HU22CSEN0100999
Eshwar Deshmukh Chavan

IMAGE PROCESSING TECHNIQUES

Segmentation

Segmentation in image processing refers to the partitioning of a digital image into multiple segments or sets of pixels. This is typically done to simplify the image and make it more meaningful and easier to analyze. Each segment represents a different object or region within the image.

Key techniques include:

- Thresholding : Pixels are grouped based on their intensity values
- Edge-Based Segmentation: Detects boundaries between different objects in an image.
- Region-Based Segmentation: Divide an image into region that are connected and hae similar properties such as color or texture.

Application include object detection, pedestrian detection, face recognition, traffic control systems, and more.

Feature Detation & Recognition

feature detection in computer vision involves identifying key points, lines or regions in an image that are deemed "intersting" or important. There features are used for further analysis, such as matching, tracking or object recognition.

Type of features:

- Edges: Points where there's a significant intensity difference between neighboring pixels, representing boundaries of objects.
- Corners / Interest Points: Points where two edges meet.
- Blobs: Regions of interest in an image that may not be detetion algorithms.

Classification Of Images

Image classification is the process of catgorizing an image into predefined classes based on its content. machine learning model especially convolutional neural networks (CNNs), are frequently used for this purpose

Steps in Image Classification:

- feature Extraction: Extract relevant feature from the imag

- Training: using a labeled dataset to train a model on recognizing these features.

- Classification: Assigning the input image to one of the predefined classes based on the learned model.

Face Recognition

face recognition is a specialized form of object recognition where the aim is to identify and verify a human face. It involves two key steps :-

- face Detection: Identifying and locating a face in a digita image

- Face Recognition: Matching the detected face againt a databa of stored face to find a match.

Techniques:

- Geometric-based methods: focus on identifying specific facia landmarks.

- Appearance-based methods: use statistical methods like principal component Analysis (PCA) or machine learning model such as CNNs.

Deep learning Algorithms for Object Detation & Recognitio

Deep learning has revolutionzed object detection and recognition with model like Convolutional Neural Networks (CNNs) and Region-based CNNs (R-CNNs)

Key Algorithms:

- Convolutional Neural Networks (CNNs): CNNs extrats spatia hierarchies of features, which makes then highly effective for tasks like image classification and object detection.
- yolo : A real-time object detection system that processes an entire image with a single neural network, making it extremely fast.
- R-CNN and fast R-CNN: Region-based CNNs, which first generate potential object regions and then classify each region

10-10-2024

TEACHABLE MACHINE

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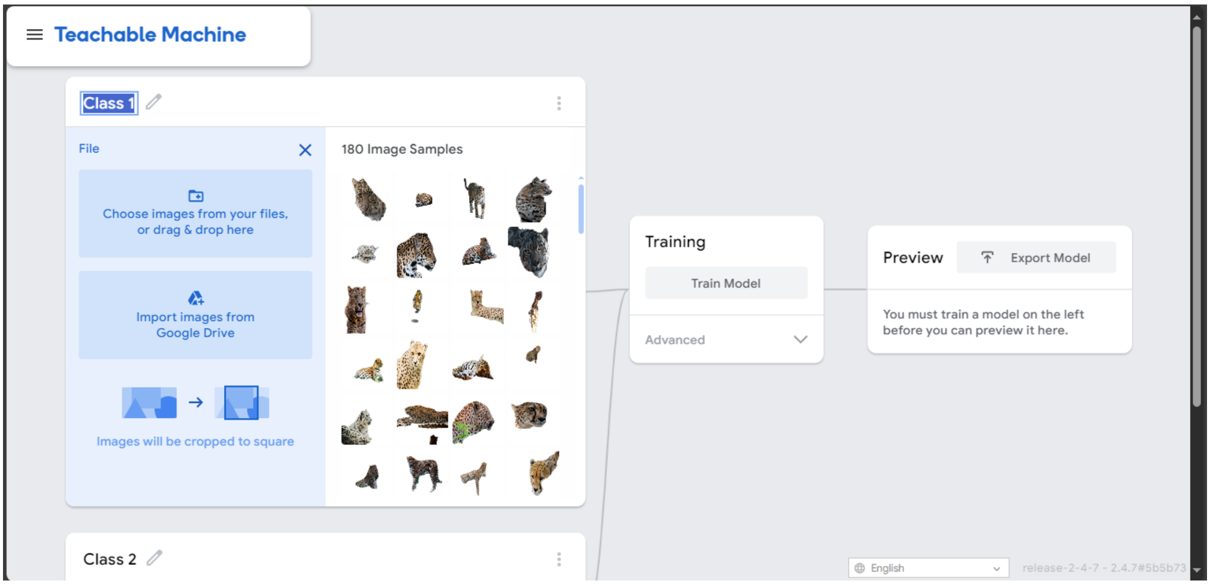


Teachable Machine

Class 1

File

Choose images from your files, or drag & drop here

Import images from Google Drive

Images will be cropped to square

180 Image Samples

Training

Train Model

Advanced

Preview

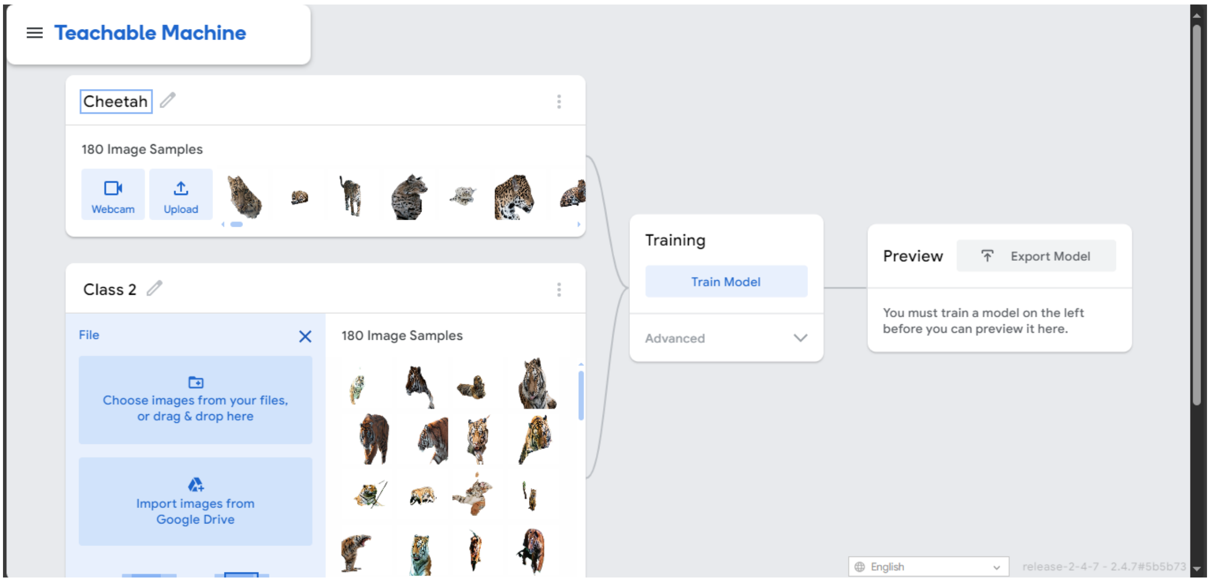
Export Model

You must train a model on the left before you can preview it here.

