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Artificial Intelligence

Project 1: ATL Component Identifier

The ATL Lab in your school has a wide variety of tools and components related to electronics, Internet of Things (IoT), robotics, prototyping, mechanical and electrical. The Lab also has many DIY kits and other accessories that can help you with tinkering and building new projects. It has been observed that many students visiting the ATL Lab find it very challenging to identify and remember the names of the tools and components in the lab. This is all the more challenging for the students who are new to your class and are visiting the lab for the very first time. Wouldn't it be better if there was an easier way to support the students in identifying and learning the different components in the lab?

You can solve this problem for your schoolmates by creating an AI model that will identify and provide the names of the ATL components in the ATL Lab. In this project, you will learn to build an AI model to solve this problem.

Let's get started!

Prerequisite

Ensure that you have gone through all the videos of the Artificial Intelligence course on the Planetcode.in portal. These videos will help you to learn about the important terms and concepts and also equip you with the tools needed for this project. If you have already completed watching all the videos, well done! You are all set to begin the project.

If you have not completed the videos, please go to the "Emerging Technologies" course on the platform <https://planetcode.in/> and complete them before you proceed further.

1. Platforms / Tools Needed

Google Teachable Machine: <https://teachablemachine.withgoogle.com/>

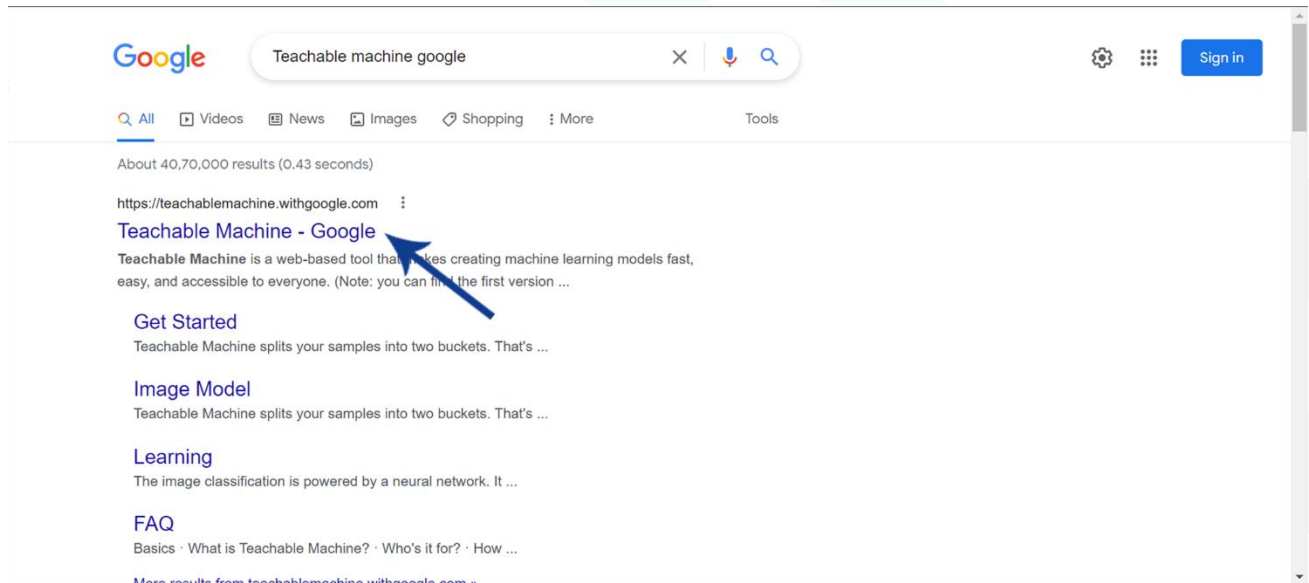
2. Major Steps to be performed in the Project

- a) Categorize different images of electronic components into different classes.
- b) Train the AI model to identify different electronics components.
- c) Test the AI model.

STEP by STEP Instructions

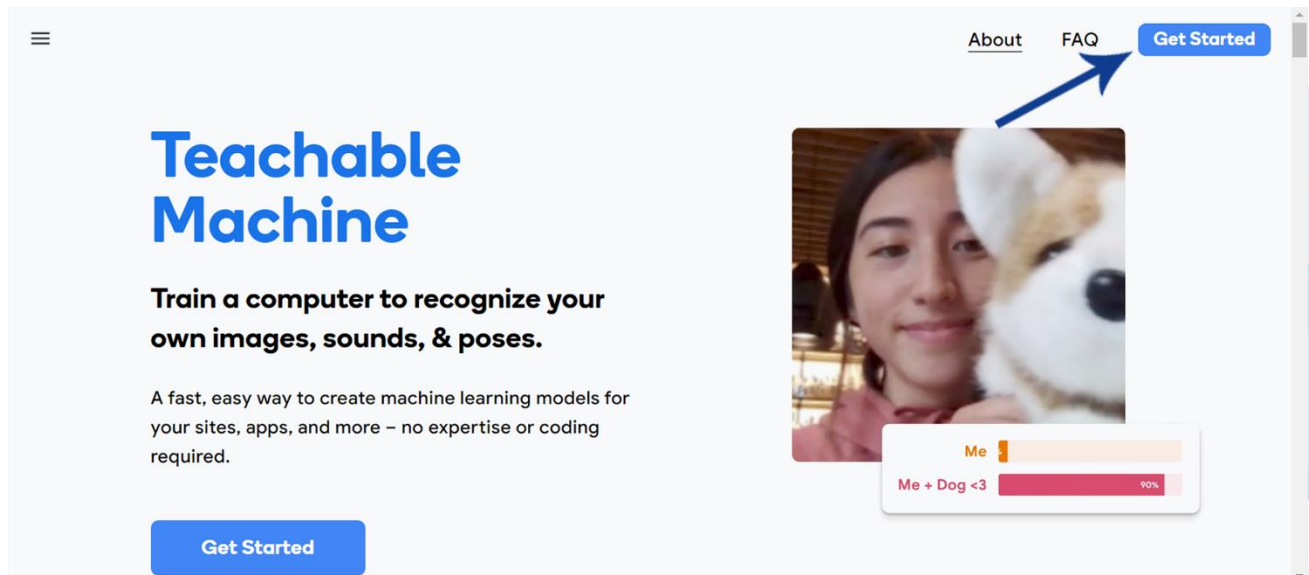
Step 1

Search for “Teachable machine google” on your web browser or in the search engine. Then, Click on **teachablemachine.withgoogle**



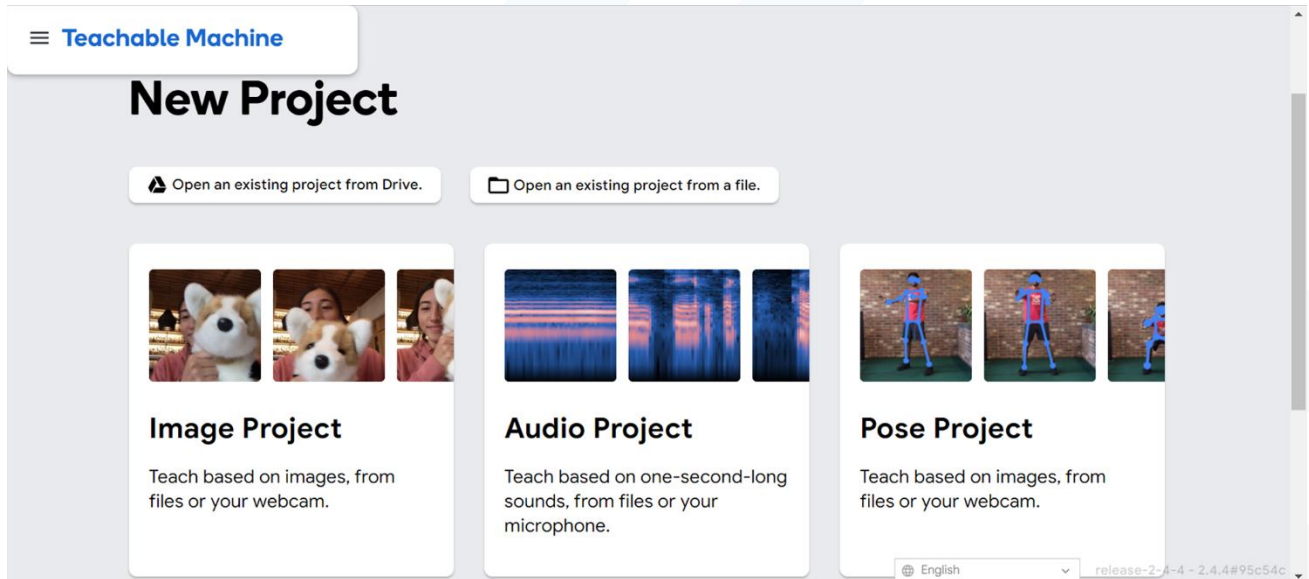
Step 2

On the Google Teachable Machine website, click on the ‘**Get Started**’ button on the top right corner of the screen.



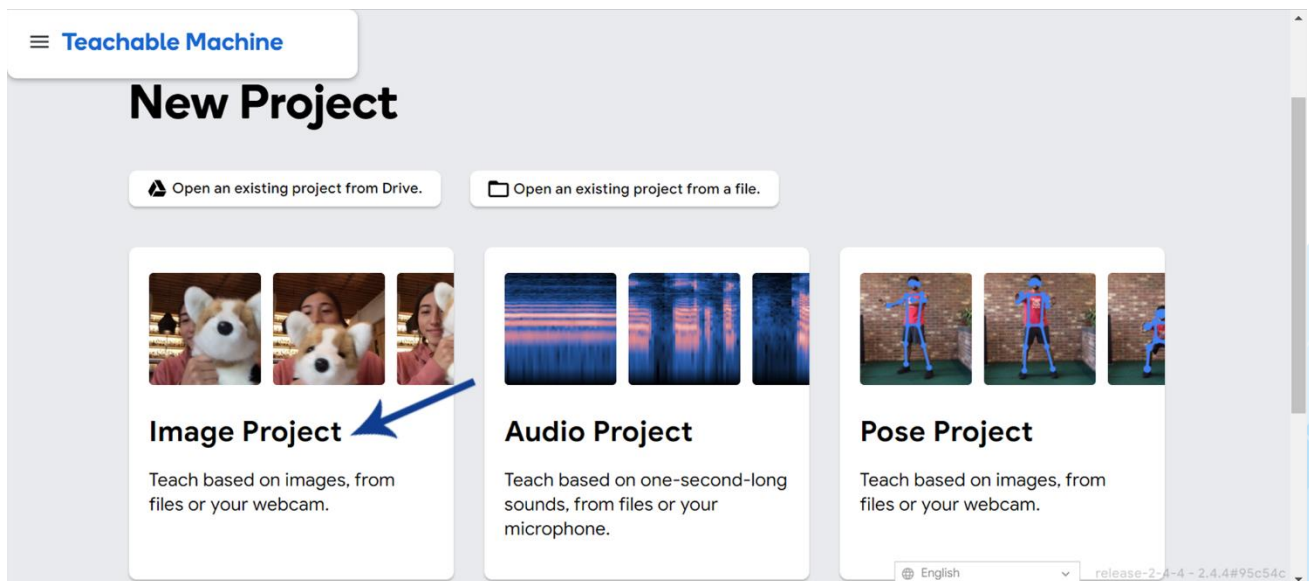
Step 3

You will see 3 projects being displayed - Image project, Audio project & Pose project.



