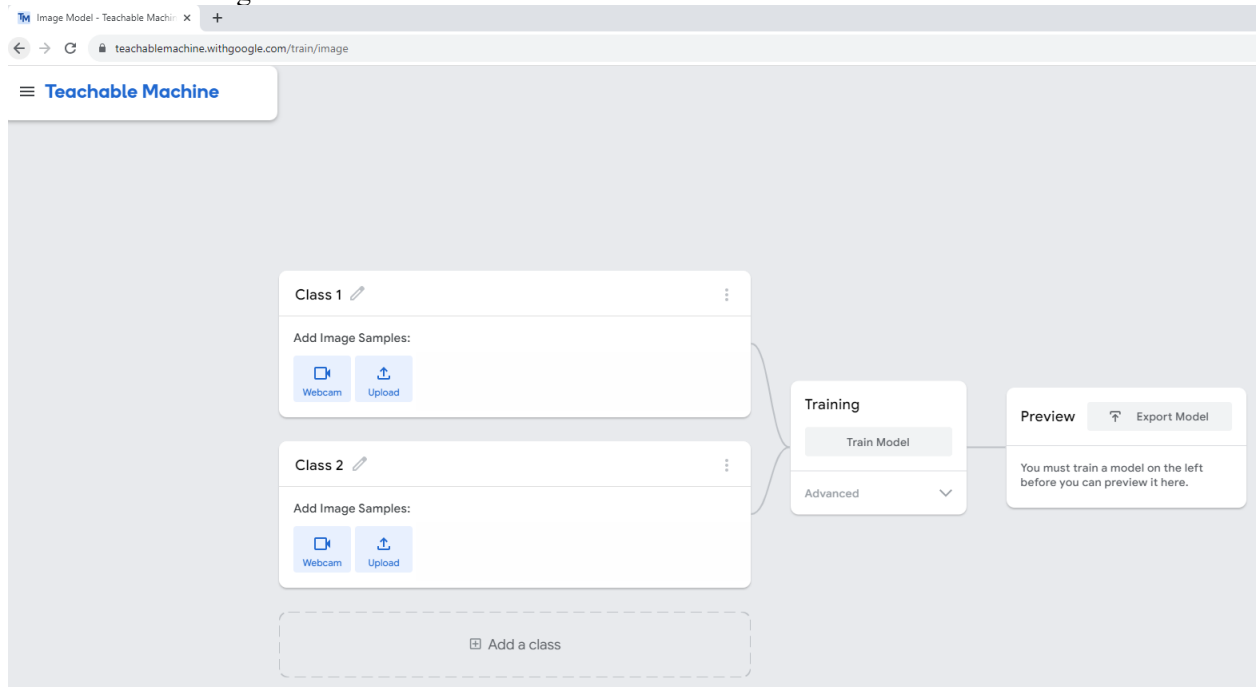
Suppl. Figure 6. The effect of learning rate on the performance of the AI model. The system hyperparameters is shown on the top left. The difference between this figure and Figure S2 is in the lower learning rate for development of the algorithm (0.0001 instead of 0.001).

