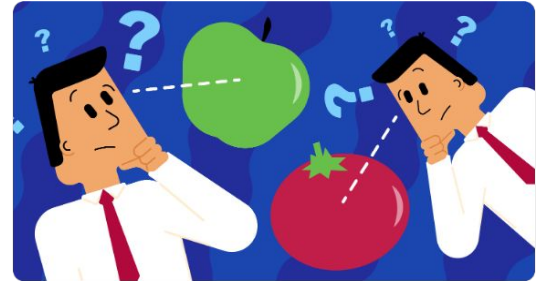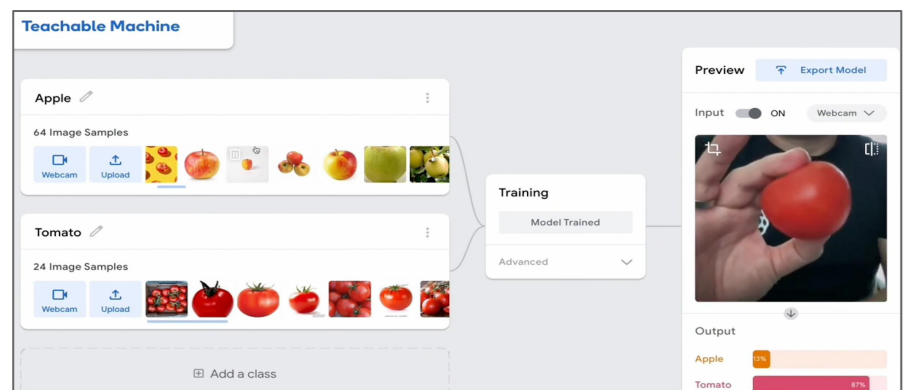# Apple vs tomato

Introduction

In this project, you will learn how to train a machine learning model to detect if you are holding an apple or a tomato, then improve it by including more diverse training data

What you will make

Train a machine learning model to detect if you are holding an apple or a tomato. Then, improve the classifier by using more diverse training data.

What you will need

- A computer with webcam
- A green apple, a red apple, a red tomato
- You will need to download and save files to your computer

Where are my images stored?

- This project uses a technology called 'machine learning'. Machine learning systems are trained using a large amount of data.
- This project does not require you to create an account or log in. For this project, the image examples you use to make the model are only stored temporarily in your browser (only on your machine).
- No images from your webcam are sent to this website or any other website.

Download the project videos!

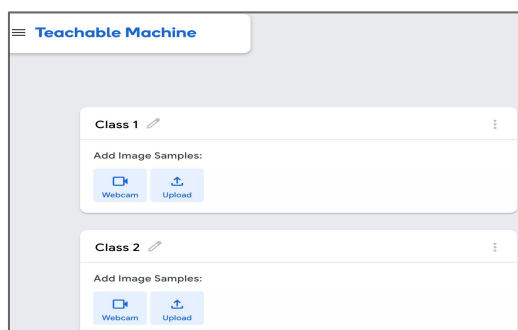You can download all the videos for this project (https://rpf.io/p/en/apple-vs-tomato-go).

1. Create a model

Step 1:
Open Teachable Machine **(https://rpf.io/tm)**.

Step 2:
Rename **Class 1** to **Apple**.
Rename **Class 2** to **Tomato**.

Step 3:
Download sample images

Step 4:
Unzip the downloaded folder.

- Download the folder containing the images of Green Apples and Red Tomatoes (https://rpf.io/tams).

- The folder will download as a zip file.

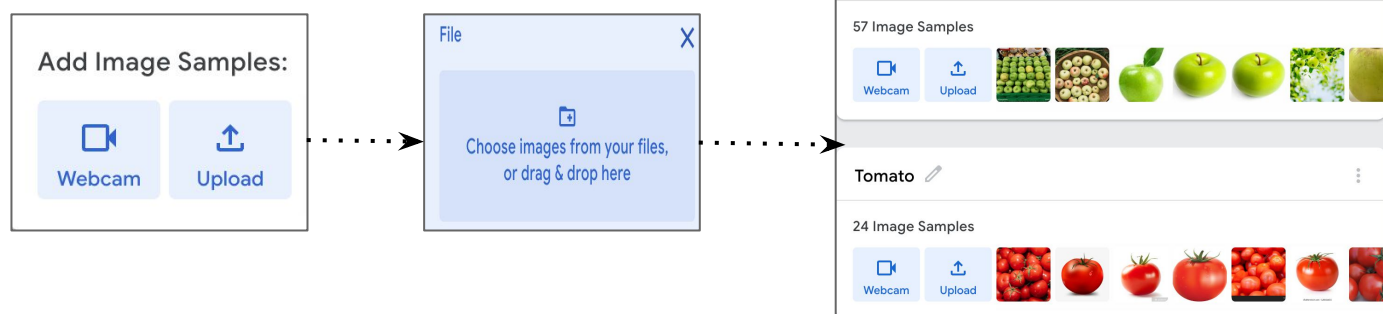| **How to unzip**	**For Chrome OS**
For Microsoft Windows	• Open Files. • Double-click on the zip file. • On the left, you will find the zip file. • Drag and drop the files/folders into a new folder of your choice.
• Open your 'Downloads' folder. • Right-click on the zip file and select Extract All.	
For macOS	For Linux
• Open your 'Downloads' folder. Double click on the zip file. • A new folder will be created that contains the de-compressed files/folders	• Open your 'Downloads' folder. • Right-click on the zip file and select Extract Here.