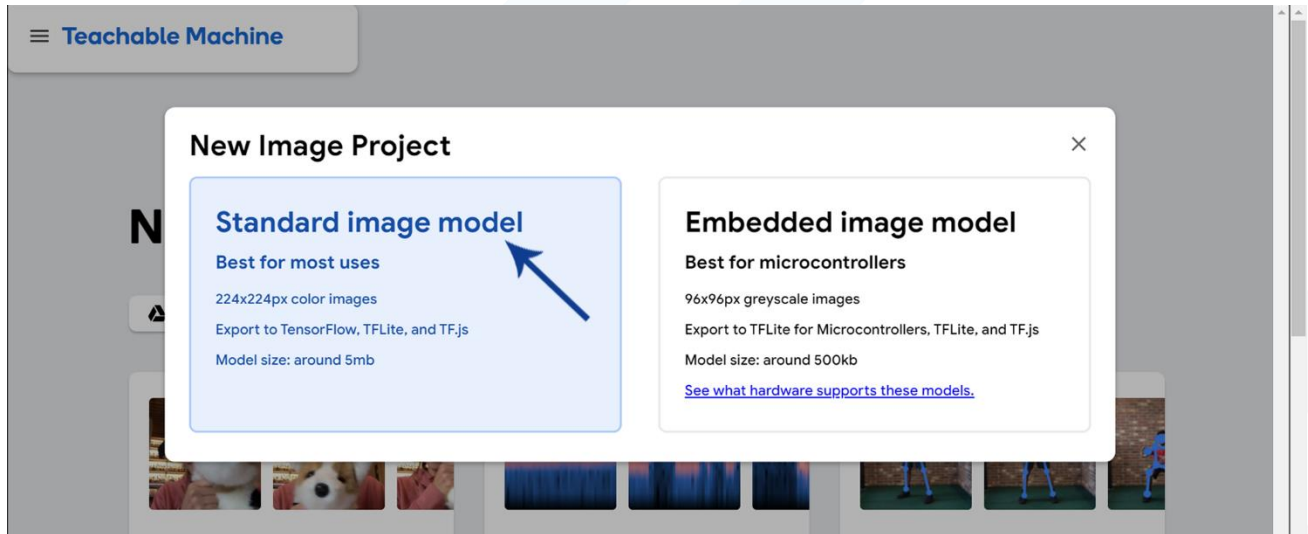
Step 4

Click on “**Image Project**” as we need to create an AI model for image recognition.



Step 5

Click on **Standard image model** as we will be using varied images of ATL components.



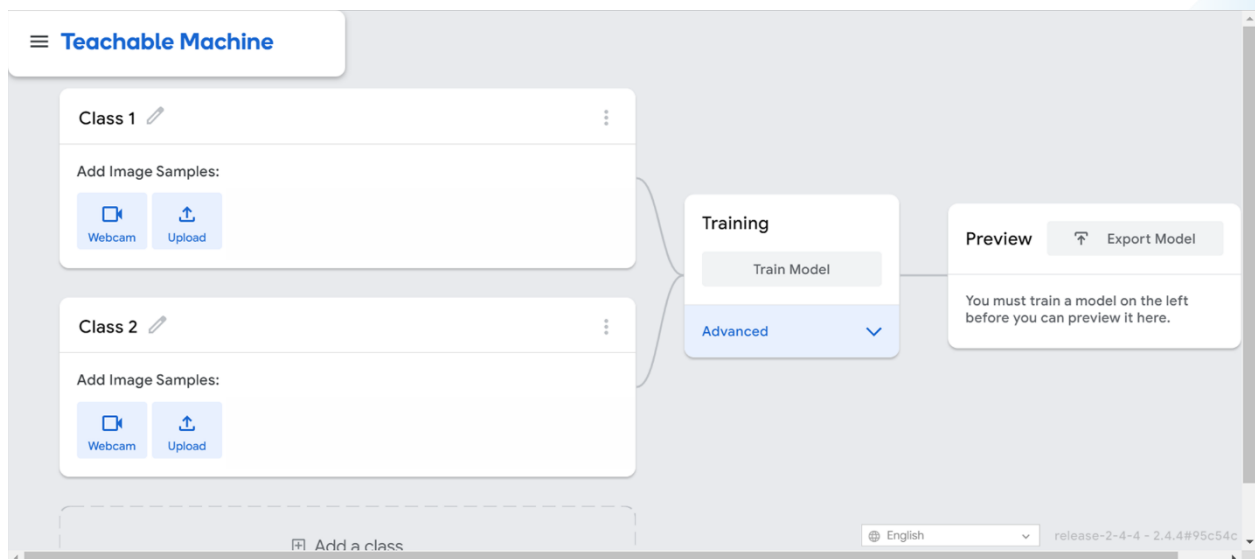
Part 1

In this project, we will create an AI model to identify 4 electronic components in the ATL Lab

Arduino, Ultrasonic Sensor, LED and Capacitor. For this purpose, we will first Categorize the images of these electronic components into different classes.

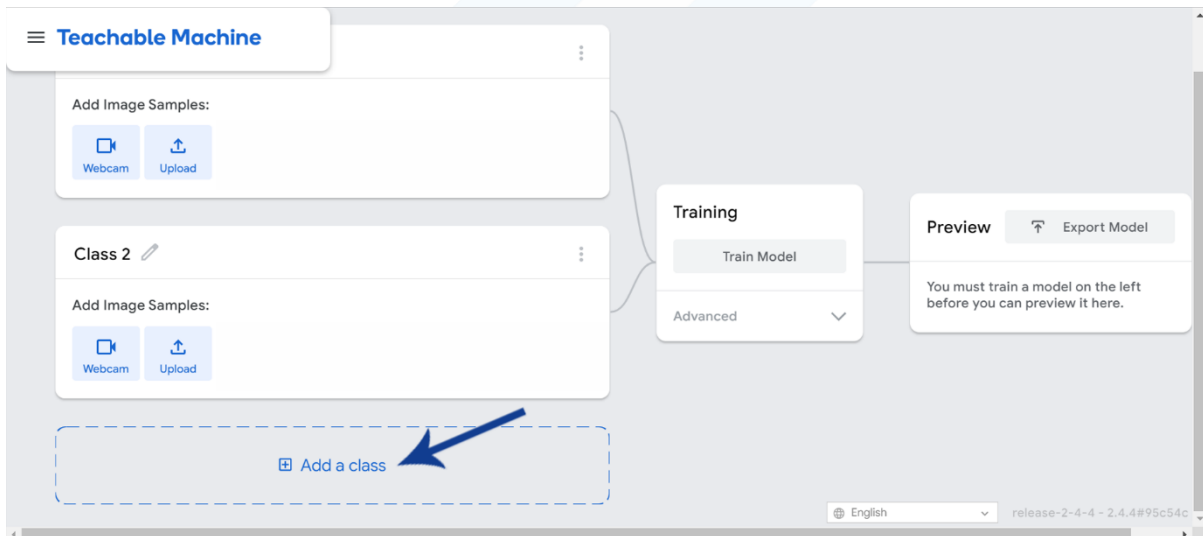
STEP 6

Two categories or classes “Class 1” and “Class 2” are created by default as shown. We need to create **4 classes** for 4 ATL components - **Arduino, Ultrasonic Sensor, LED and Capacitor**



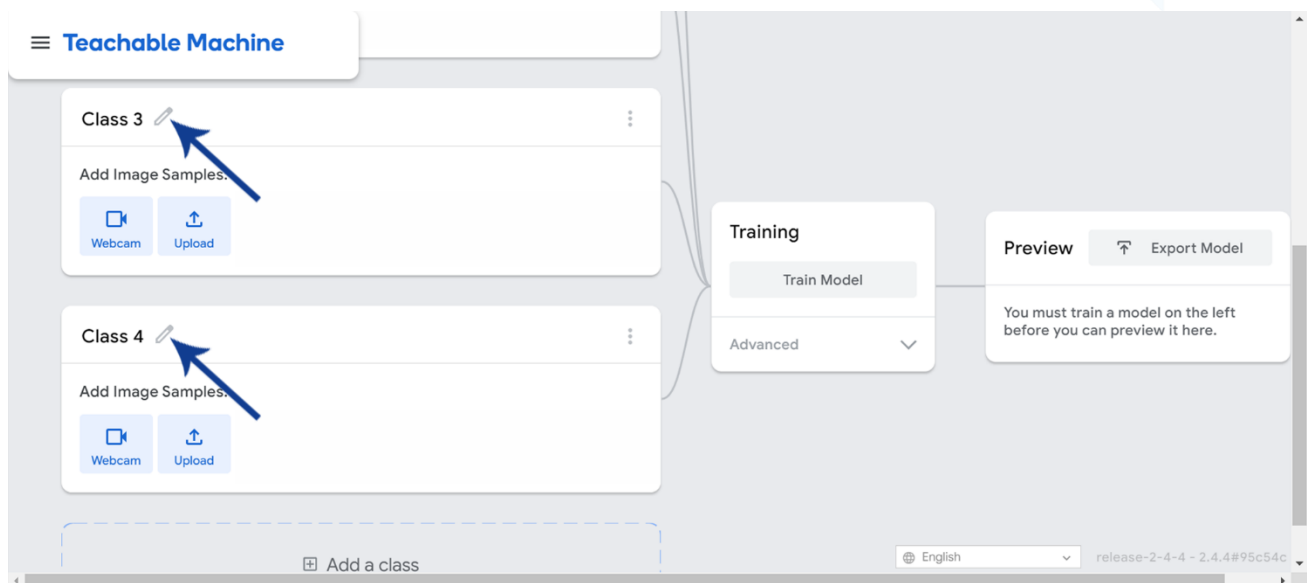
Step 7

Click on "Add a class" to create 2 more classes.



Step 8

"Class 3" & "Class 4" will be displayed on the screen as shown.



Step 9

Rename all the 4 classes as given below.

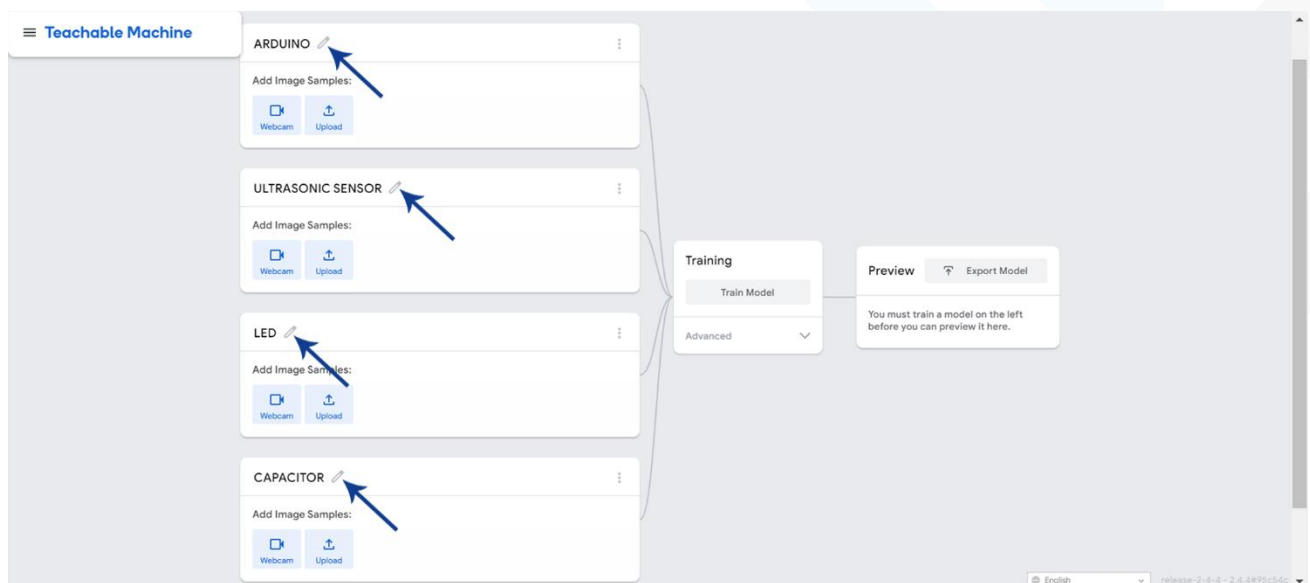
Class 1 - ARDUINO

Class 2 - ULTRASONIC SENSOR

Class 3 - LED

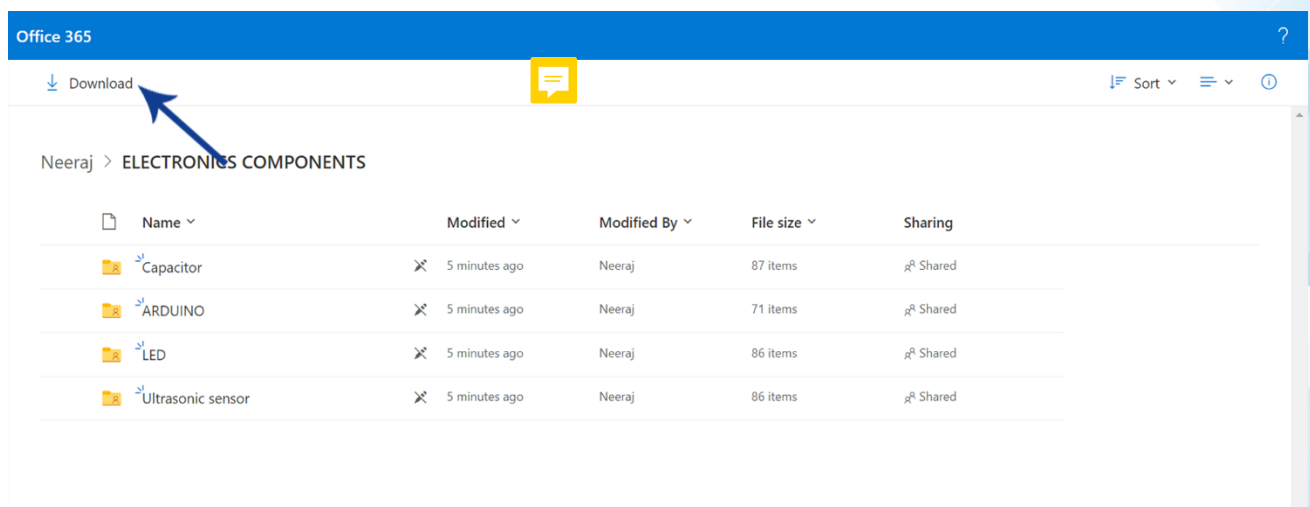
Class 4 - CAPACITOR

These classes help us to categorize the images of the ATL components.