Class 2

English

release-2-4-7 - 2.4.7#5b5b73



Teachable Machine

Cheetah

180 Image Samples

Webcam

Upload

Class 2

File

Choose images from your files, or drag & drop here

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180 Image Samples

Training

Train Model

Advanced

Preview

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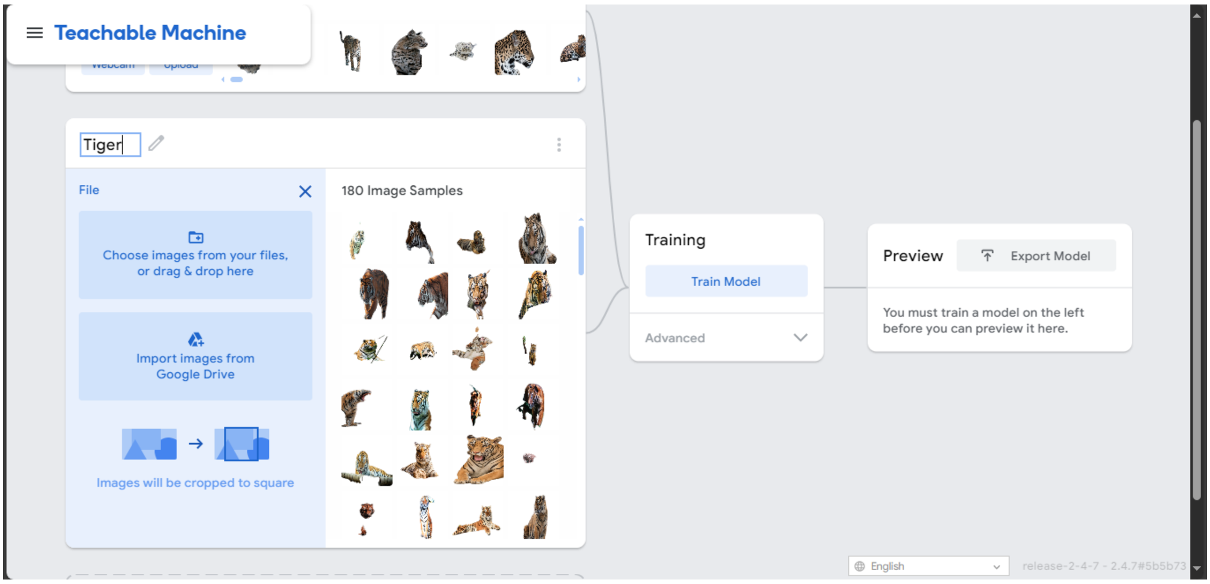
Teachable Machine
Tiger
File
180 Image Samples
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Training
Train Model
Advanced
Preview
Export Model
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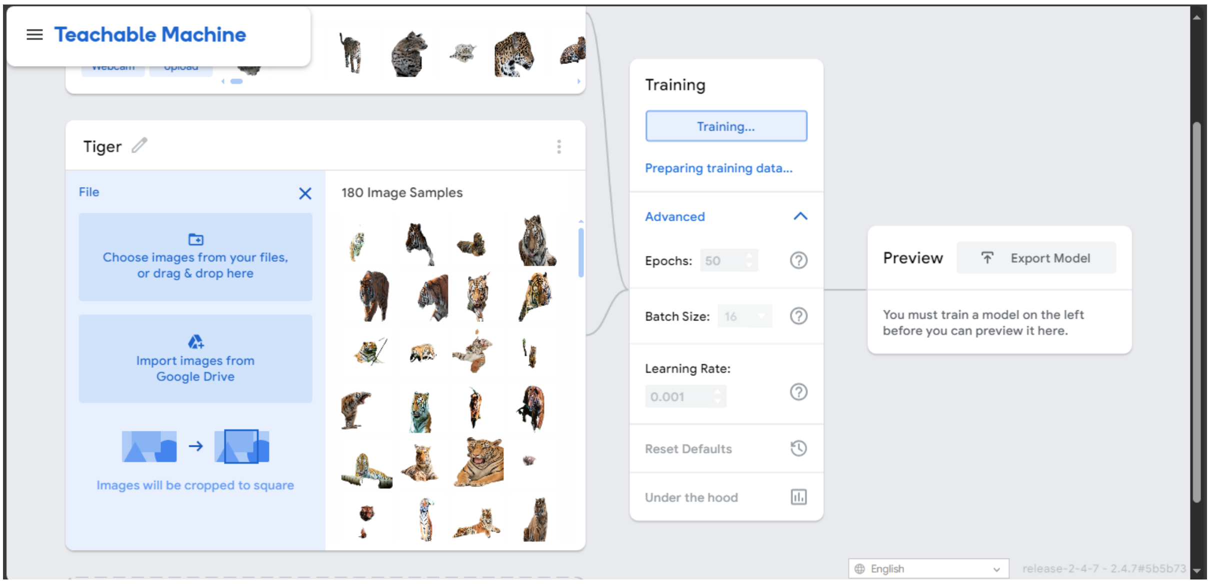
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Training
Training...
Advanced
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Under the hood
Preview
Export Model
English
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Preparing training data...

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

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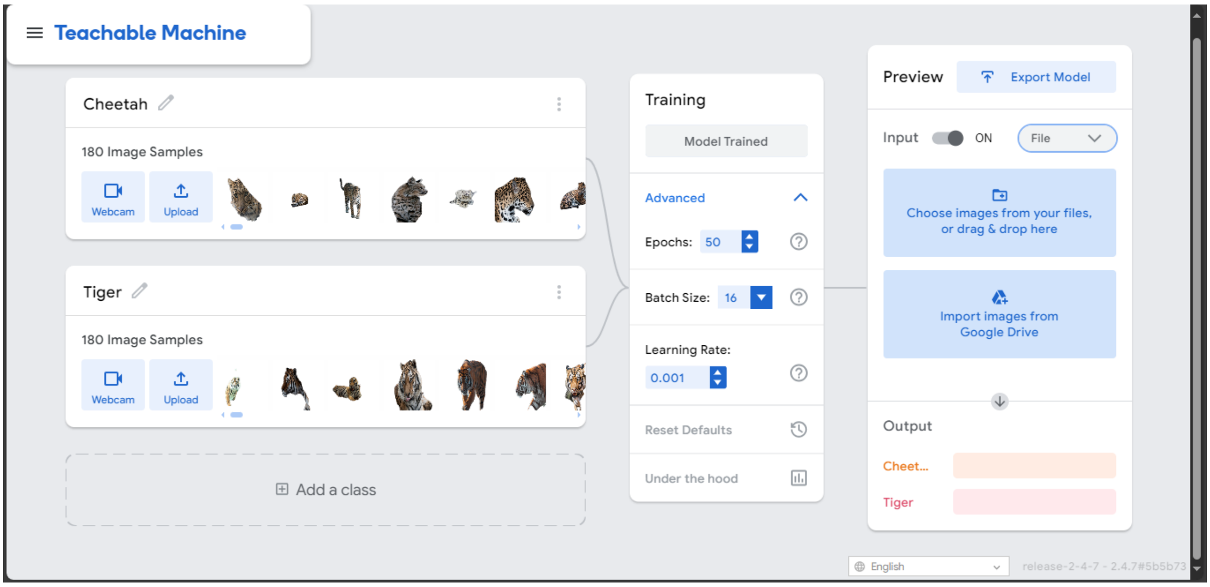

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Batch Size: 16

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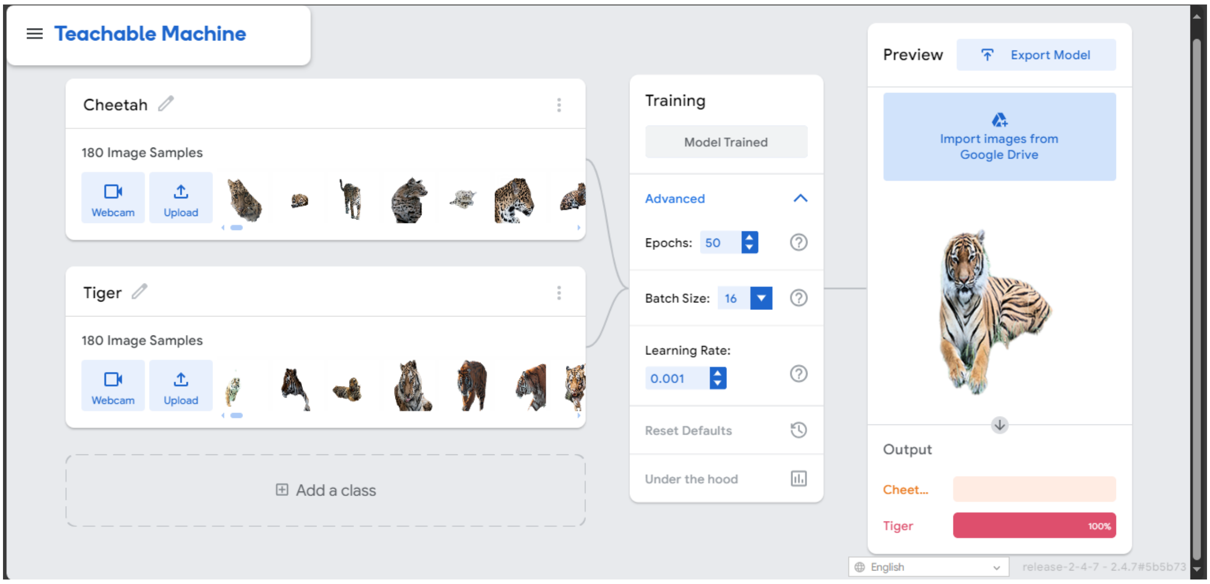


