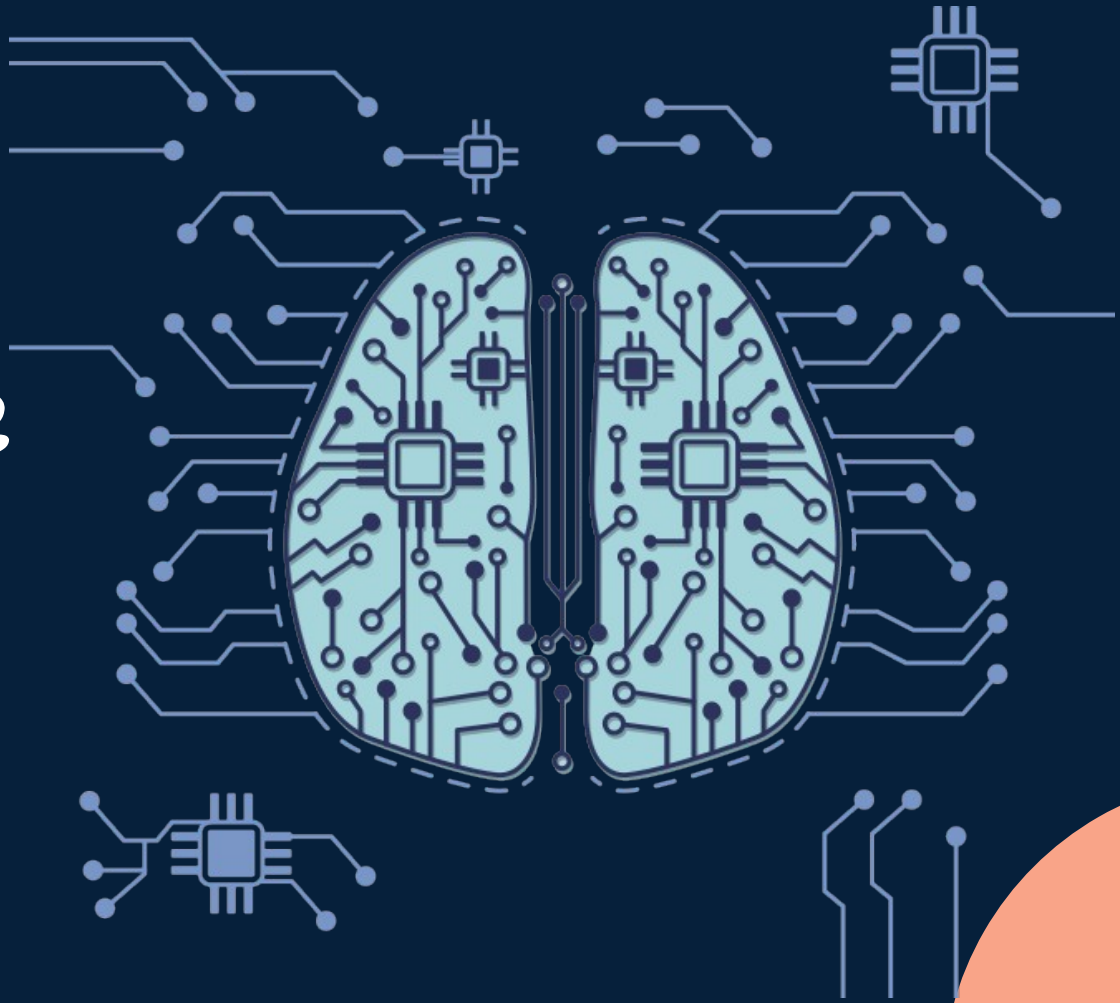
Teachable Machine



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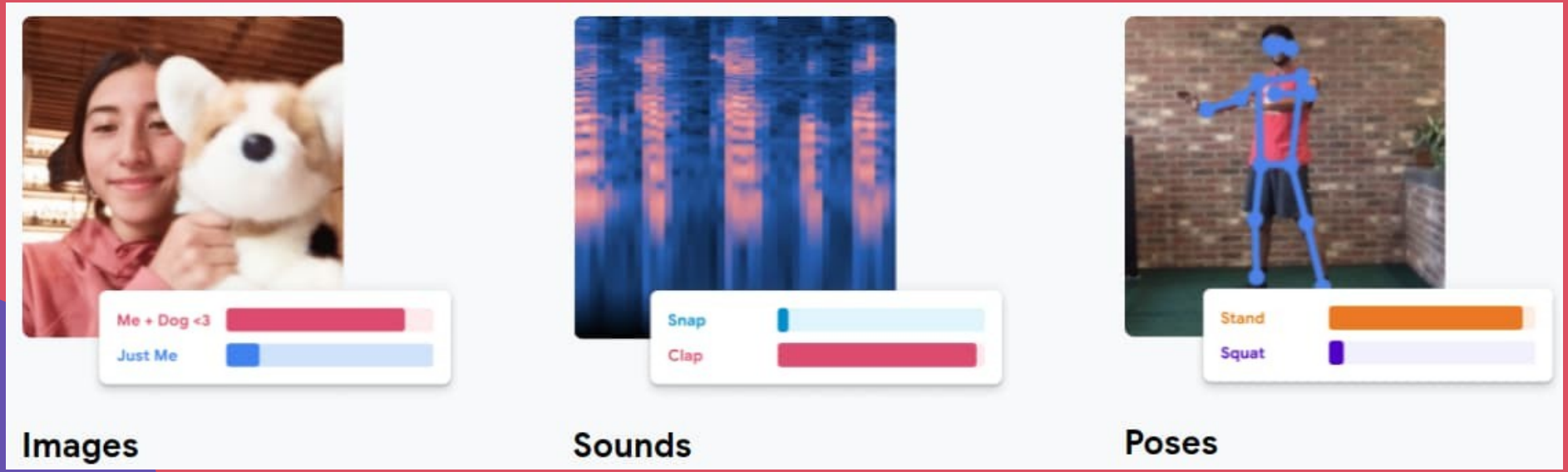
Teachable Machine

- Web-based tool to build machine learning models



Building Model?

Basically the training phase...

1) You provide Image / Sound / Pose

2) Tell the machine what each of these contains

3) Tool will train the model (...curve fit)

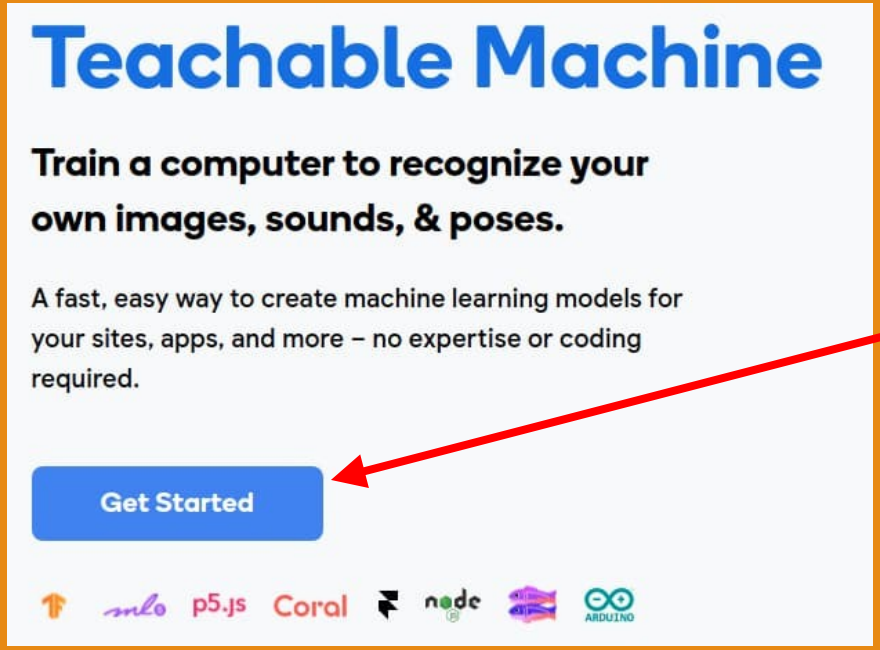
4) Tool provides a model file containing the training results

Transfer Learning

- Instead of learning from zero, Teachable Machine uses “Transfer Learning”
- The model is already trained on many images / sound / pose before you start
- What it learned before helps it to learn the data you provide faster
- Think of it like this...
  - Person that is trained to recognize different models of cars can apply some of his skills when learning to recognize trucks