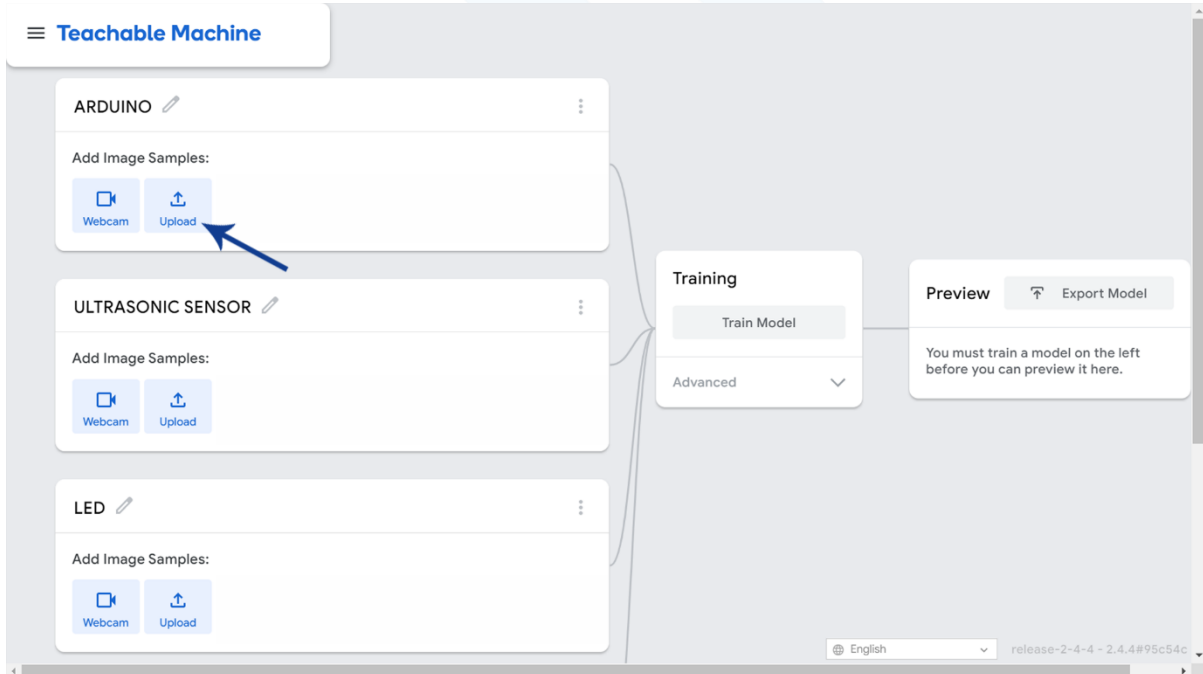
Step 10

Download sample image files of the ATL components from the link - [ATL Components Image Files](#)



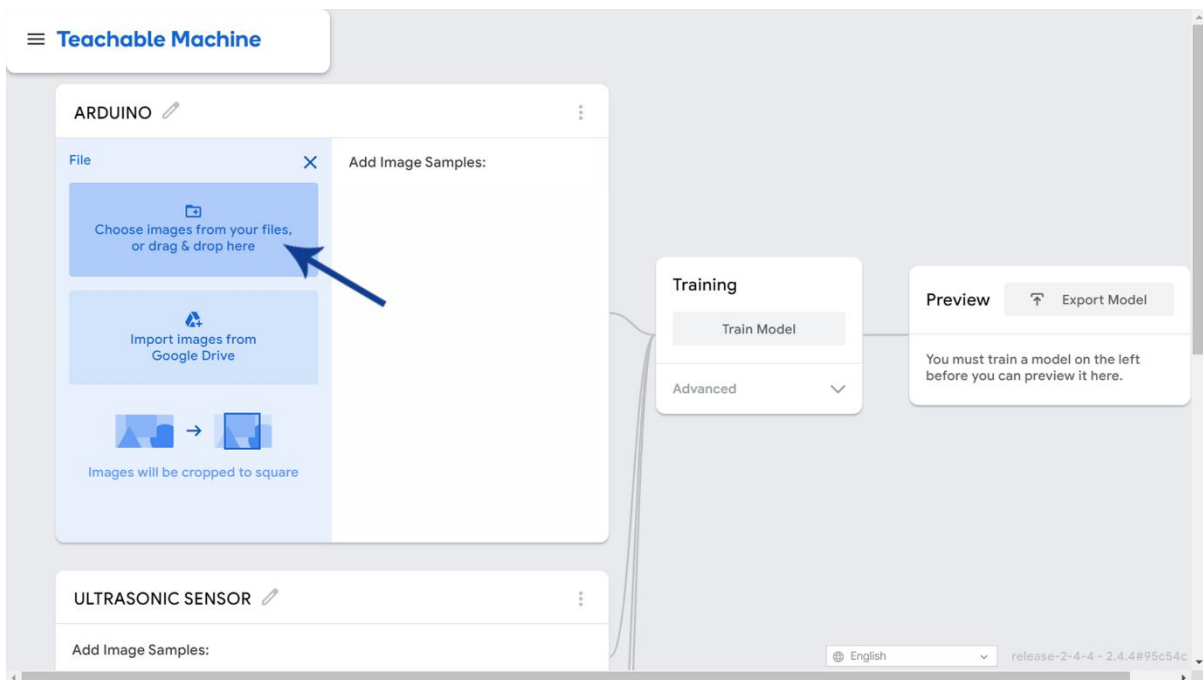
Step 11

Then, upload the sample images of the component **Arduino**. Click on the upload button in the **Arduino** class.



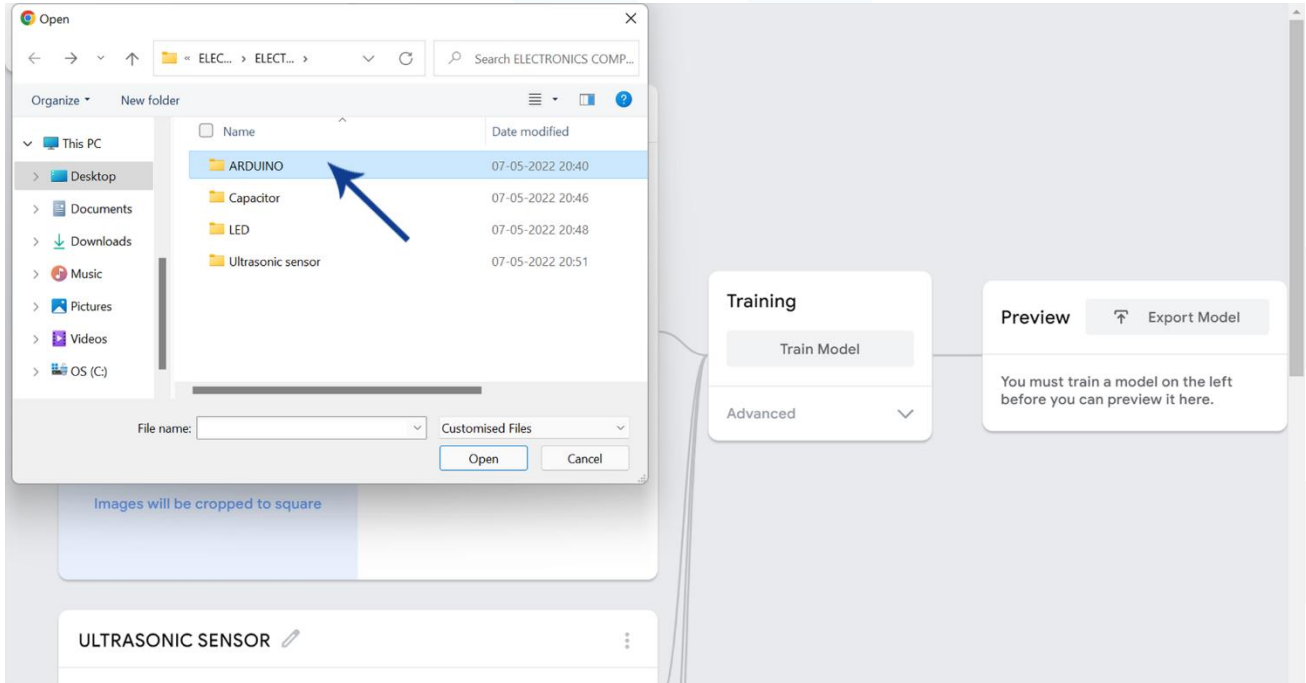
Step 12

Select the option to choose images from your files. This option will let you select the image files downloaded on your laptop/desktop.



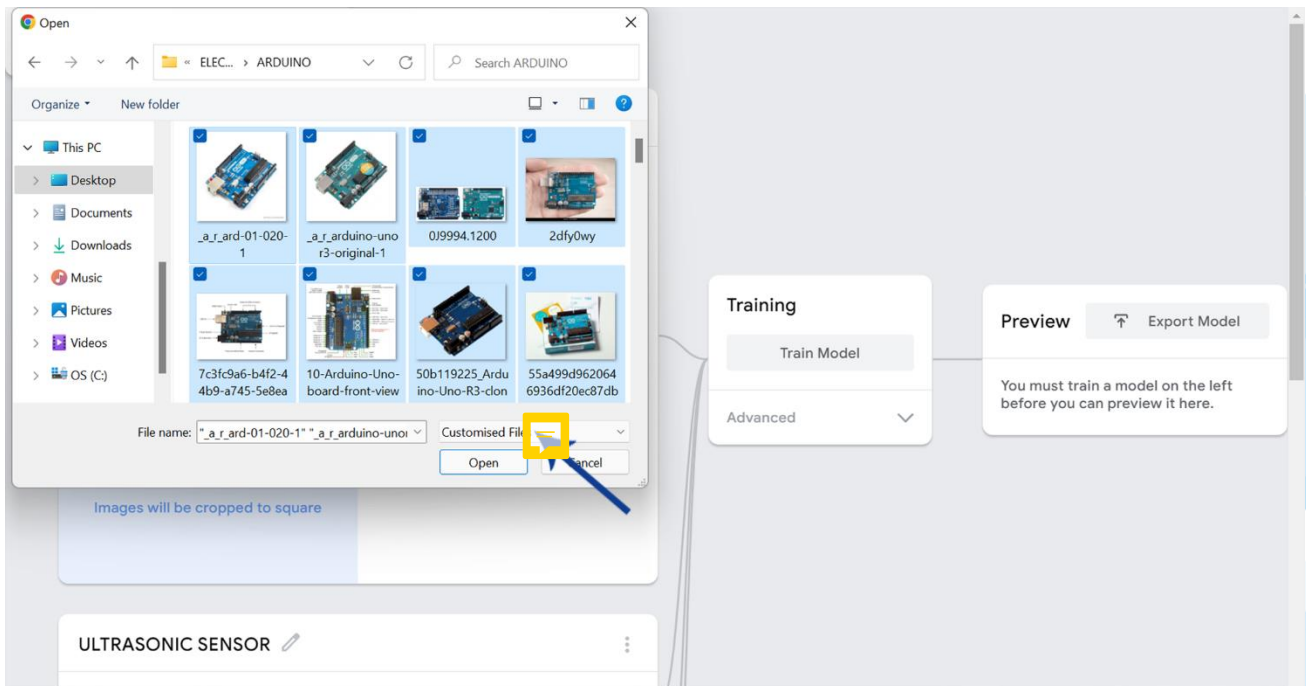
Step 13

Go to the folder where you have downloaded the sample image files of the ATL Components. Click on the folder with the name “**Arduino**” here.