Cheetah

180 Image Samples

Tiger

180 Image Samples

Training

Model Trained

Advanced

Epochs: 50

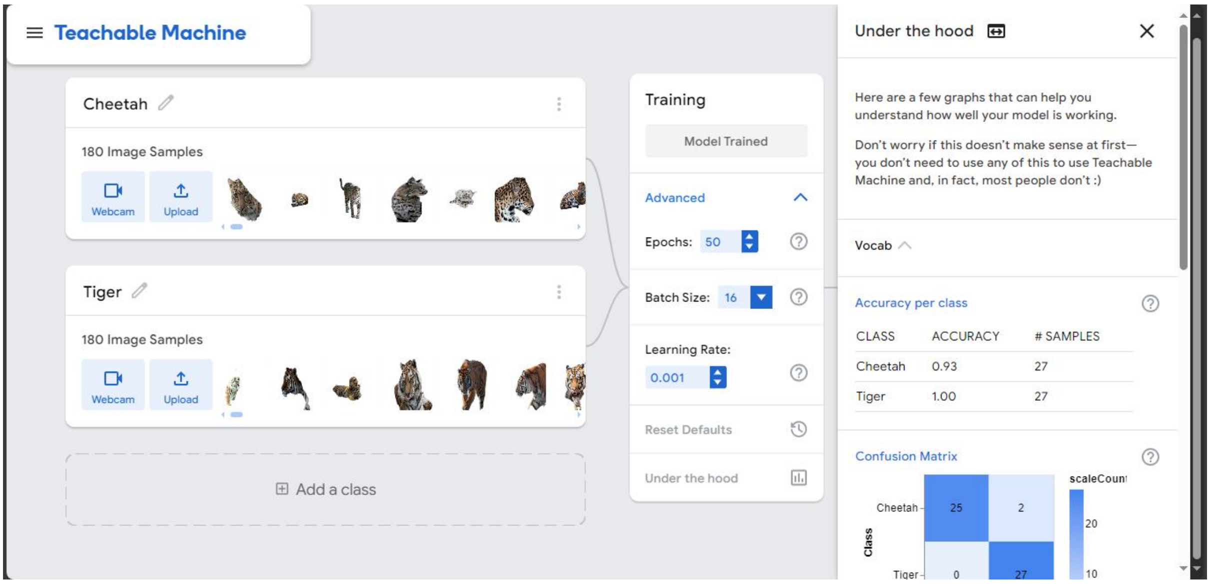
Batch Size: 16

Learning Rate: 0.001

Preview

Output

Cheet...	
Tiger	100%



Cheetah

180 Image Samples

Tiger

180 Image Samples

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Under the hood

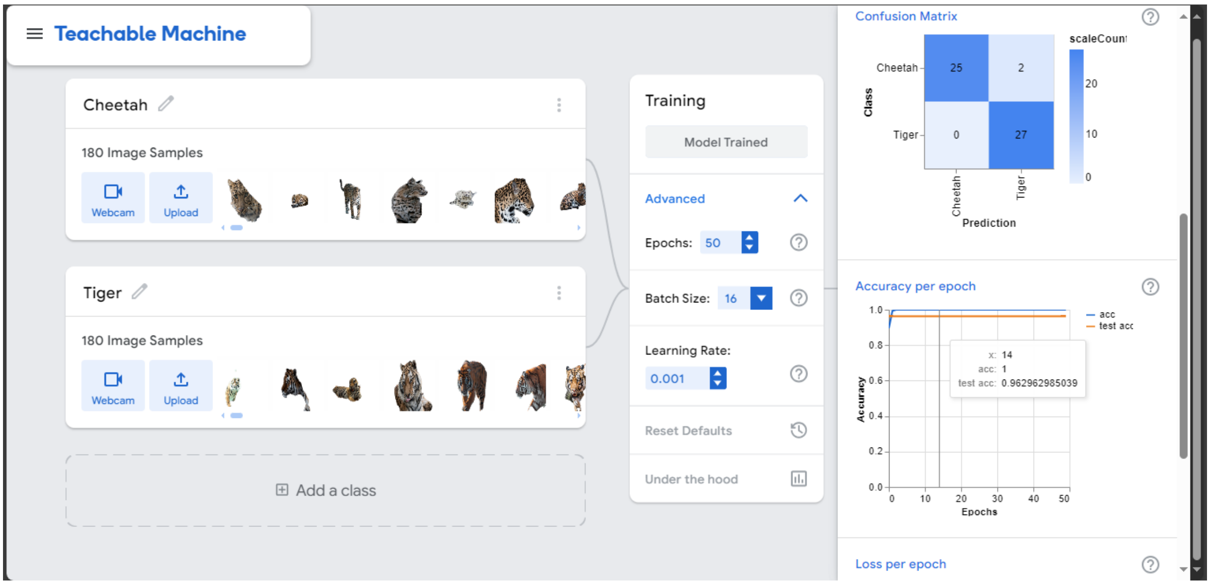
Here are a few graphs that can help you understand how well your model is working.

Don't worry if this doesn't make sense at first—you don't need to use any of this to use Teachable Machine and, in fact, most people don't :)

Vocab

Accuracy per class

CLASS	ACCURACY	# SAMPLES
Cheetah	0.93	27
Tiger	1.00	27



Cheetah

180 Image Samples

Tiger

180 Image Samples

Training

Model Trained

Advanced

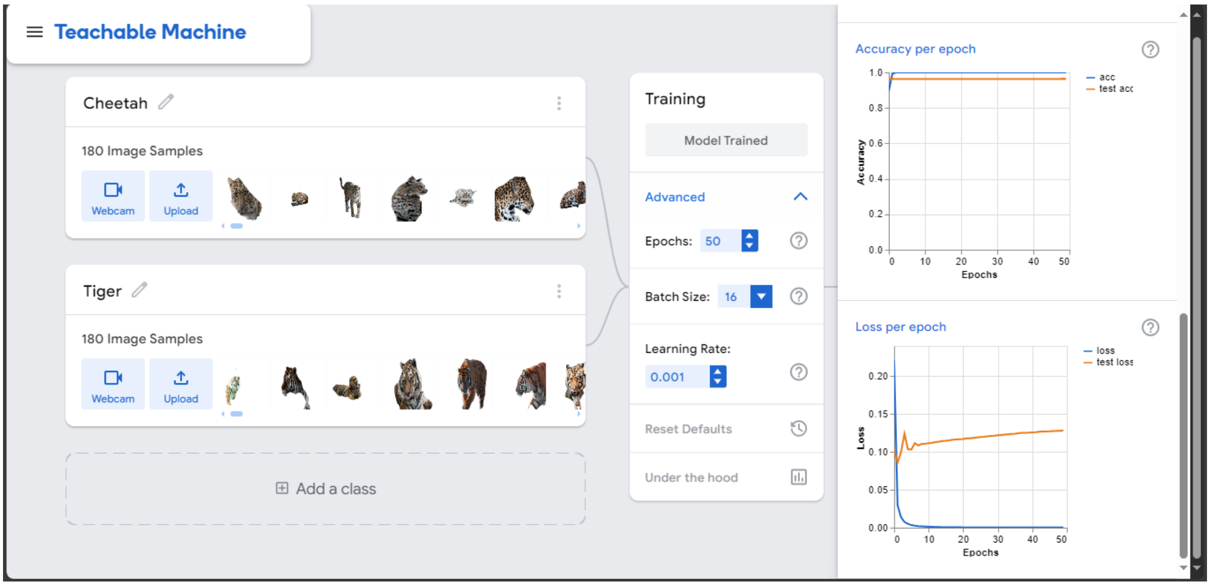
Epochs: 50

Batch Size: 16

Learning Rate: 0.001

	Cheetah	Tiger
Cheetah	25	2
Tiger	0	27

x: 14
acc: 1
test acc: 0.962962985039



Teachable Machine

Cheetah

180 Image Samples

Tiger

180 Image Samples

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10-10-2024

TEACHABLE MACHINE

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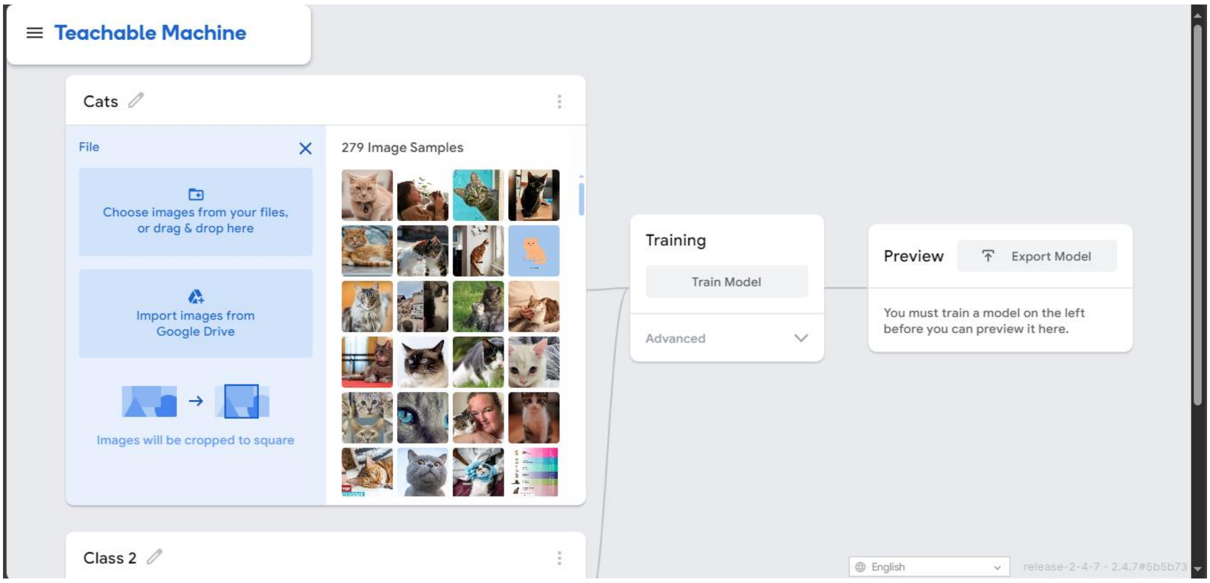
Teachable Machine
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release-2-4-7 - 2.4.7#5b5b73