Teachable Machine

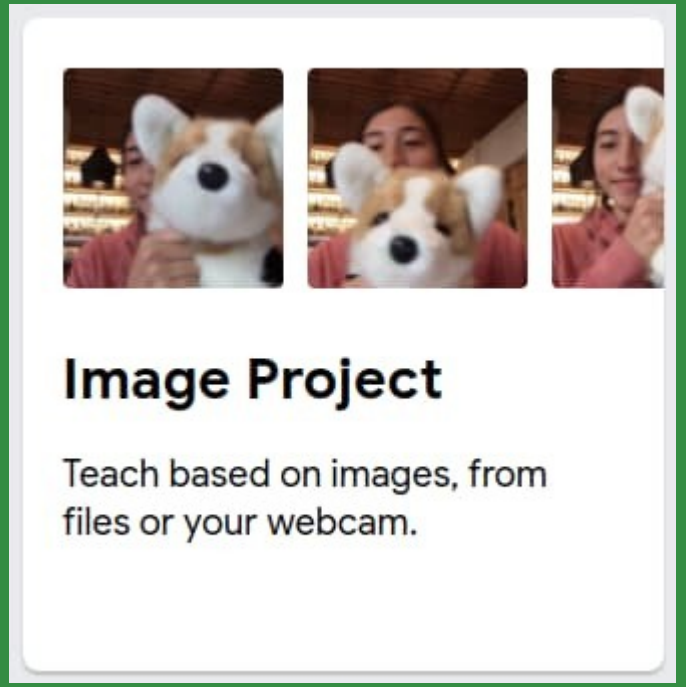
- Open https://teachablemachine.withgoogle.com



Click “Get Started”

Teachable Machine

- We’ll start with an image project



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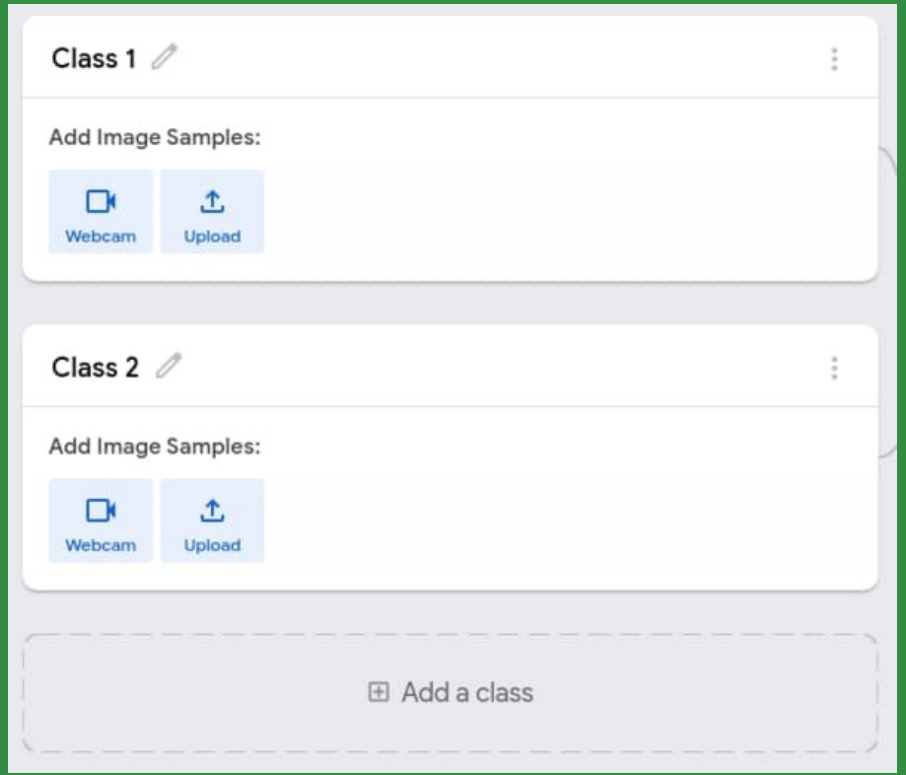
- Use a “Standard image model”
- Embedded model is smaller, making it better suited to run on a micro-controller, but is less accurate