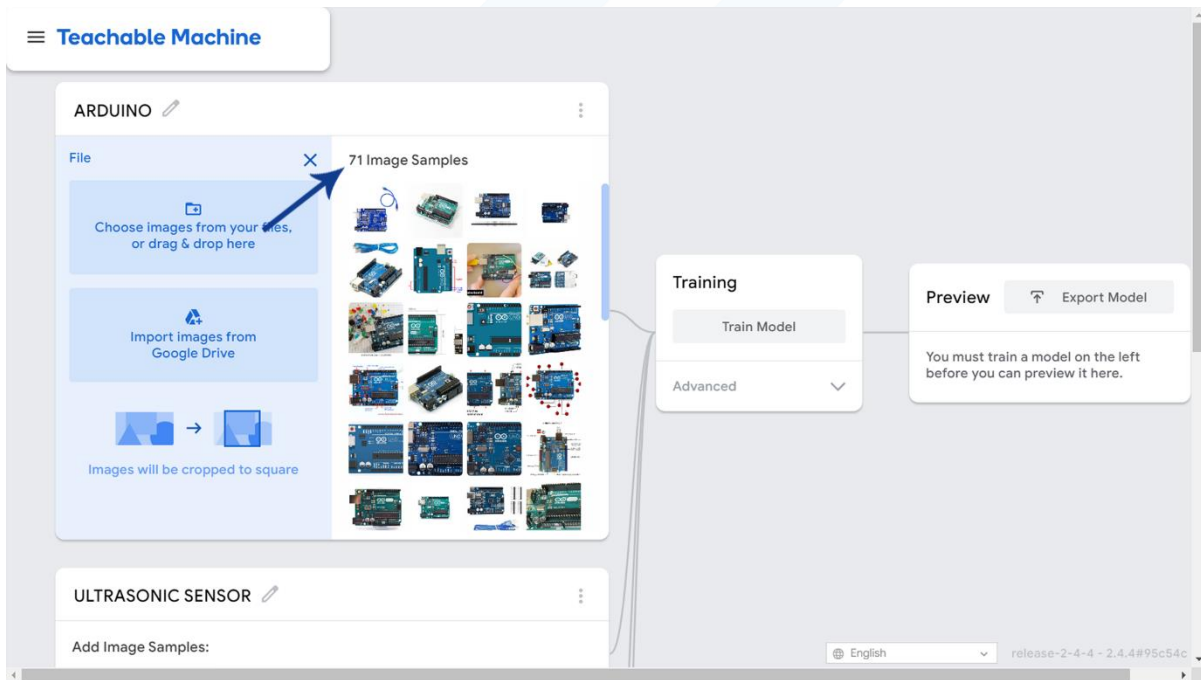


Step 14

Press **Ctrl + A** to select all the images in the “**Arduino**” folder & Click on the button “**Open**”.



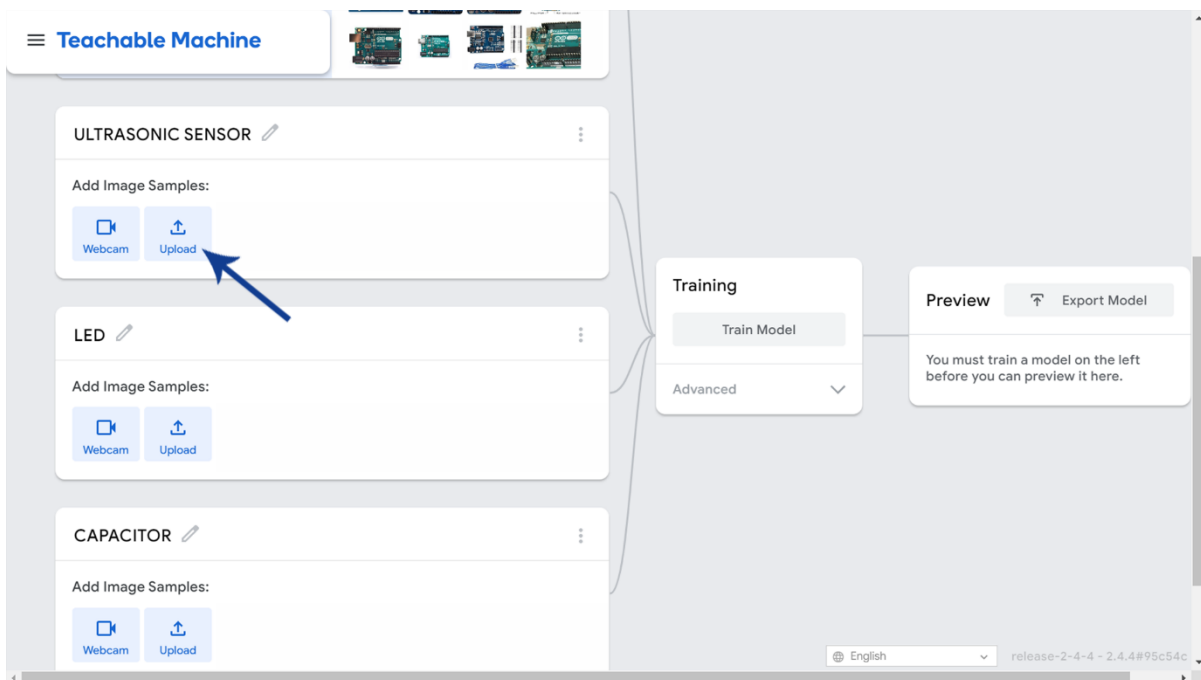
You will see all the samples images displayed under the class “**Arduino**” on Teachable Machine.



Step 15

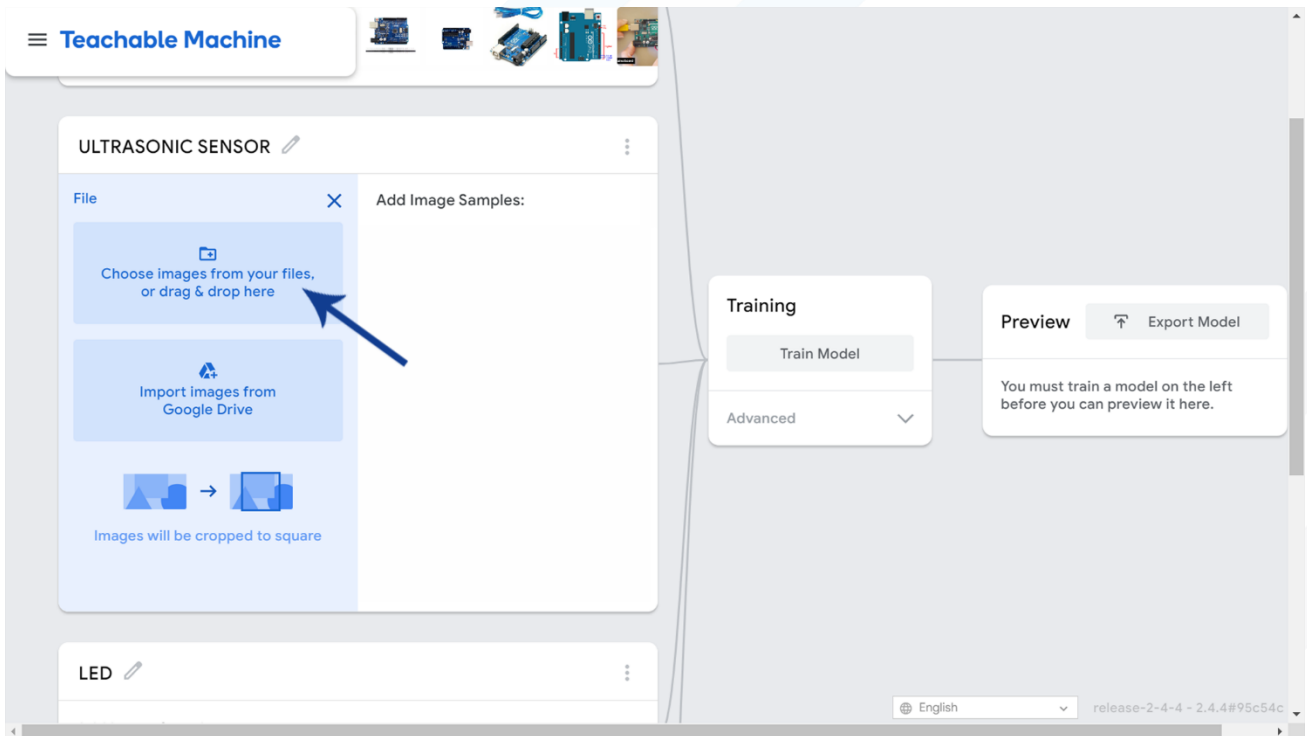
Repeating the same steps we did for Arduino we will now upload the sample images of the component **ultrasonic sensor** in the corresponding class.

Click on the **upload** button in the **Ultrasonic Sensor class**.



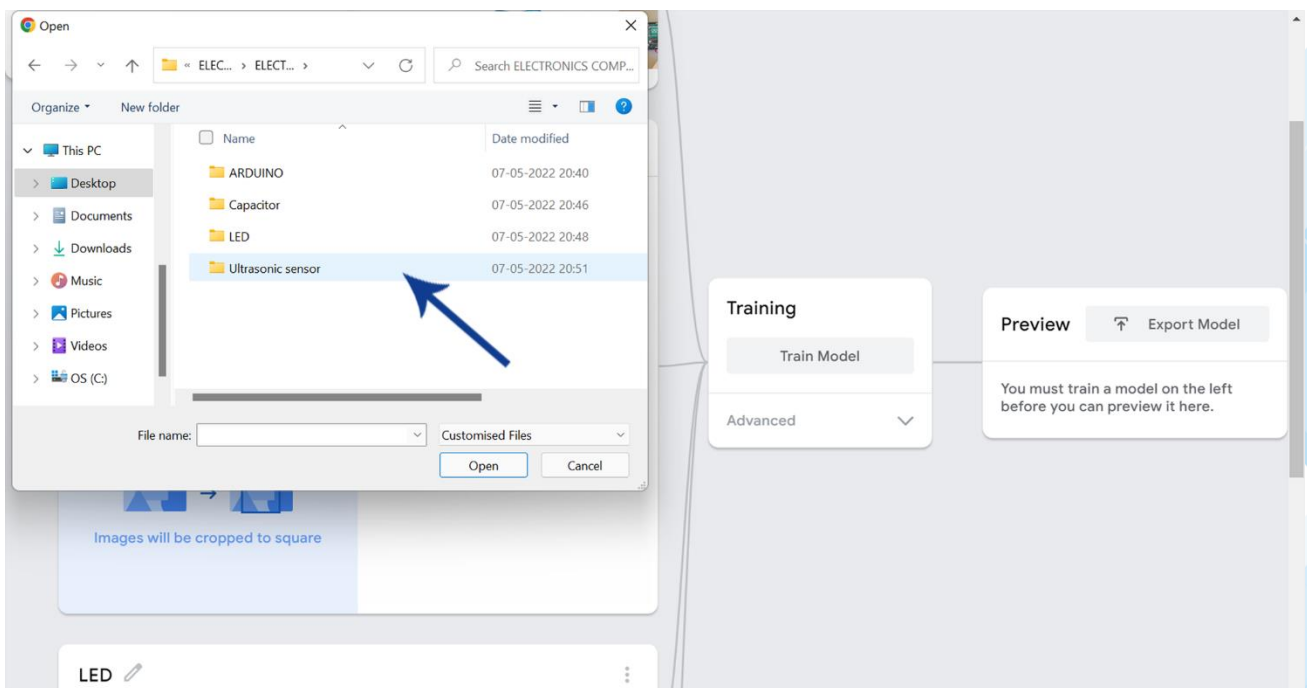
Step 16

Select the option - Choose images from your files.