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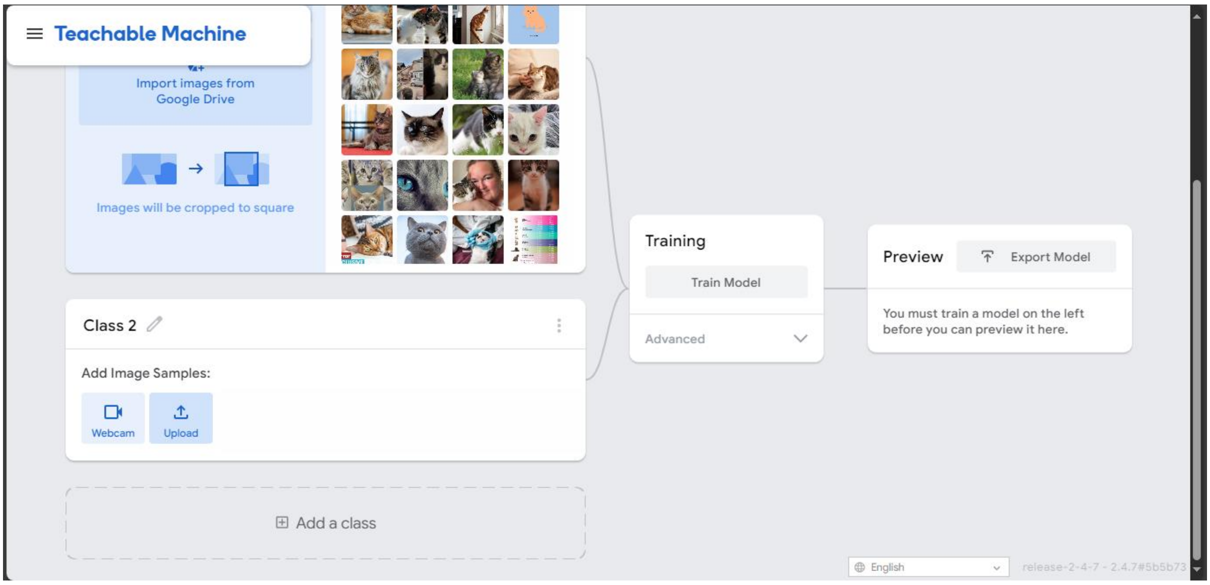

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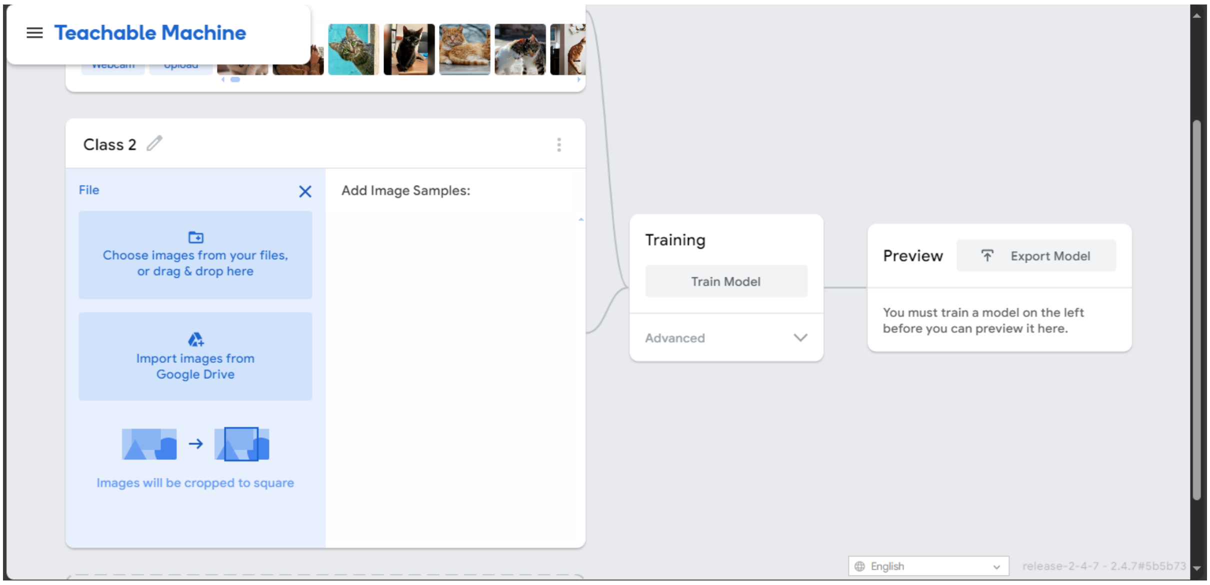

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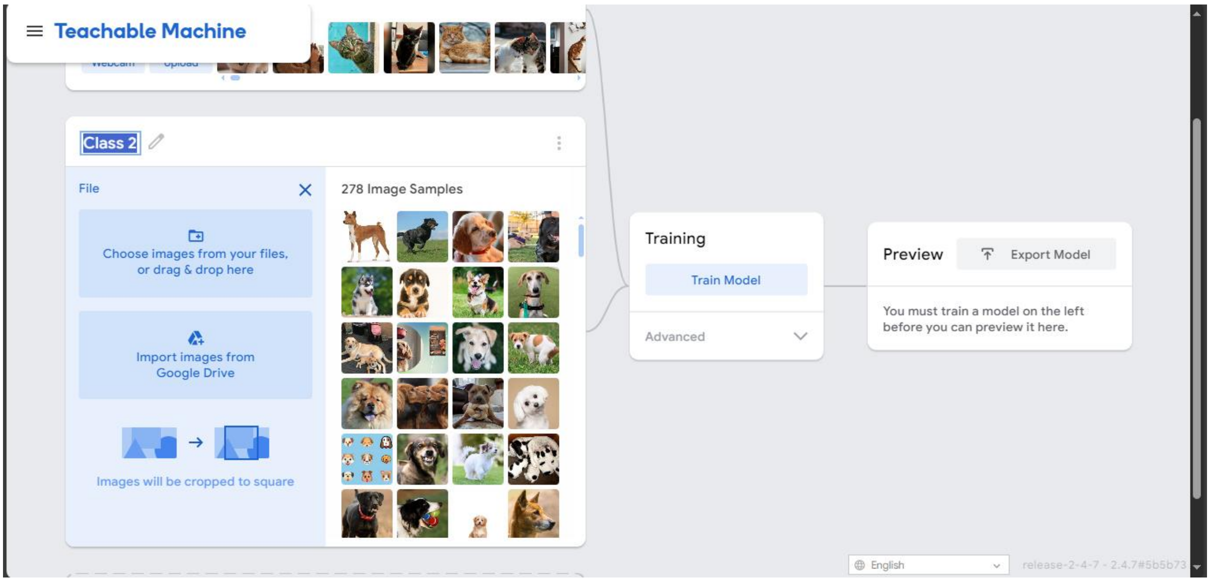

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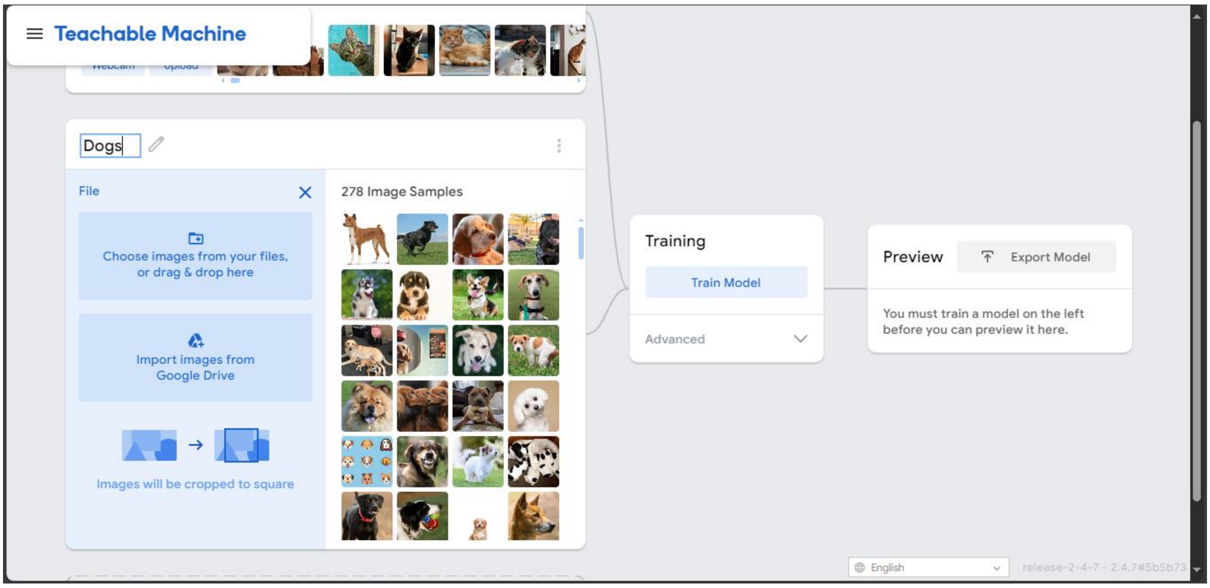