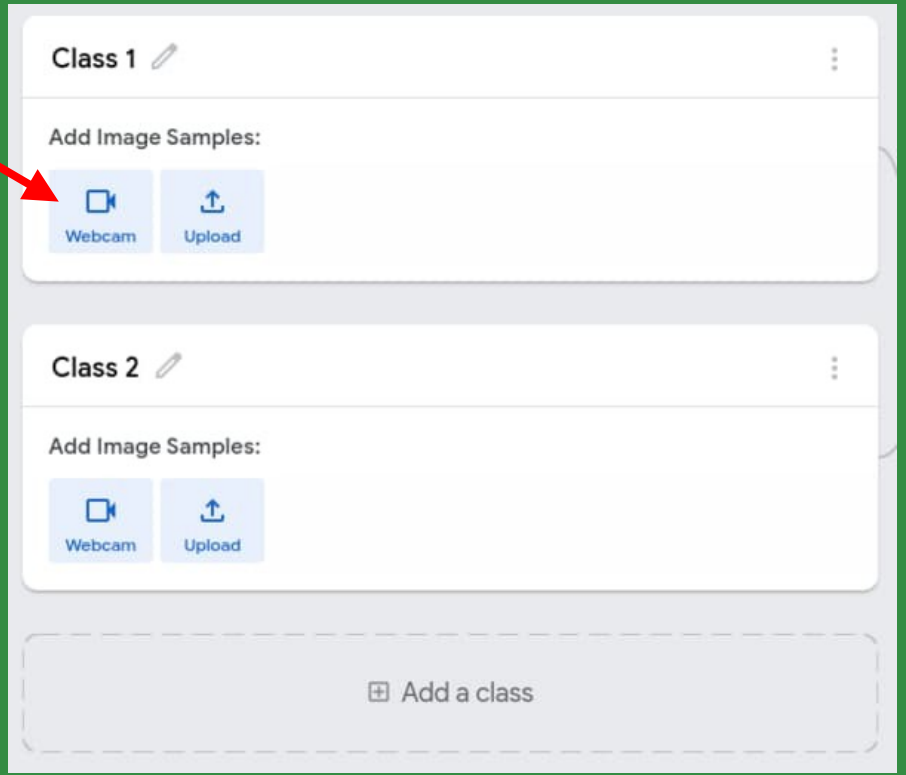
Teachable Machine

- Name the two classes (eg. Pirate and Ninja)
- Add more classes if needed (eg. Pirate, Ninja, Vikings)



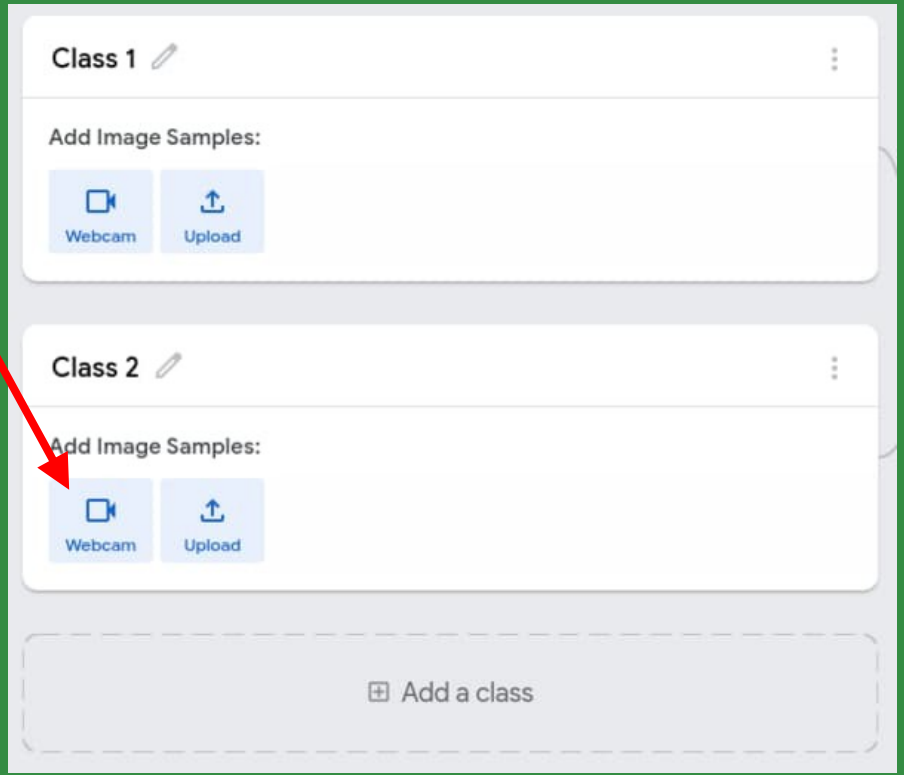
Teachable Machine

- Open the Webcam
- Place the object for your first class in view, then click or hold the “Record” button