Step 4:
Add sample images to the model
- To add image, click on "upload"
- Then choose your location from where you want to upload the images
- Upload the green apple images to the 'Apple' class.
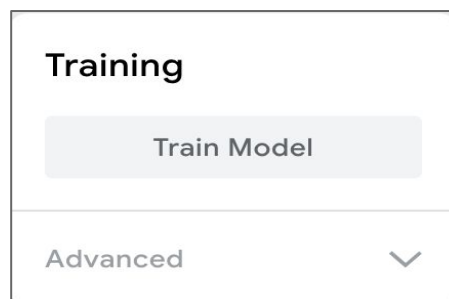- Upload the red tomato images to the 'Tomato' class.

2. Train and test
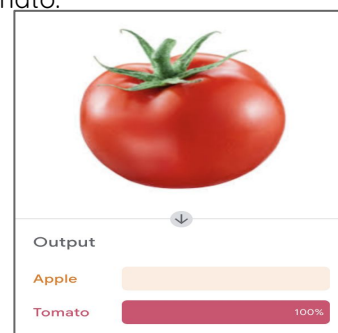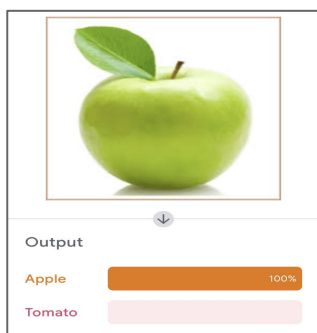
Step 1:
Click on **Train Model**.

Note: Be patient! It can take 10 to 20 seconds to complete.

Training

| Train Model |

Advanced ⌄

Step 2:
Test the Model

- Hold up your green apple to your webcam.
- The model should produce a prediction with a high confidence score that it is an apple.

- Hold up your red tomato to your webcam.
- The model should produce a prediction with a high confidence score that it is a tomato.

Output
Apple   100%
Tomato

Output
Apple
Tomato   100%

3. A different apple
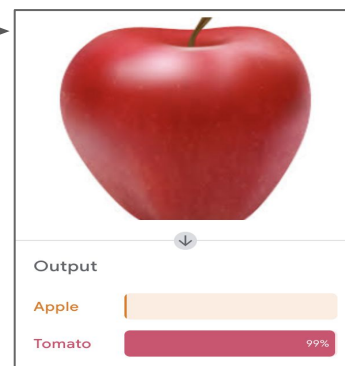
Use a different apple

Step 1:
Hold up your red apple to your webcam to test the model.

Step 2:
The model should not produce a prediction with a high confidence score that it is an apple.

Step 3:
It will probably produce a prediction that it is a tomato!

Output
Apple
Tomato   99%

4. Improve the Model

The training data is biased, as it only includes green apples.
To reduce the bias, you need to add extra examples of apples to the 'Apple' class.

Step 1:
Download a folder of more images of apples (https://drive.google.com/drive/folders/1OIuoG7go72c7QririlpukJ4tW-arrtfA).

Step 2:
Unzip the folder.

Step 3:
In the 'Apple' class, add some samples of images from one of the folders you have just downloaded.

Choose images that look most like your red apple.
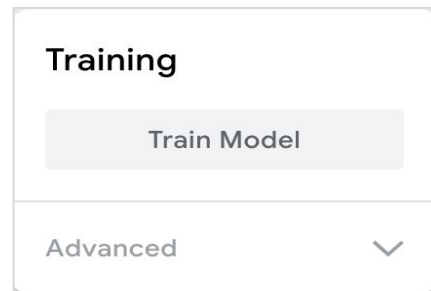
Step 4:

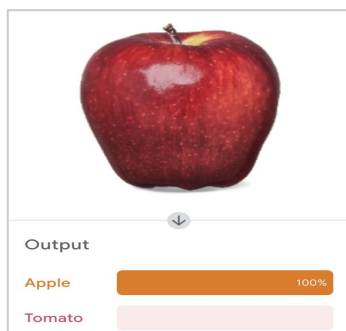**Train the model again**

Click on train model

Training

Train Model

Advanced ⌄

Step 5:
Hold up your red apple to your webcam to test the model again.
The model should produce a prediction with a higher confidence score that it is an apple.

Output
Apple   100%
Tomato

Step 6:
Hold up your tomato to your webcam.

The model might produce a prediction with a lower confidence score that it is a tomato.

Apple ✏

101 Image Samples

📷 Webcam   ⬆ Upload