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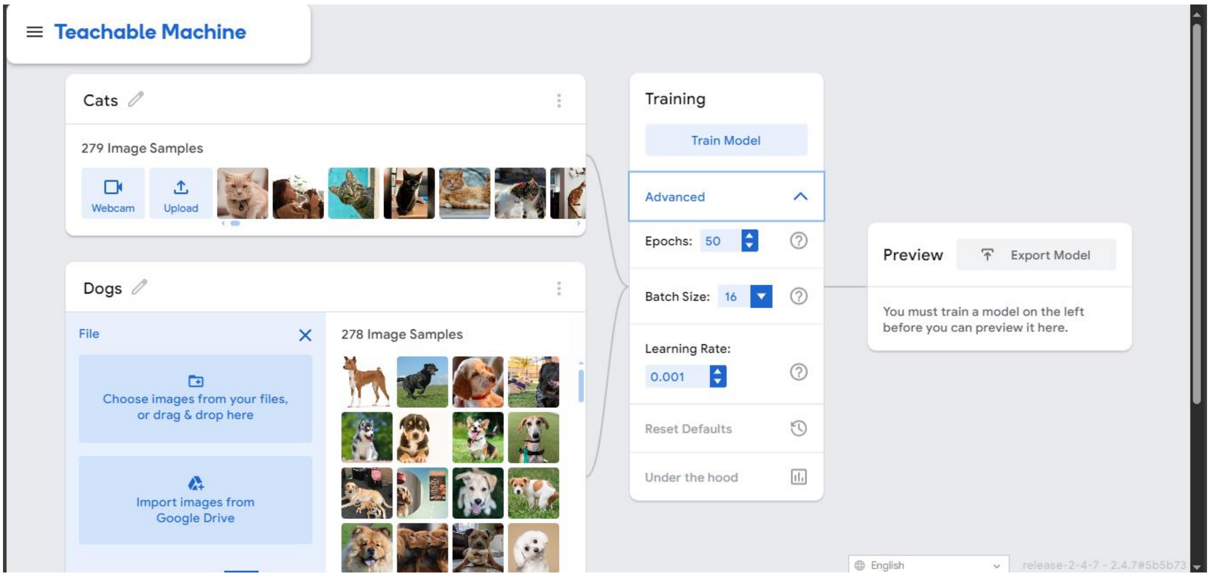

Teachable Machine

Cats

279 Image Samples

Webcam Upload

Dogs

File

Choose images from your files, or drag & drop here

Import images from Google Drive

278 Image Samples

Training

Train Model

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Reset Defaults

Under the hood

Preview

Export Model

You must train a model on the left before you can preview it here.

English

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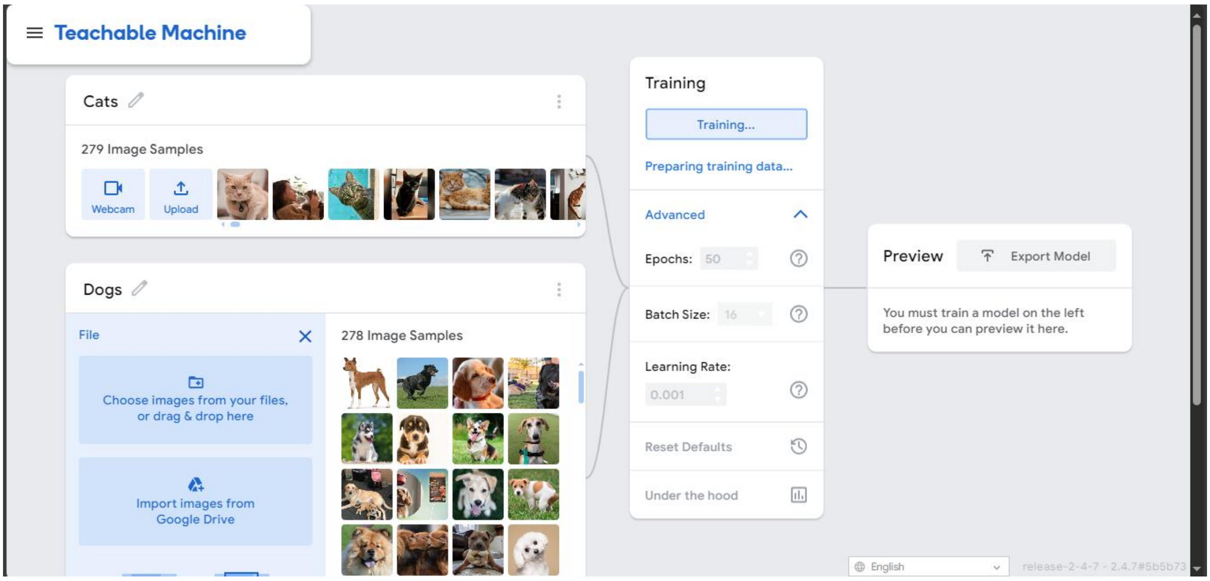

Teachable Machine

Cats

279 Image Samples

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Dogs

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Import images from Google Drive

278 Image Samples

Training

Training...

Preparing training data...

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Reset Defaults

Under the hood

Preview

Export Model

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English

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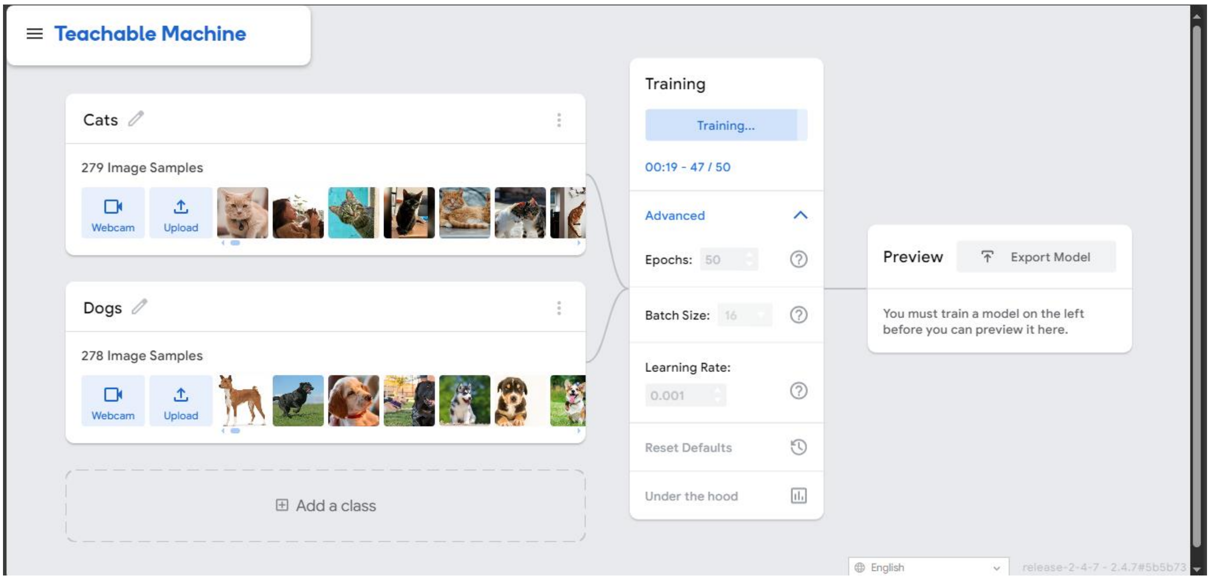

Teachable Machine

Cats

279 Image Samples

Webcam Upload

Dogs

278 Image Samples

Webcam Upload

Add a class

Training

Training...