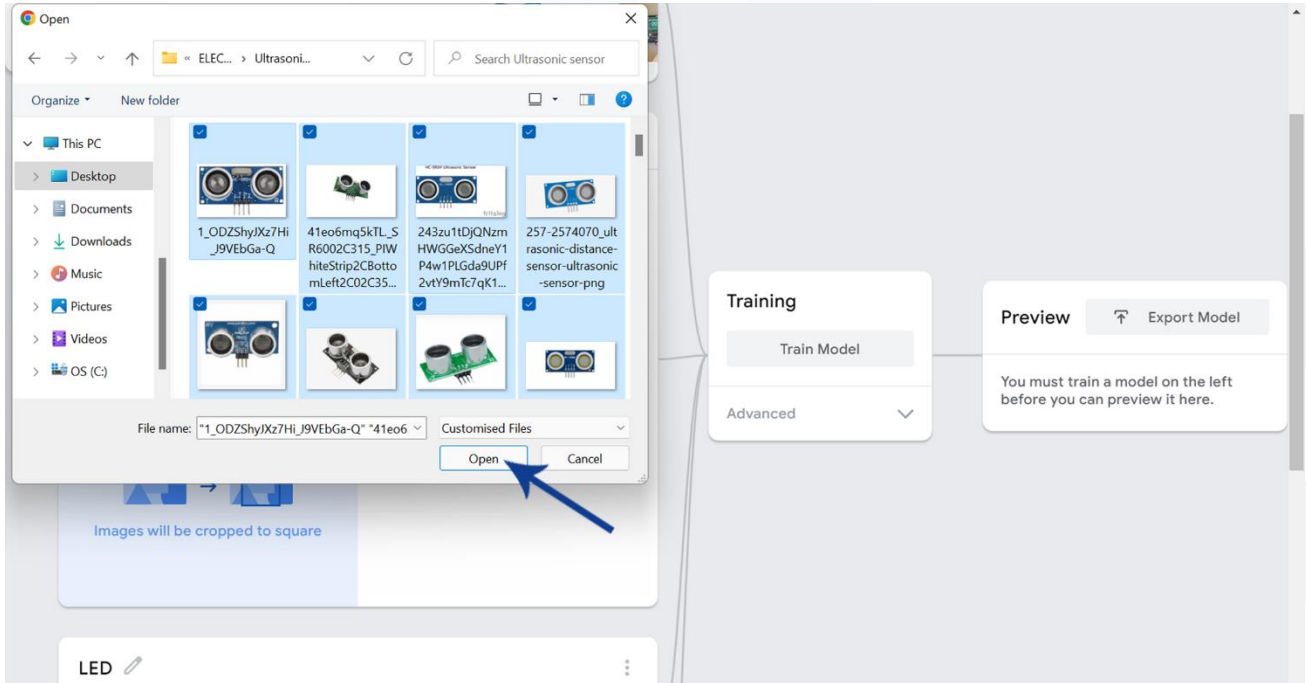
Step 17

Go to the folder where you have downloaded the sample image files of the ATL Components. Click on the folder with the name "**Ultrasonic sensor**" here.

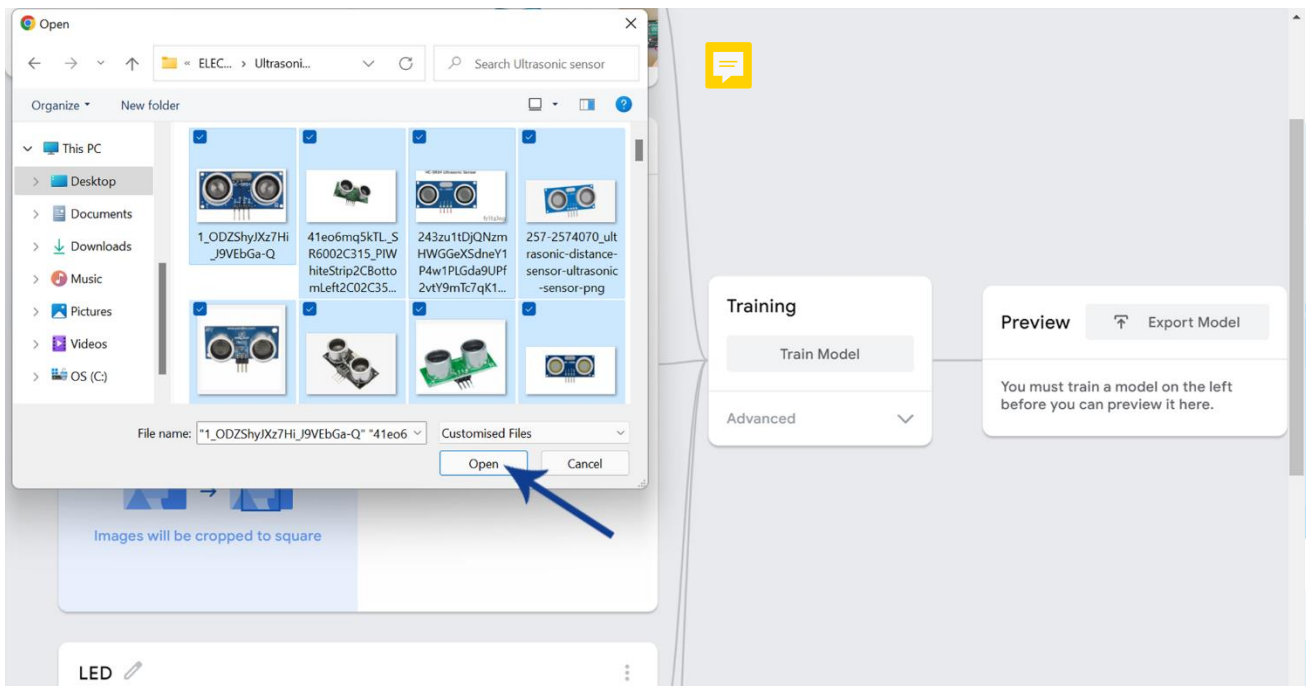


Step 18

Press **Ctrl + A** to select all the images in the “**Ultrasonic sensor**” folder & Click on the button “**Open**”.

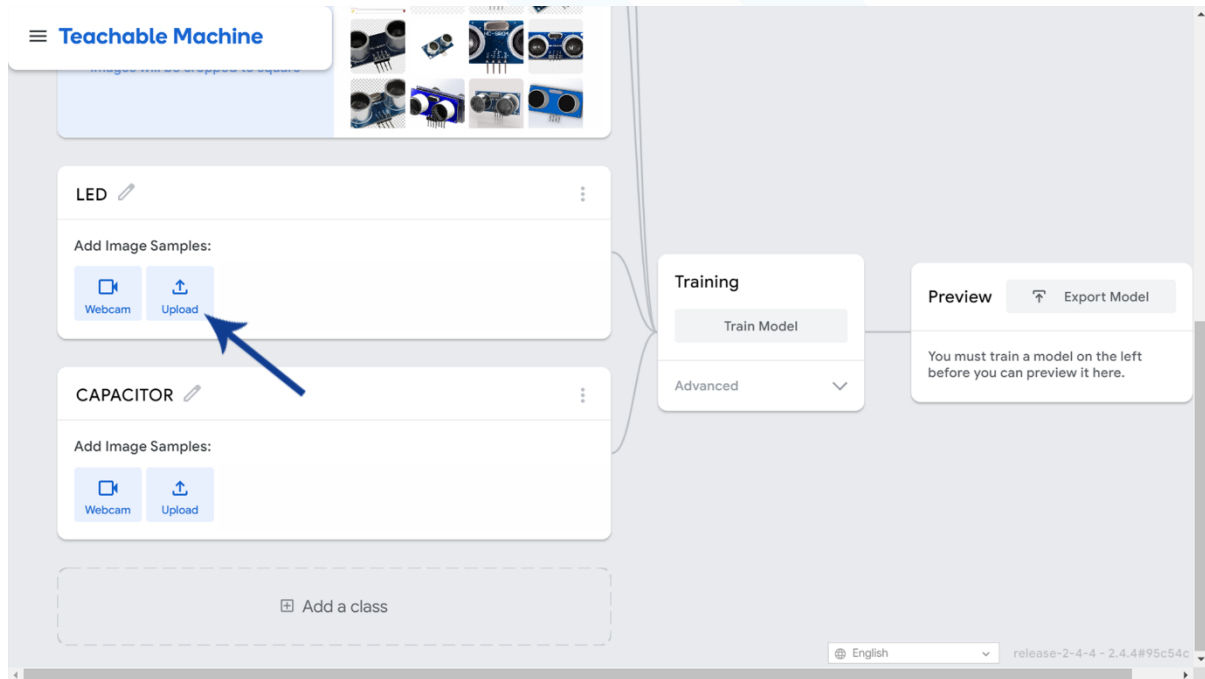


You will see all the sample images displayed under the class “**Ultrasonic sensor**” on Teachable Machine.



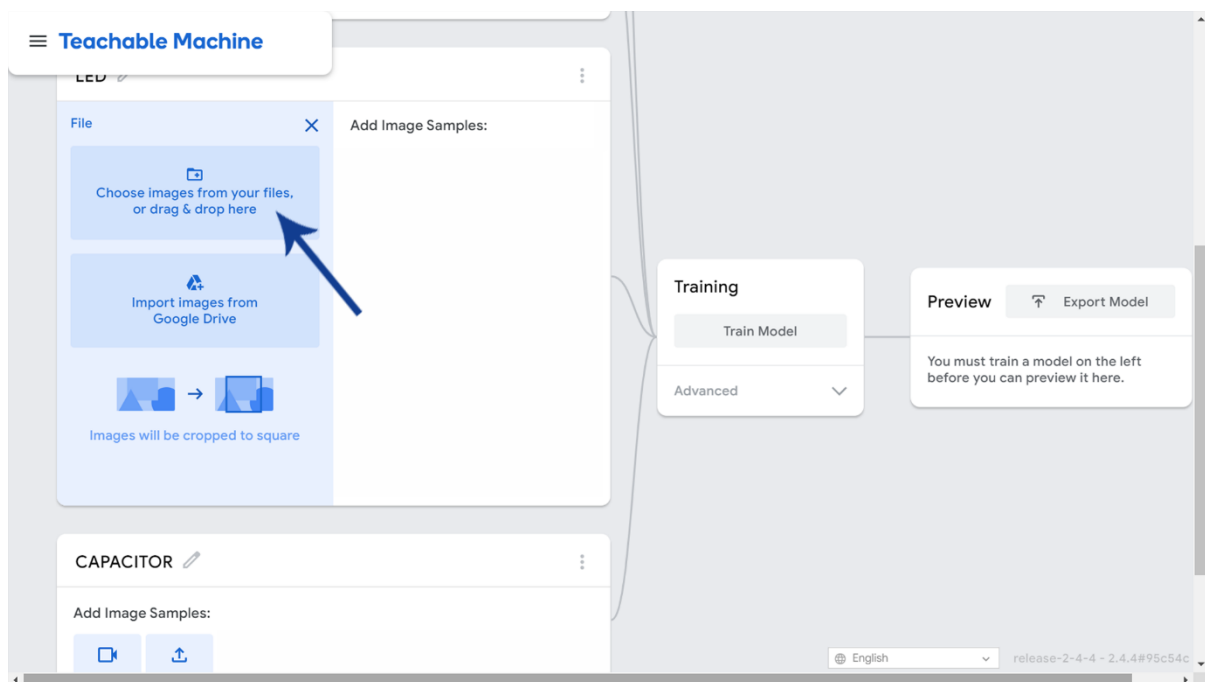
Step 19

Repeating the same steps we did for Arduino & Ultrasonic Sensor, we will now upload the sample images of the component LED in the corresponding class. Click on the **upload** button in the **LED class**.



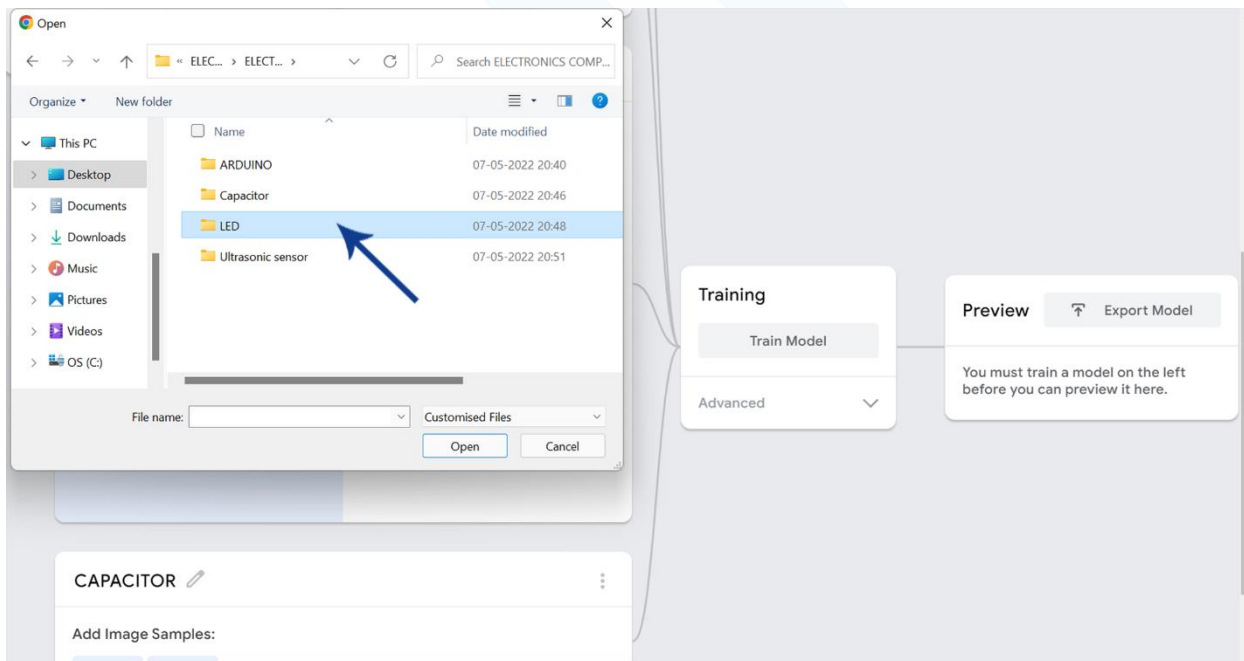
Step 20

Select the option - Choose images from your files.