Teachable Machine

- Repeat for the other classes



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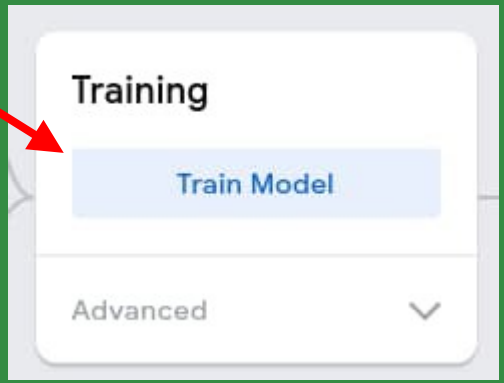
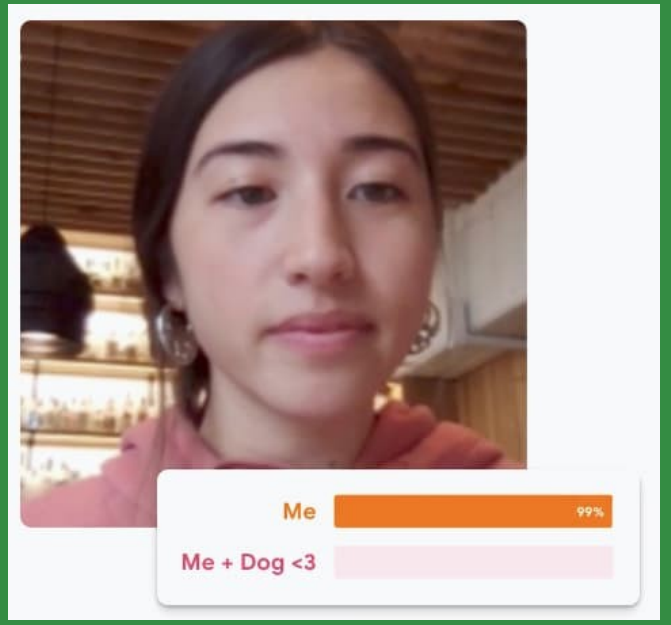
- Train the model
- This may take a while to complete