SUPPLEMENTARY MATERIAL

1. Go to <https://teachablemachine.withgoogle.com/train> (Accessed on August 24th, 2023)

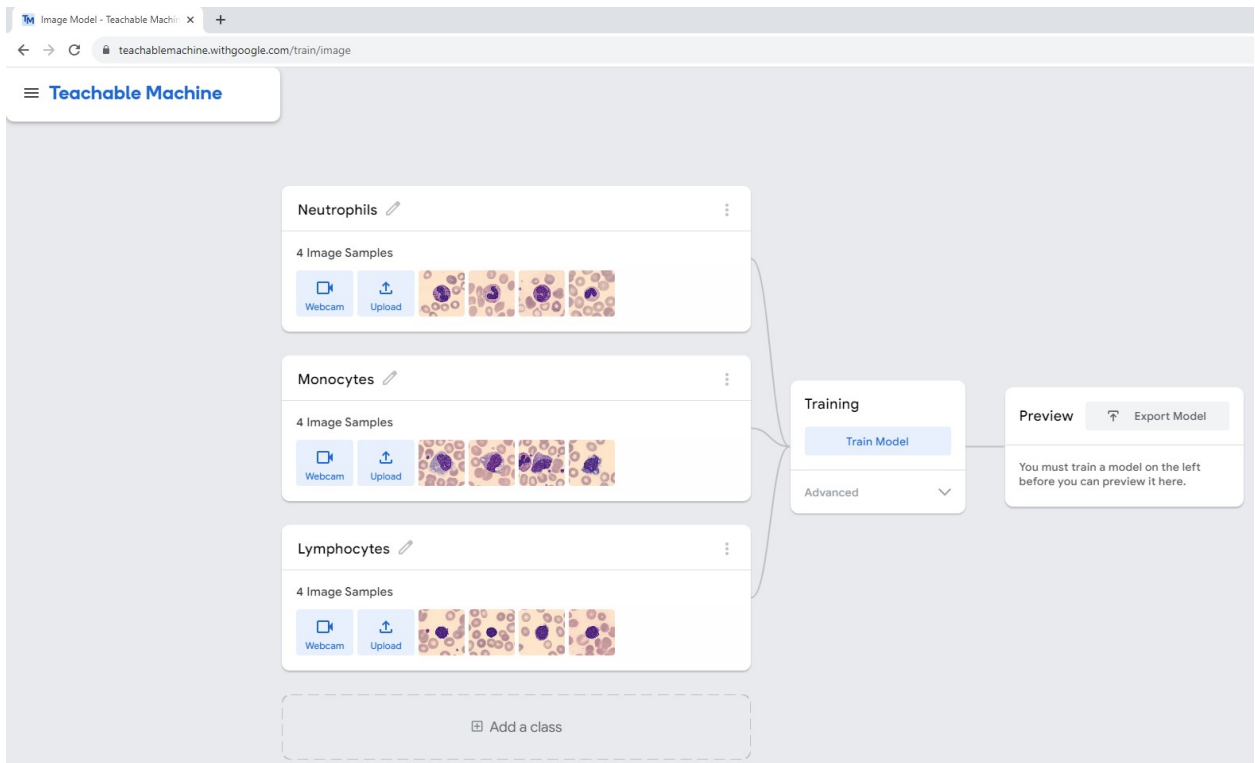


2. Click on “Image Project”
3. Click on “Standard image model”