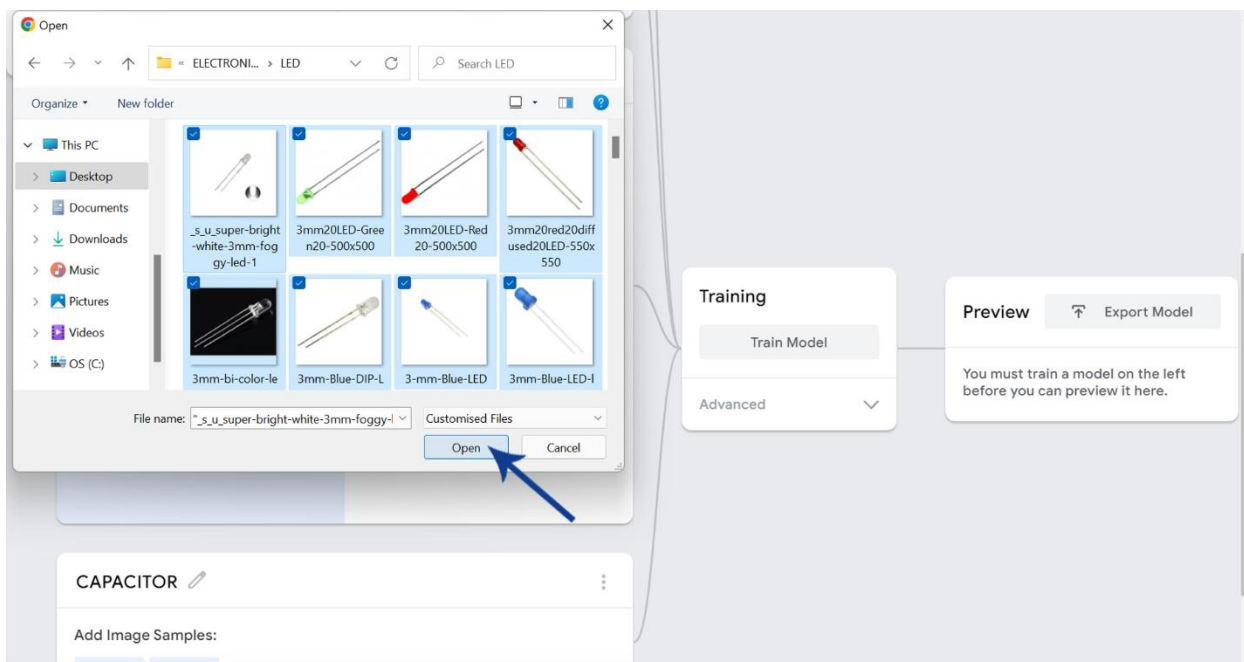
Step 21

Go to the folder where you have downloaded the sample image files of the ATL Components. Click on the folder with the name “LED” here.

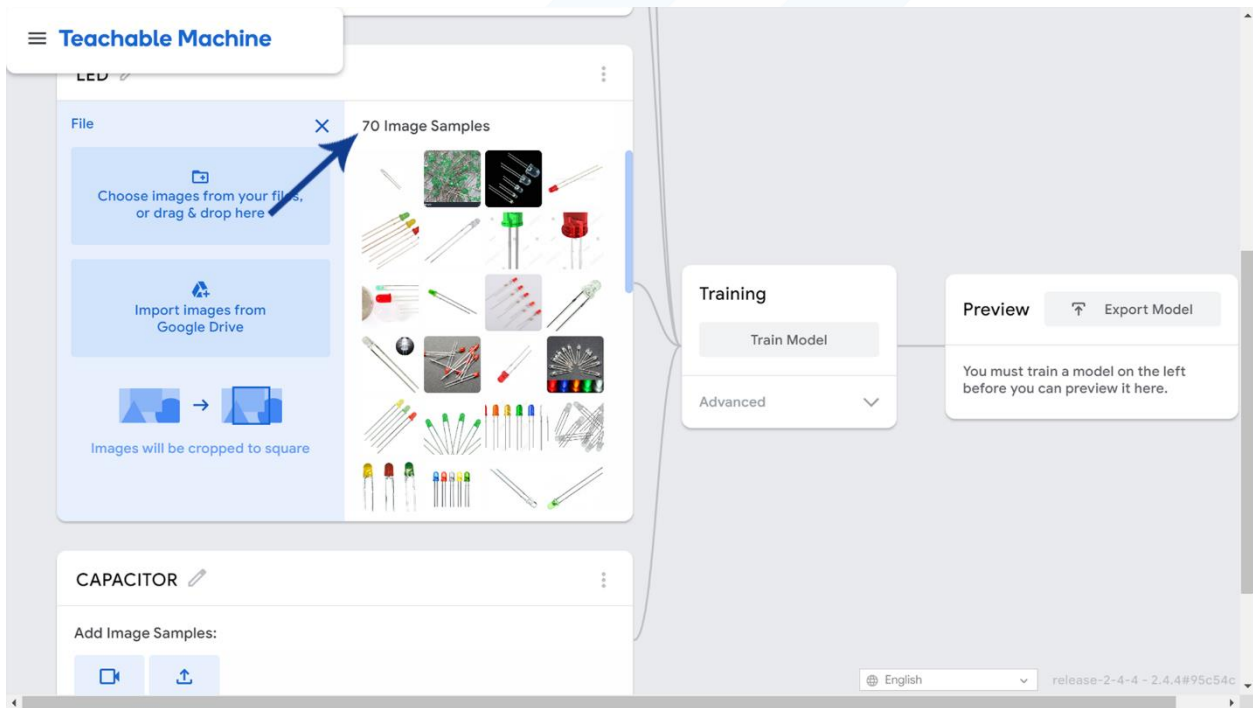


Step 22

Press **Ctrl + A** to select all the images in the “LED” folder & Click on the button “Open”.

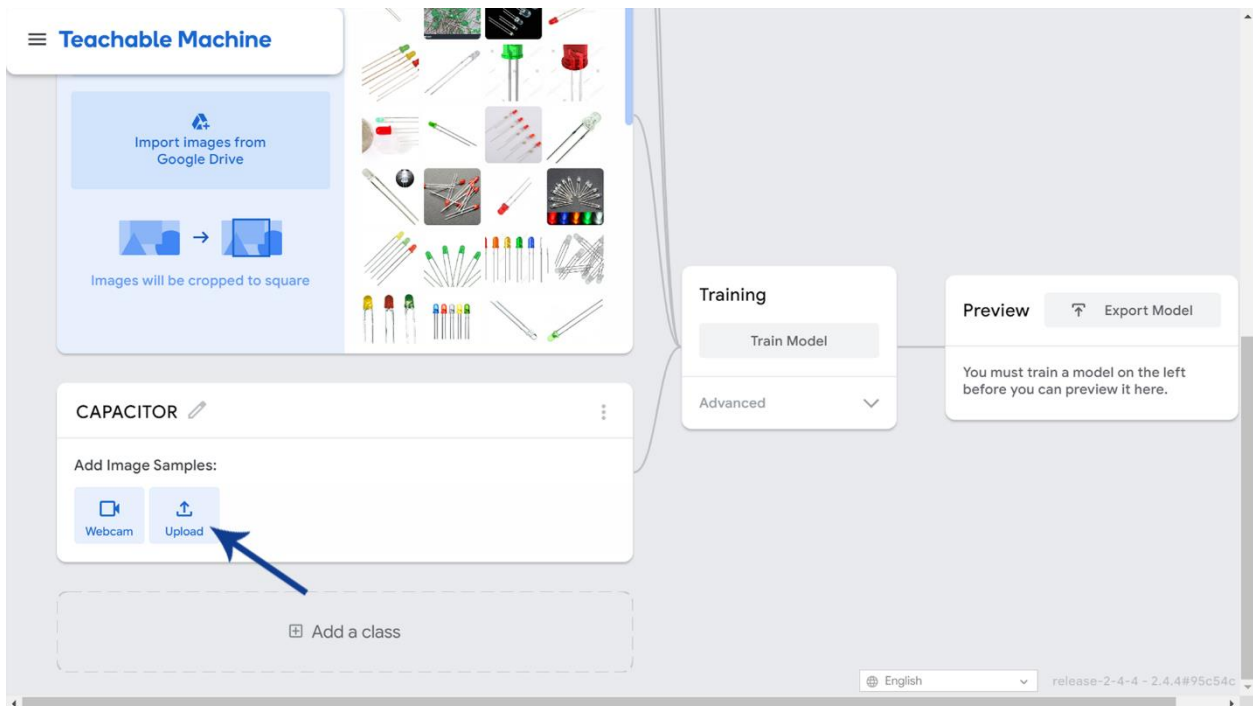


You will see all the sample images displayed under the class “LED” on Teachable Machine.



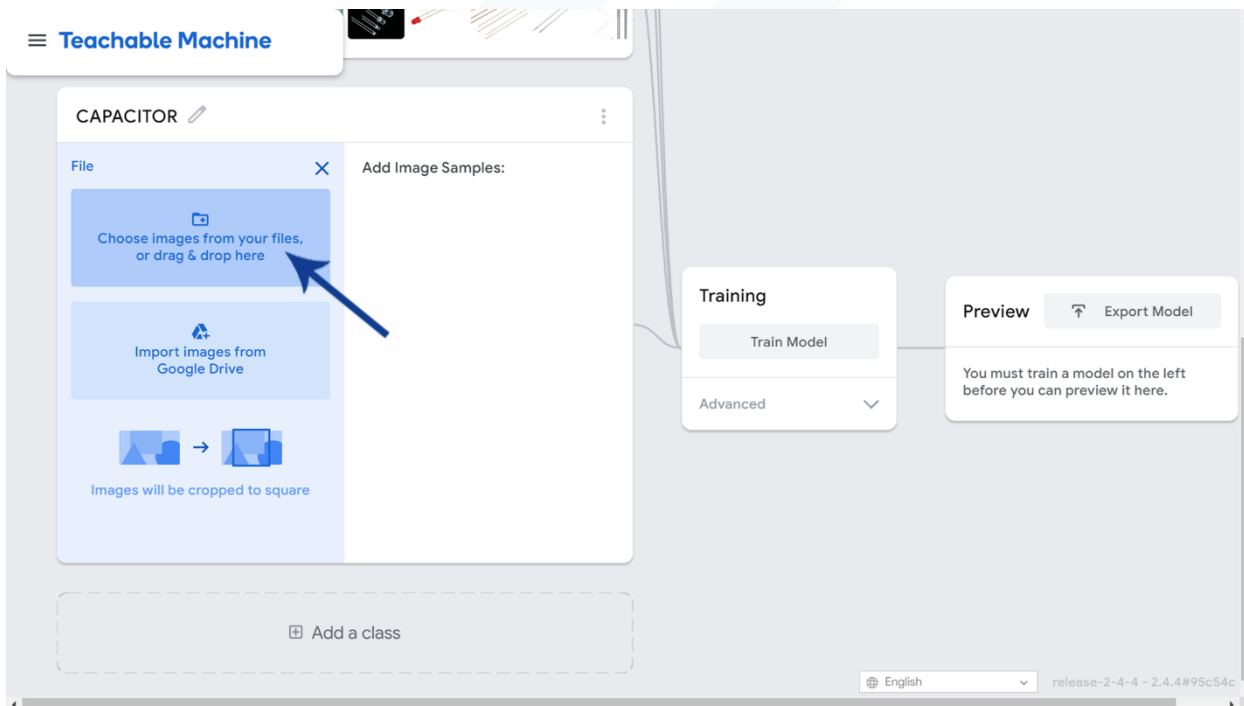
Step 23

Repeating the same steps we did for Arduino, Ultrasonic Sensor and LED, we will now upload the sample images of the component **capacitor** in the corresponding class. Click on the **upload** button in the “**CAPACITOR**” class.