00:19 - 47 / 50

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Reset Defaults

Under the hood

Preview

Export Model

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English

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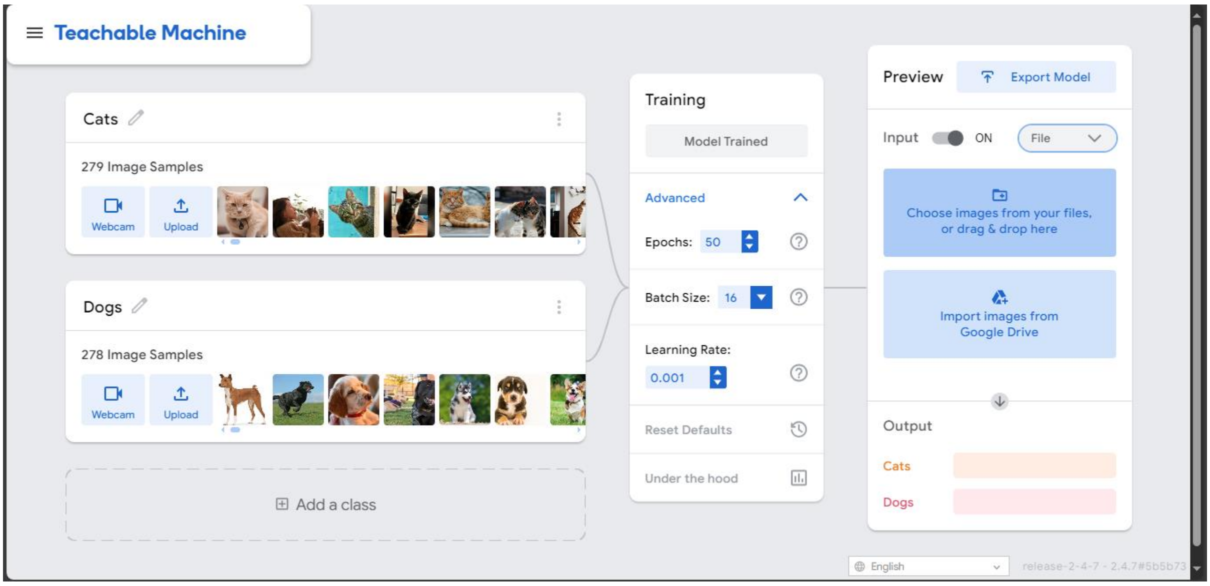

Teachable Machine

Cats

279 Image Samples

Dogs

278 Image Samples

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Preview

Input ON File

Output

Cats

Dogs

Webcam
Upload
Add a class
Reset Defaults
Under the hood
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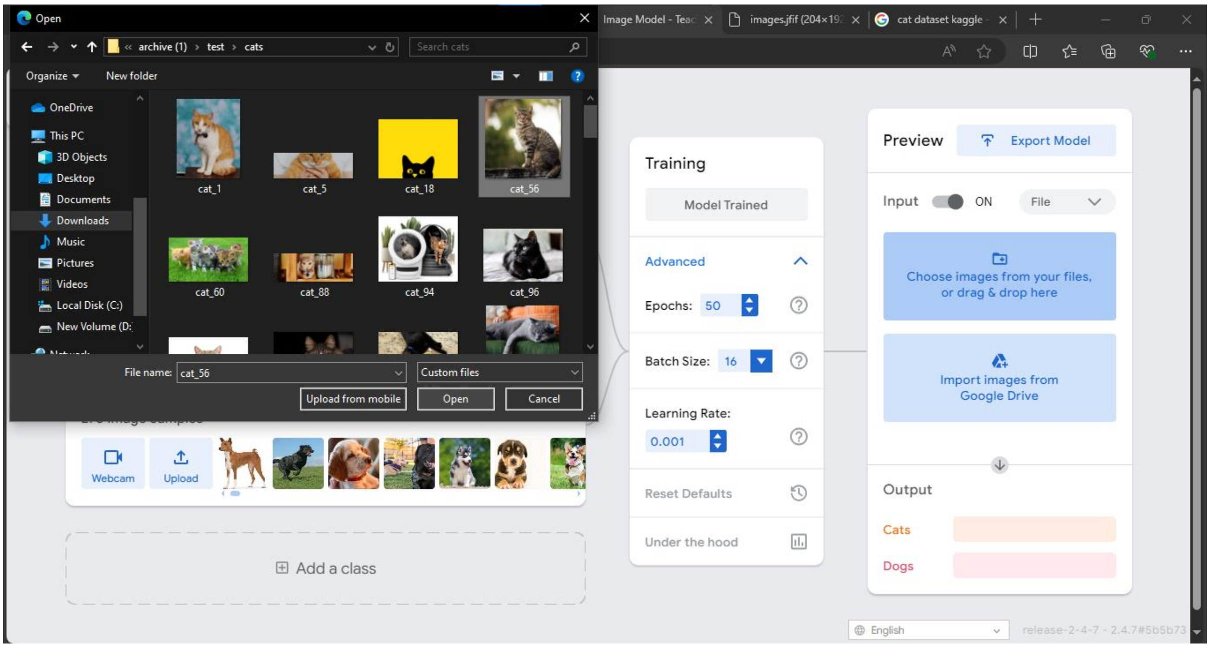

Open

« archive (1) › test › cats

File name: cat_56

Custom files

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Preview

Input ON File

Output

Cats

Dogs

Webcam
Upload
Add a class
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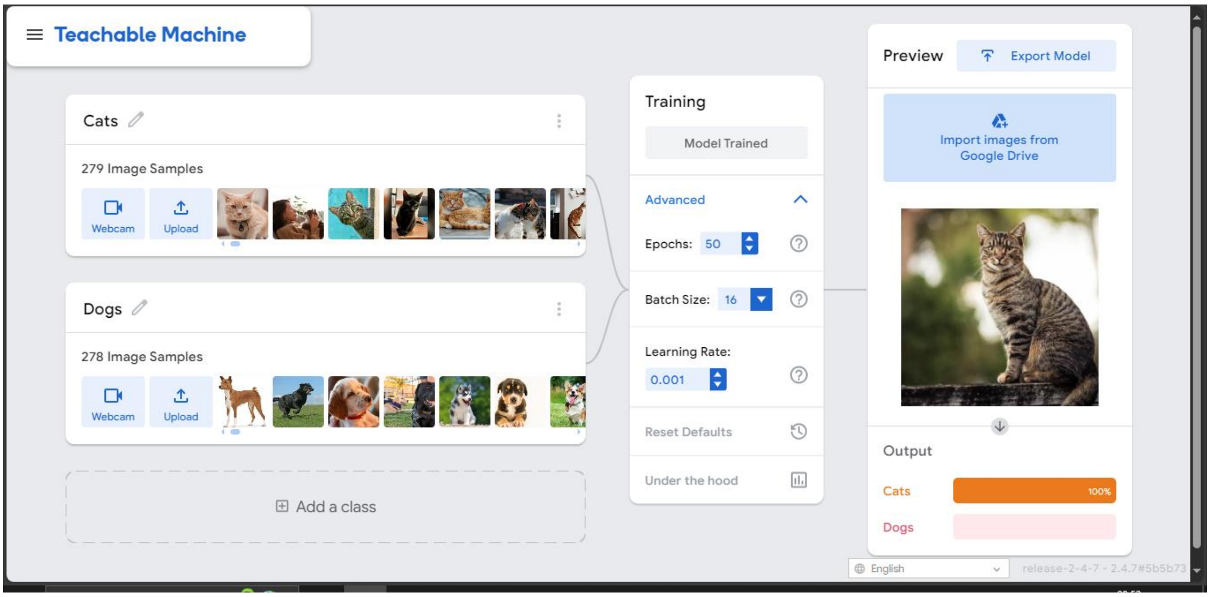