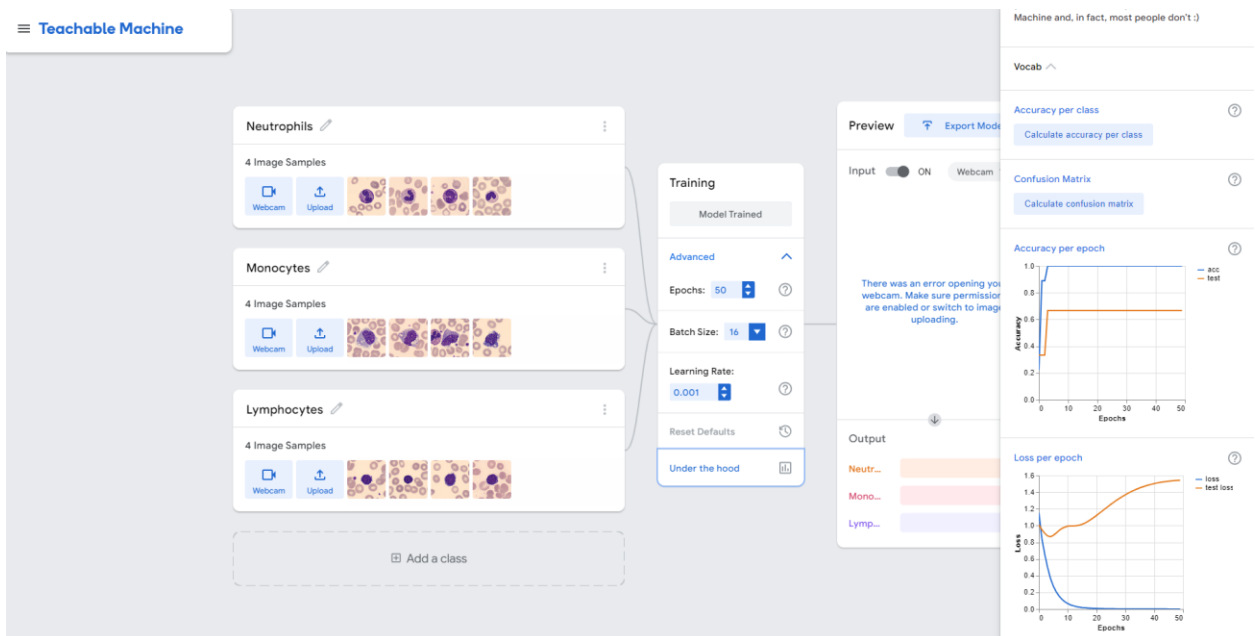


4. Rename the classes (for example neutrophils, monocytes, and lymphocytes)
5. Add more classes by clicking on “Add a class”
6. Click on the “upload” option for each class and import images for that class