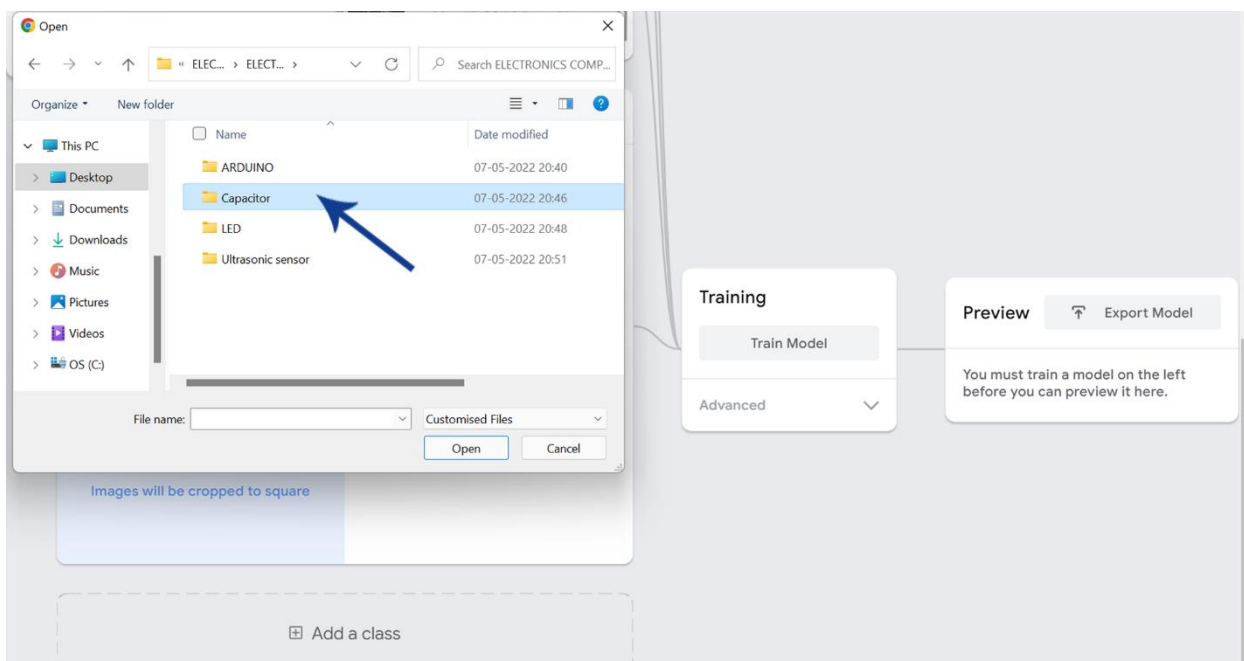
Step 24

Select the option - Choose images from your files.



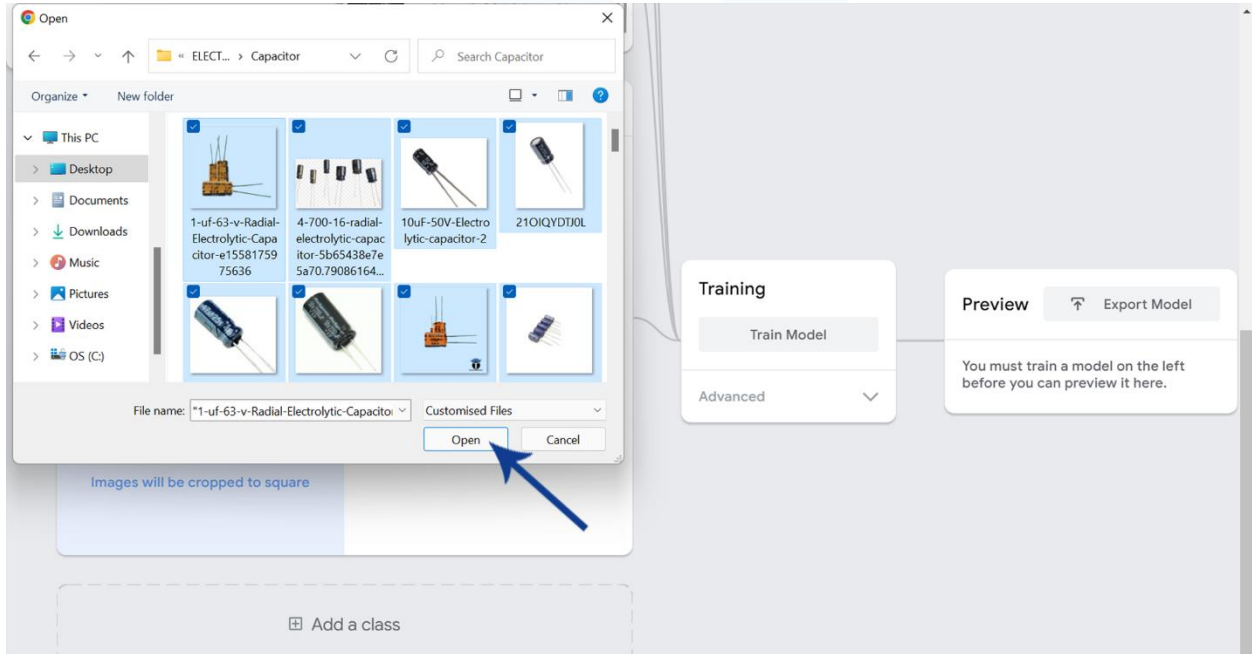
Step 25

Go to the folder where you have downloaded the sample image files of the ATL Components. Click on the folder with the name "**Capacitor**" here.

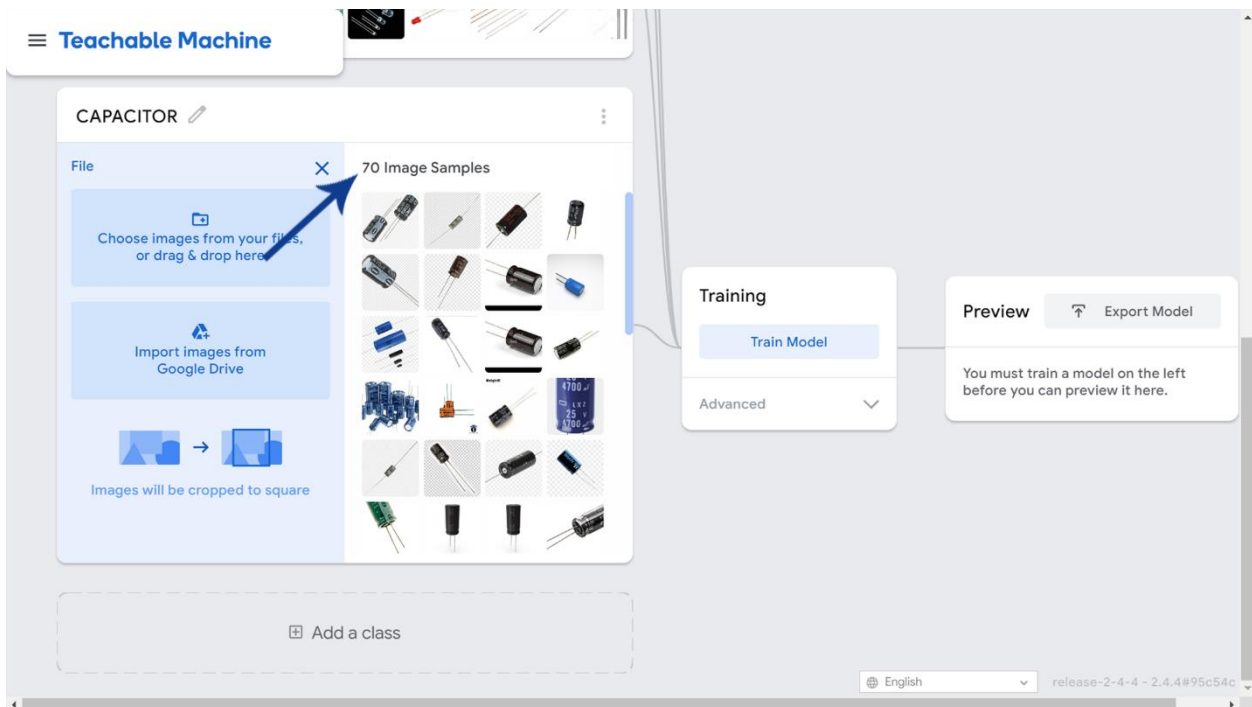


Step 26

Press **Ctrl + A** to select all the images in the “**Capacitor**” folder & Click on the button “**Open**”.

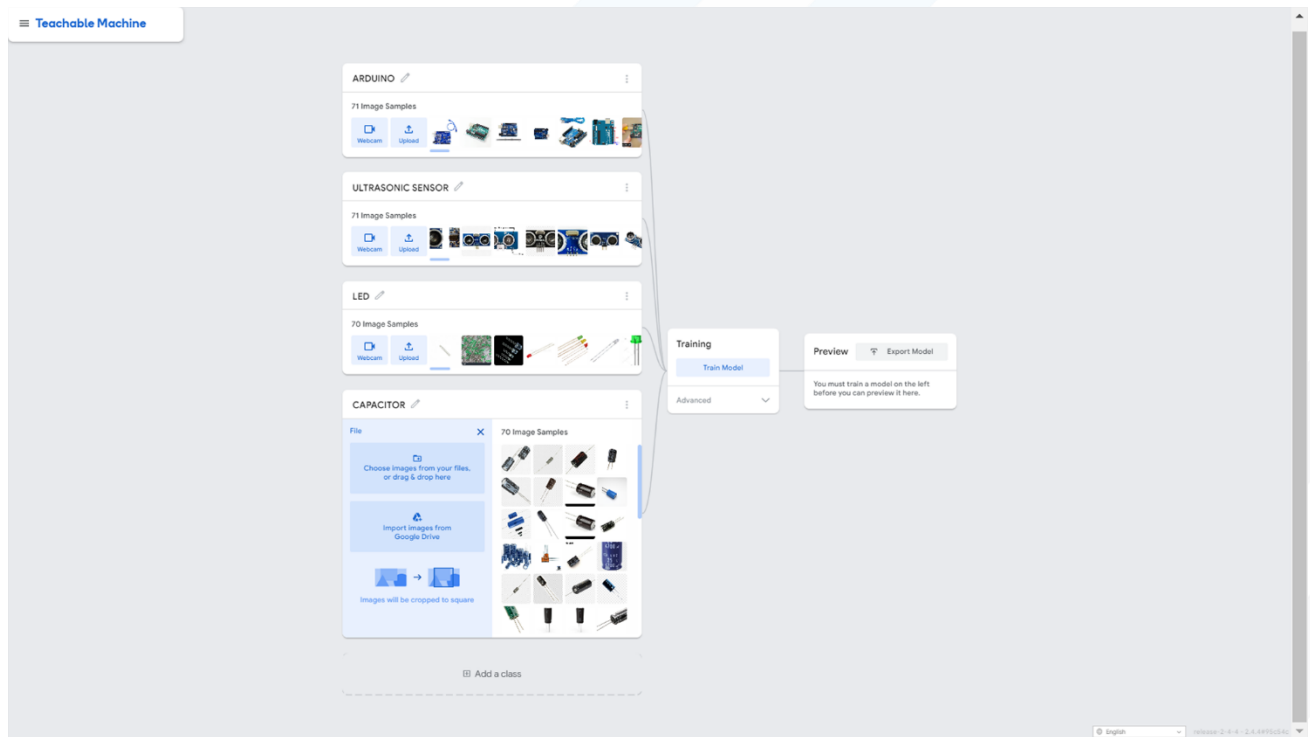


You will see all the sample images displayed under the class “**CAPACITOR**” on Teachable Machine.



Emerging Technologies - Artificial Intelligence

We have now categorized all the ATL components into classes.