Teachable Machine

Cats

279 Image Samples

Dogs

278 Image Samples

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

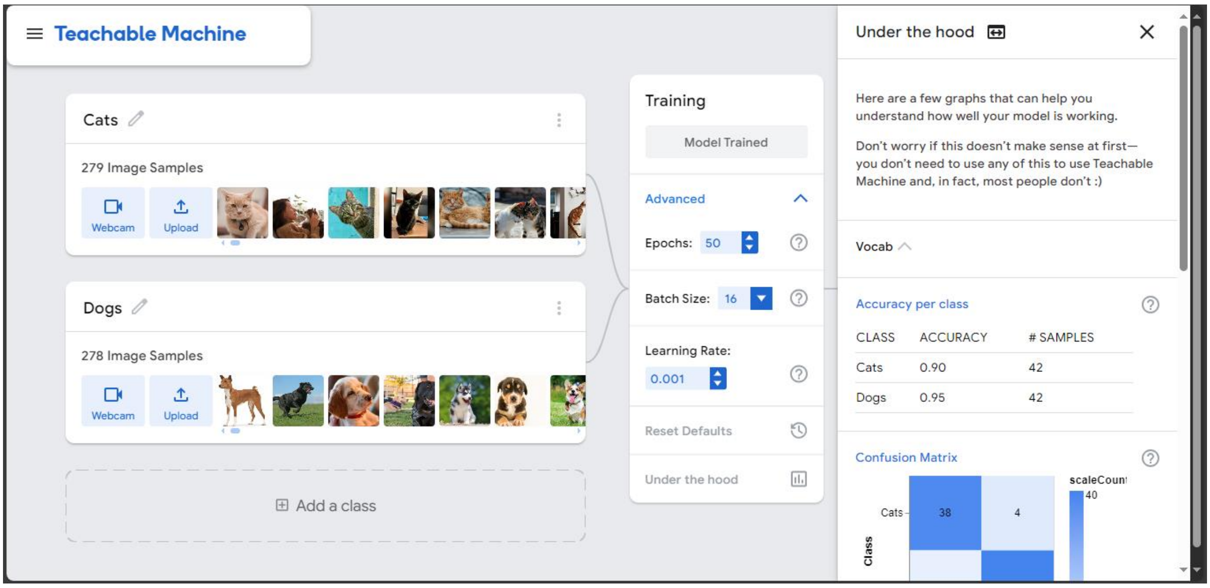
Learning Rate: 0.001

Preview

Output

Cats 100%

Dogs



Teachable Machine

Cats

279 Image Samples

Dogs

278 Image Samples

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Under the hood

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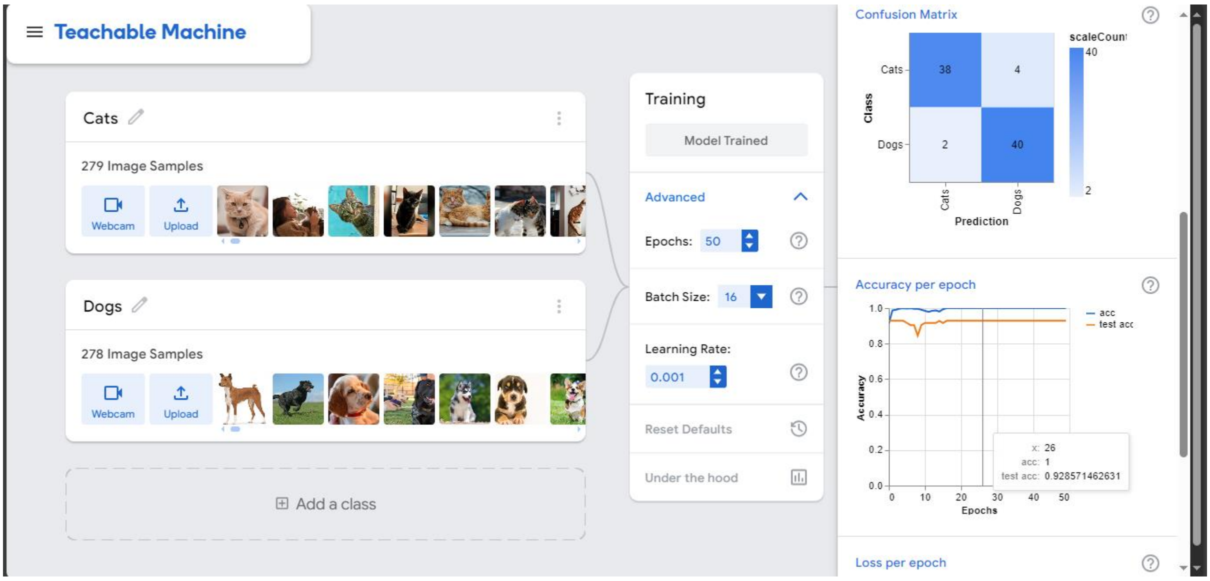
Vocab

Accuracy per class

CLASS	ACCURACY	# SAMPLES
Cats	0.90	42
Dogs	0.95	42

Confusion Matrix



Teachable Machine

Cats

279 Image Samples

Dogs

278 Image Samples

Training

Model Trained

Advanced

Epochs: 50

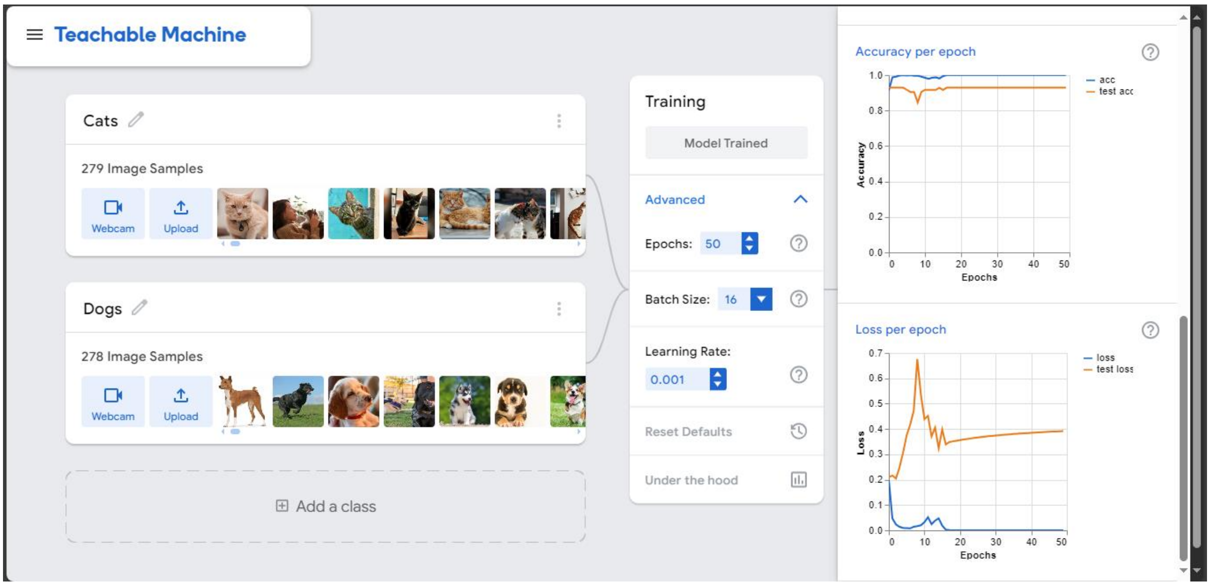
Batch Size: 16

Learning Rate: 0.001

Confusion Matrix

Accuracy per epoch

Loss per epoch



Teachable Machine

Cats

279 Image Samples

Dogs

278 Image Samples

Training

Model Trained

Advanced

Epochs: 50

Batch Size: 16

Learning Rate: 0.001

Accuracy per epoch

Loss per epoch

Haar Cascade Object detection for Eye and Face in Python using Open CV on Facial Image Data for atleast 5 images

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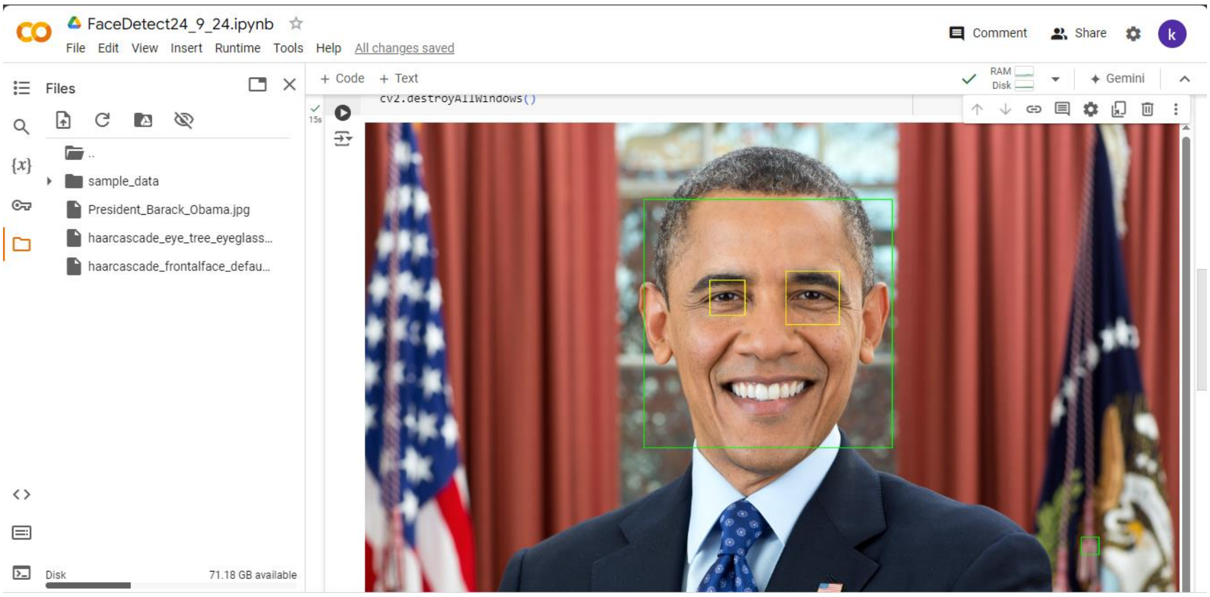

```
cv2.destroyAllWindows()
```