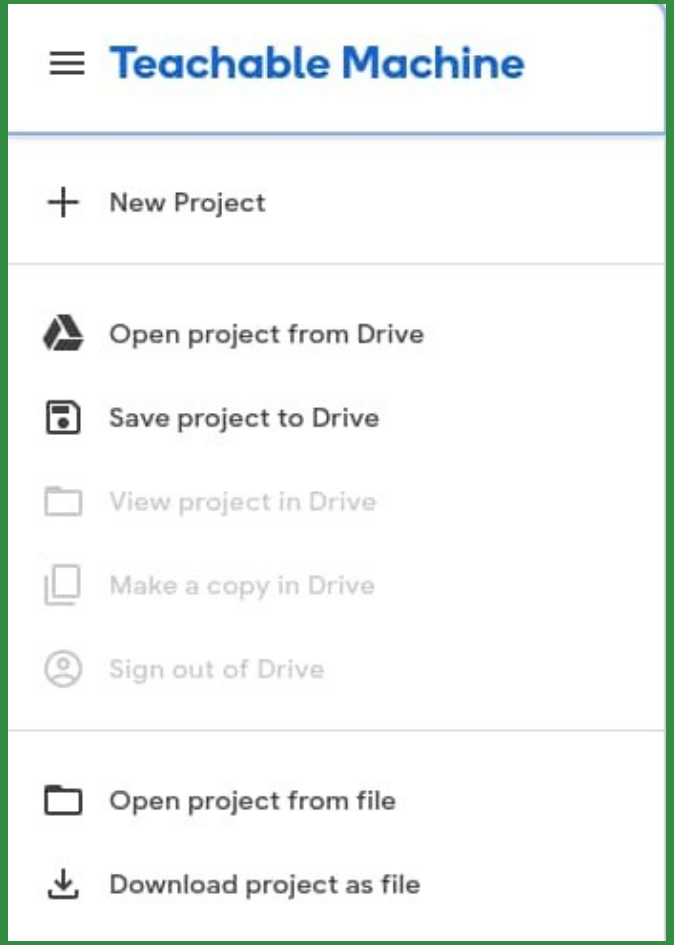
Teachable Machine

- Test the model in the preview
- Make sure it works well



Teachable Machine

- Save your project
  - To Google drive...
  - ...or download to your computer



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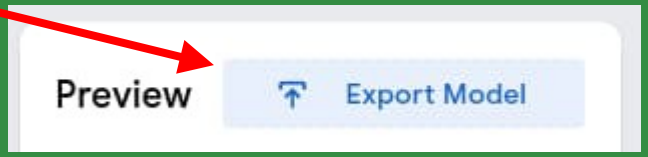
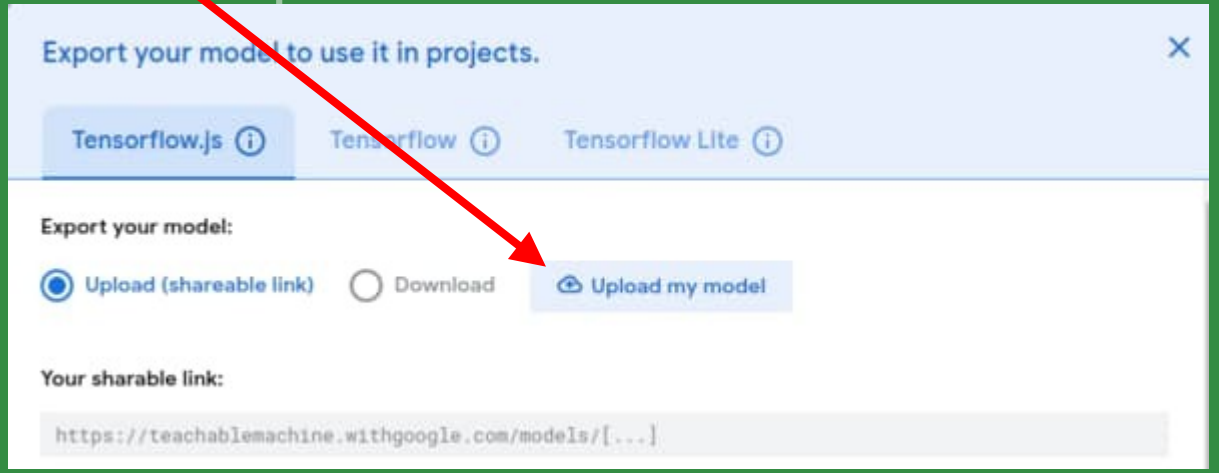
- Export your model...
- ...and upload it to a shareable link
- Copy the link





Tips

1) Have a “Nothing” class

- eg. To differentiate between a cat and a dog, you might want to have 3 classes “Cat”, “Dog”, “Nothing”

2) Capture many images, making slight changes in the position, distance, and rotation each time

- This teaches the model to recognize the object in any orientation

Tips

3) Increase the “Epochs” setting

- Click on “Advanced” under “Training”. This may make the training slower

4) Capture all sides

- Unlike a human, the AI cannot infer what the other sides of a 3D object looks like.

Tips

5) Choose your objects wisely...

- Some objects are easier to differentiate than others

Easy

Difficult

Tips

6) Capture in different backgrounds...

- Capturing images with different backgrounds teaches the AI that the background isn’t important

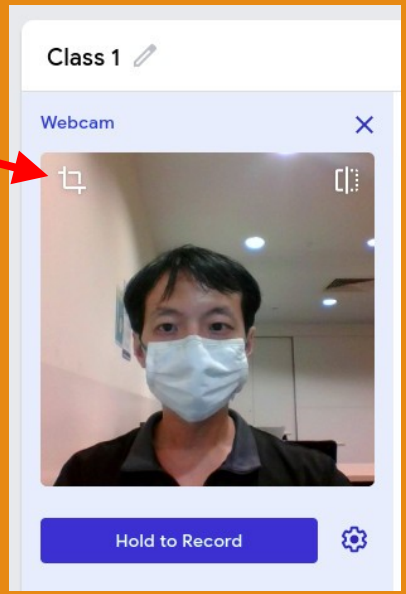
7) ...or fix the background

- To prevent background objects from interfering, you can position your camera so that there is nothing in the background

Tips

8) Crop the image

- Useful when the item of interest takes up only a small part of the camera view
- May need to use together with a low threshold



What to do with the Model?

- Can be loaded in any programs using Tensorflow (...the ML library)
- Can be in Python, Javascript, etc
- Also usable in https://stretch3.github.io with TM2Scratch or TMPose2Scratch extensions

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