7. Click on “Train Model” and wait until the model is trained (“Model Trained” appears)

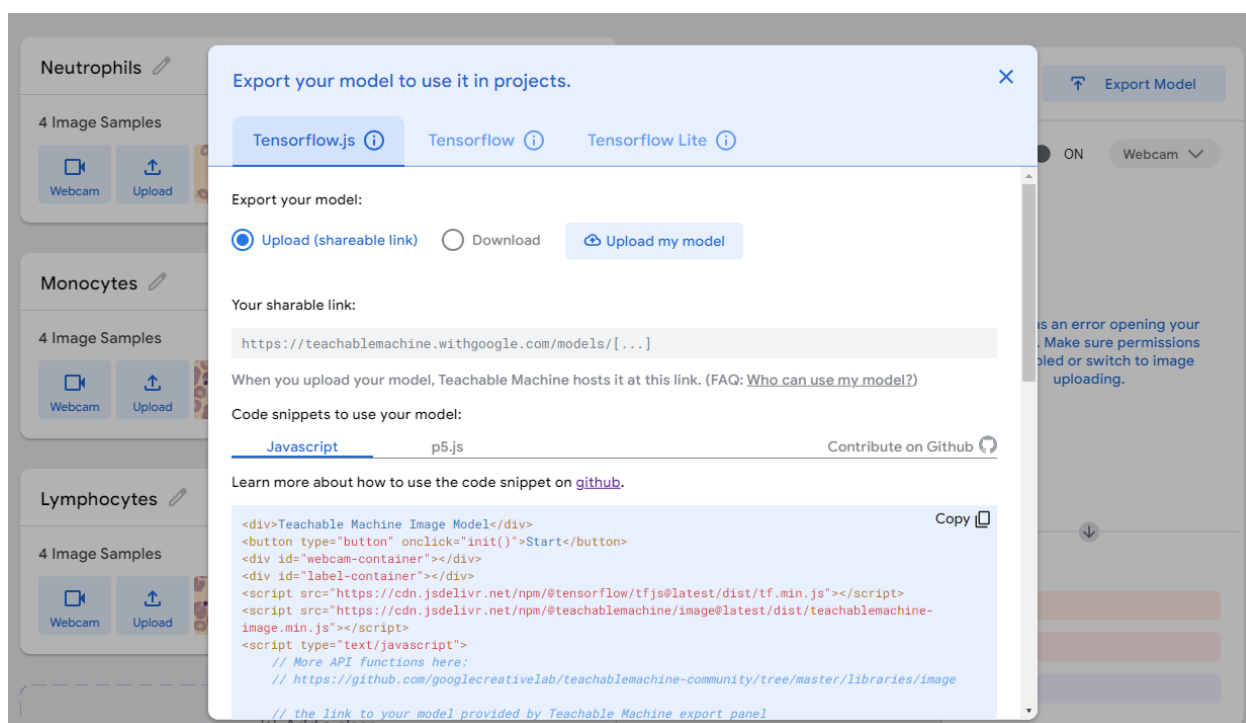
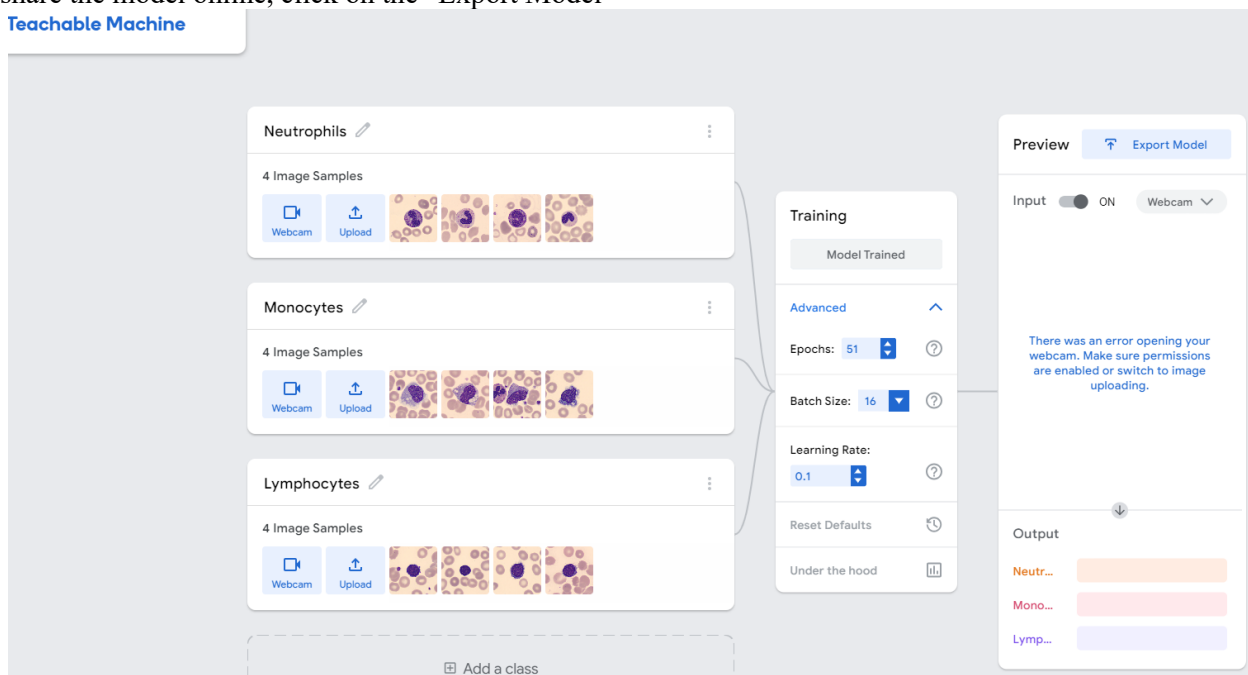