FaceDetect24_9_24.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
+ Code + Text
RAM Disk
Gemini
15s
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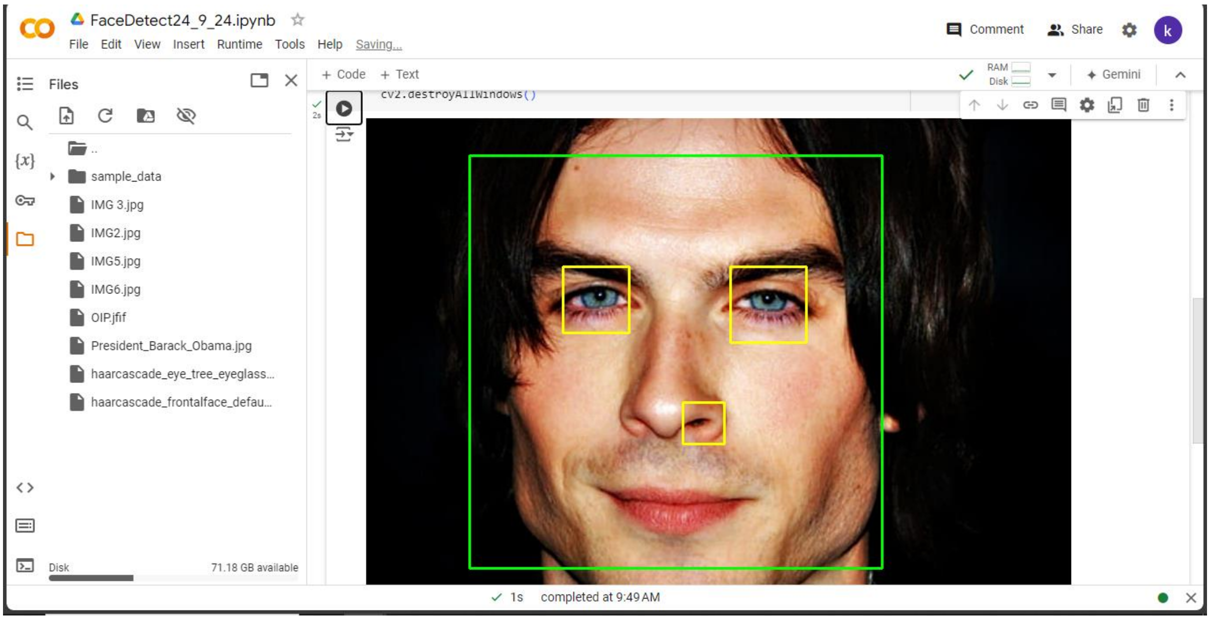
sample_data
President_Barack_Obama.jpg
haarcascade_eye_tree_eyeglass...
haarcascade_frontalface_defau...
Disk 71.18 GB available



```
cv2.destroyAllWindows()
```

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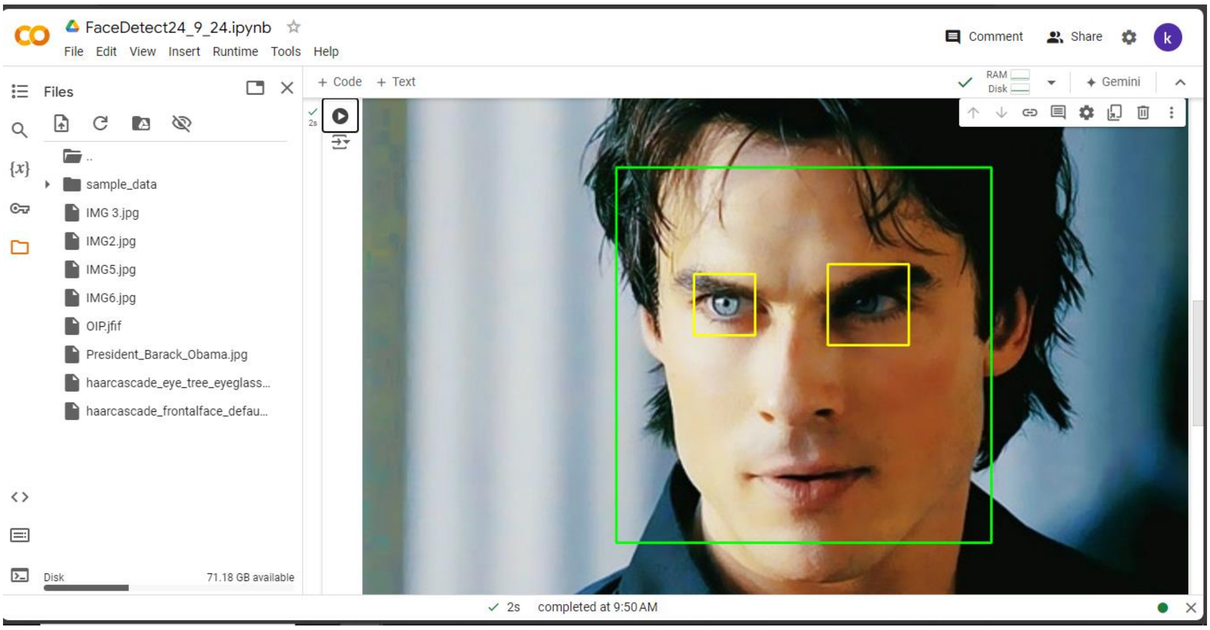

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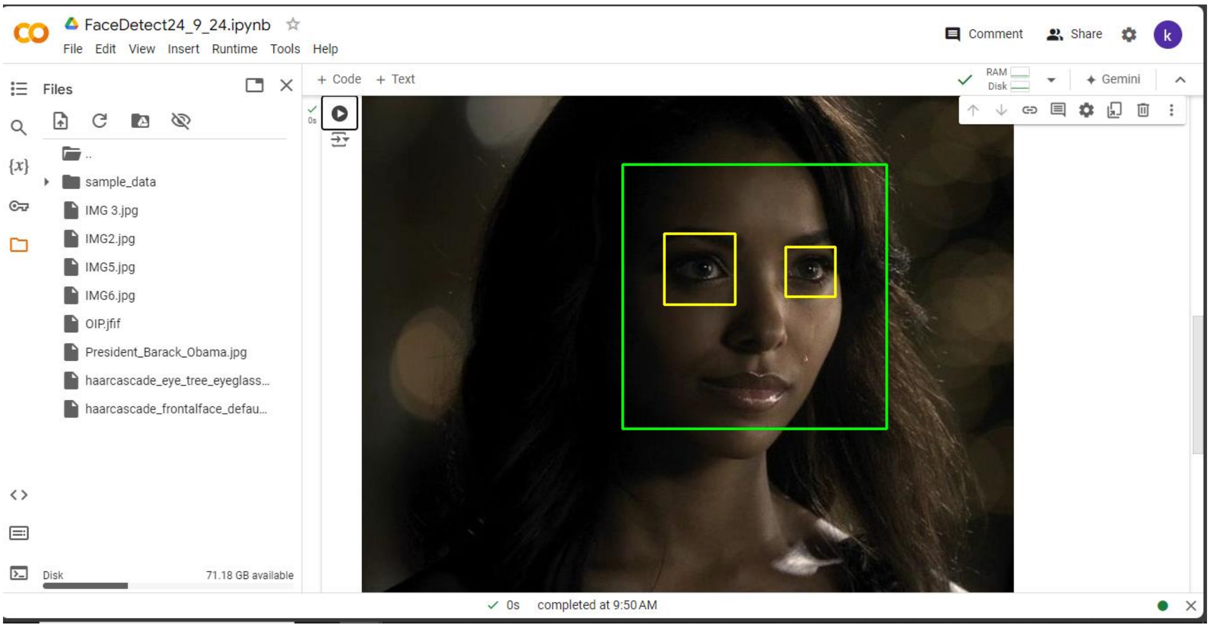
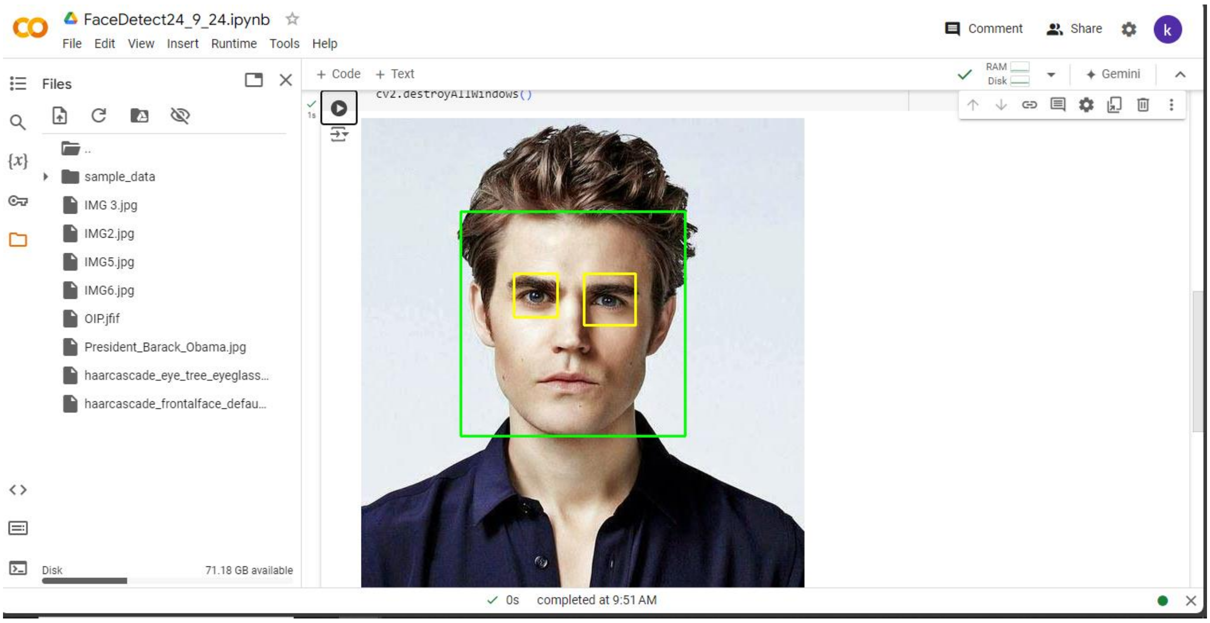


✓ 0s completed at 9:50 AM



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