8. Click on “Advanced” and then “under the hood”



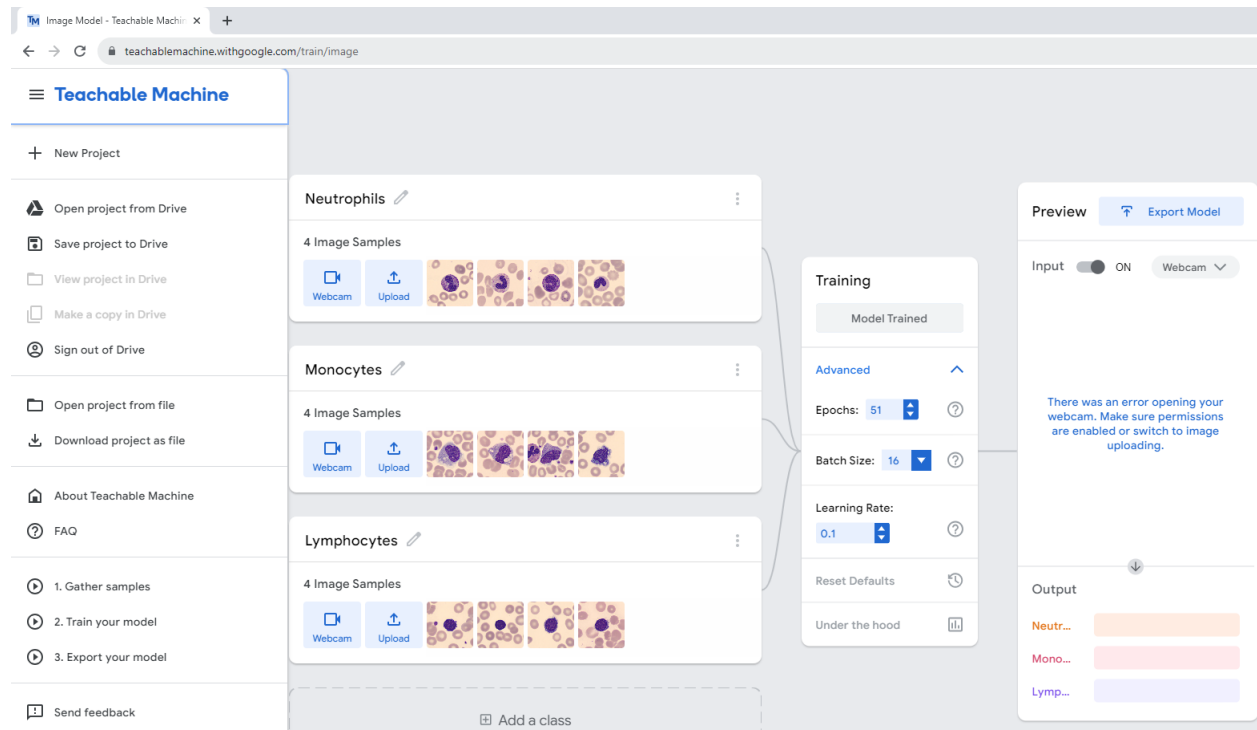
9. Click on “calculate accuracy per class” to determine the model’s accuracy for each class
10. Click on “calculate confusion matrix” to see the confusion matrix
11. Look at the accuracy per epoch and the loss per epoch to evaluate the model further

12. To tweak the hyperparameters, go to the “Advanced” option and change the parameters. Then click on “Train Model” again and repeat the cycle.
13. To share the model online, click on the “Export Model”



14. Click on “upload my model” and wait until the system finished uploading. Then under the “your sharable link”, copy the URL.
15. If you want to download the model, click on “download” and use the file format you want to have and click “download my model”.



16. If you want to save your whole project, click on the three horizontal hamburger icon on top left menu and click on “Save project to Drive” if you want to save it on google Drive or click on “Download project as file” if you want to download it on your computer.

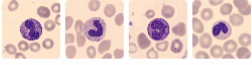


17. If you want to test the model on independent data, click on the “webcam” icon on the right top of the page and choose “file”.
18. Click on “choose images from your files, or drag and drop here”. Then look at the “output” to see the predicted type of your image

Neutrophils



4 Image Samples

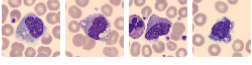
 



Monocytes



4 Image Samples

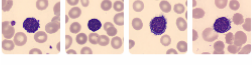
 




Lymphocytes

4 Image Samples


 







 Add a class



Training


Model Trained


Advanced 

Epochs: 51  


Batch Size: 16  


Learning Rate: 0.1  


Reset Defaults 

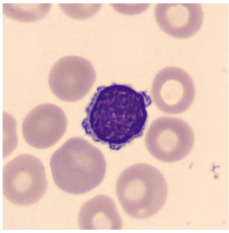
Under the hood 


Preview Export Model

Input ON File 


 Choose images from your files, or drag & drop here


 Import images from Google Drive






Output

Neutr... 

Mono... 

Lymp...  100%