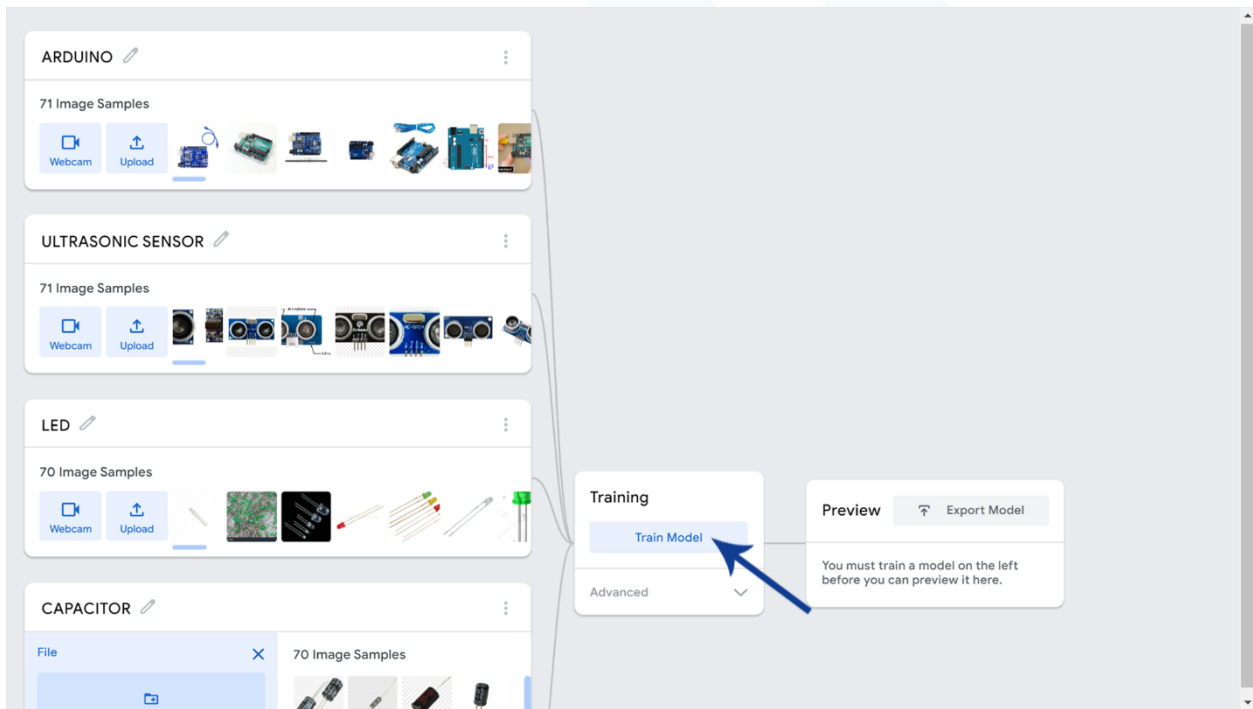


Part 2

We will now Train the AI model to identify different electronics components.

Step 27

Click on '**Train Model**' and wait until the training is completed.



Training time depends on the number of samples you have provided. More the number of samples, more the training time.

I am just assuming this training happens automatically and there is nothing to do at the user end. If not add the steps on how to train the model.

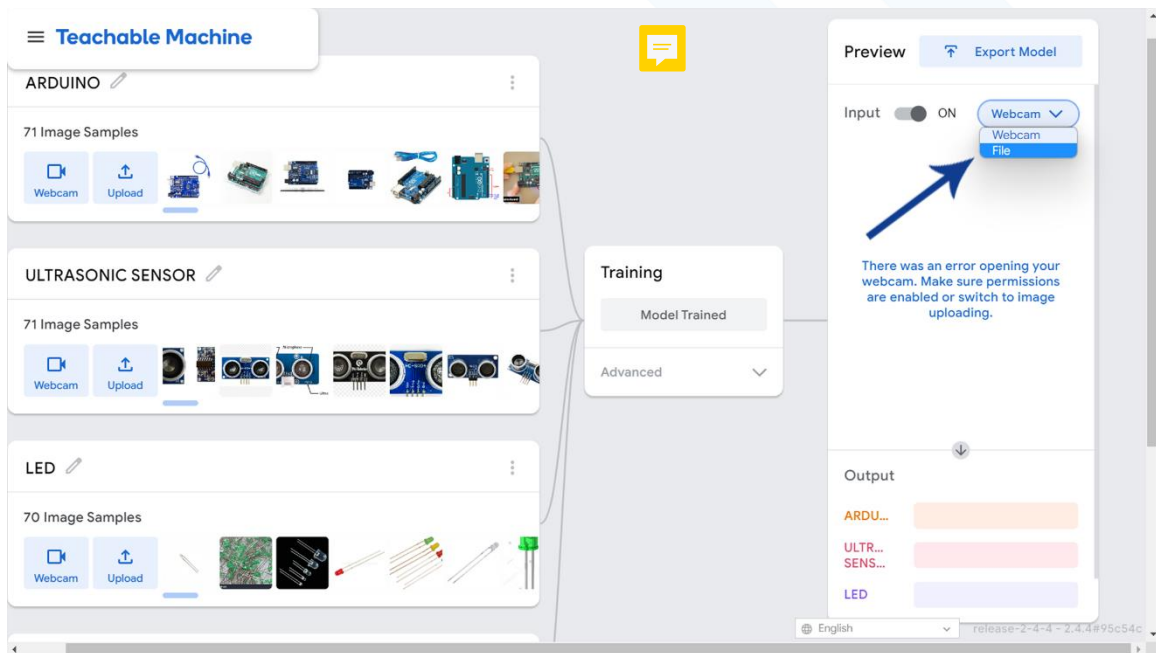
Part 3

Now you can Test the AI model

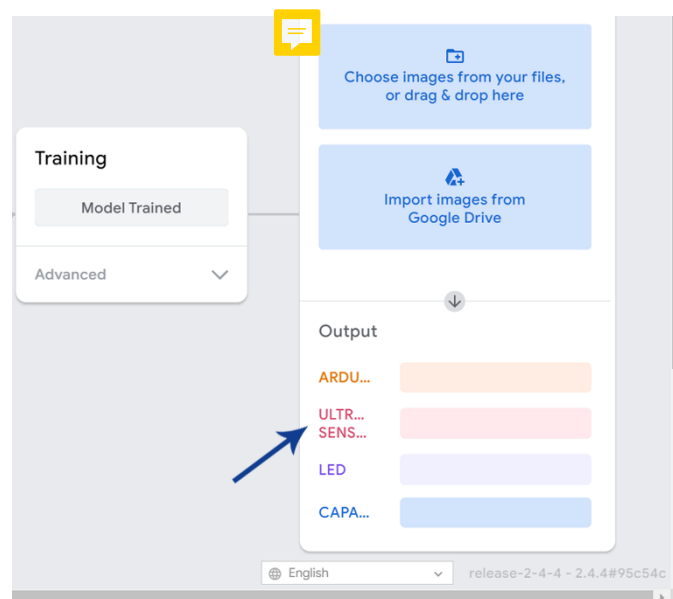
Step 28

Find the **preview panel** on the right side. With the help of preview panel you can test your model.

You will see two options File/Webcam to check the **output**.

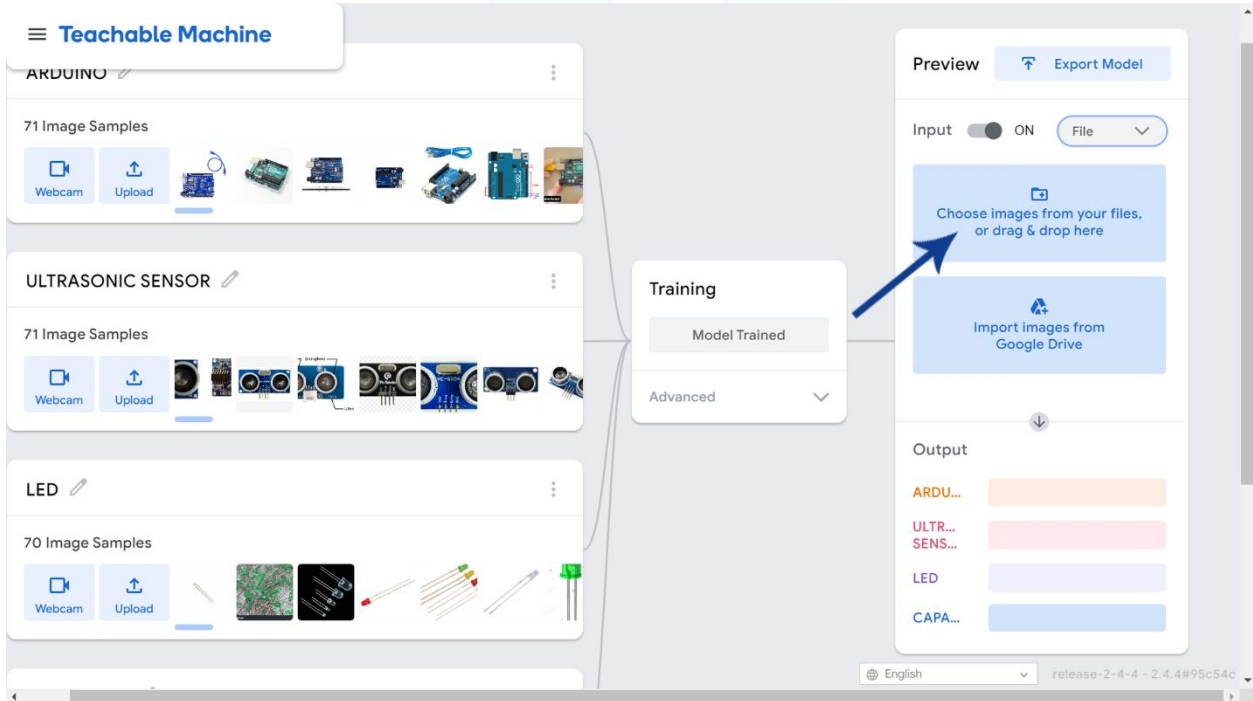


The output section in the panel displays the names and test results of all the 4 classes of ATL components.



Step 29

Click on the “**File**” option at the top of the preview panel and select option to choose images from your files.



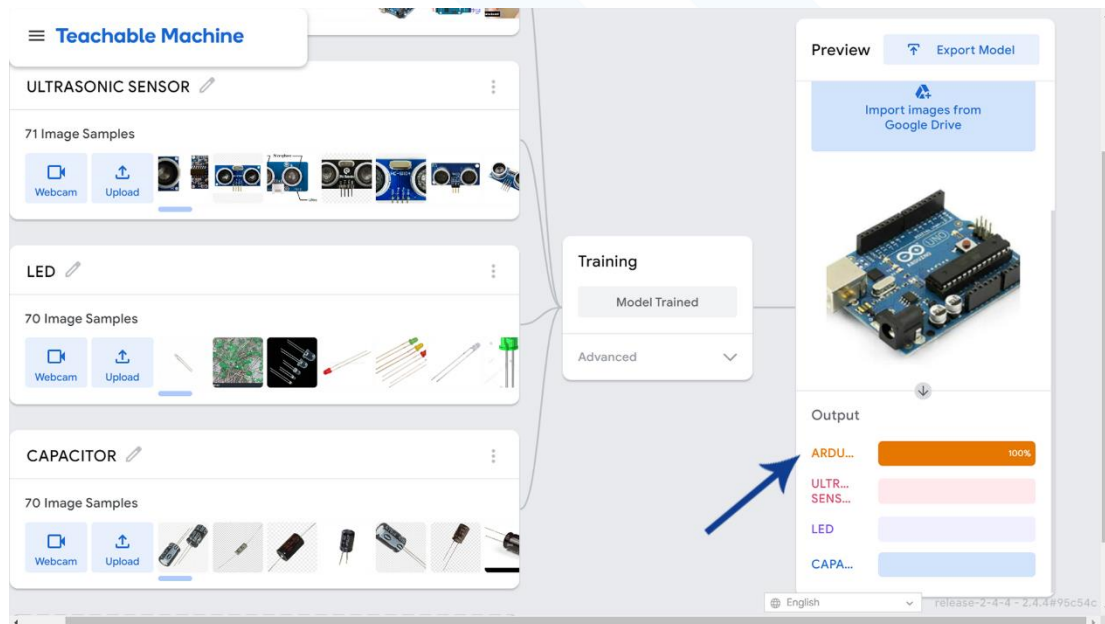
Step 30

Choose a **random new image** of **Arduino** from your images folder



Step 31

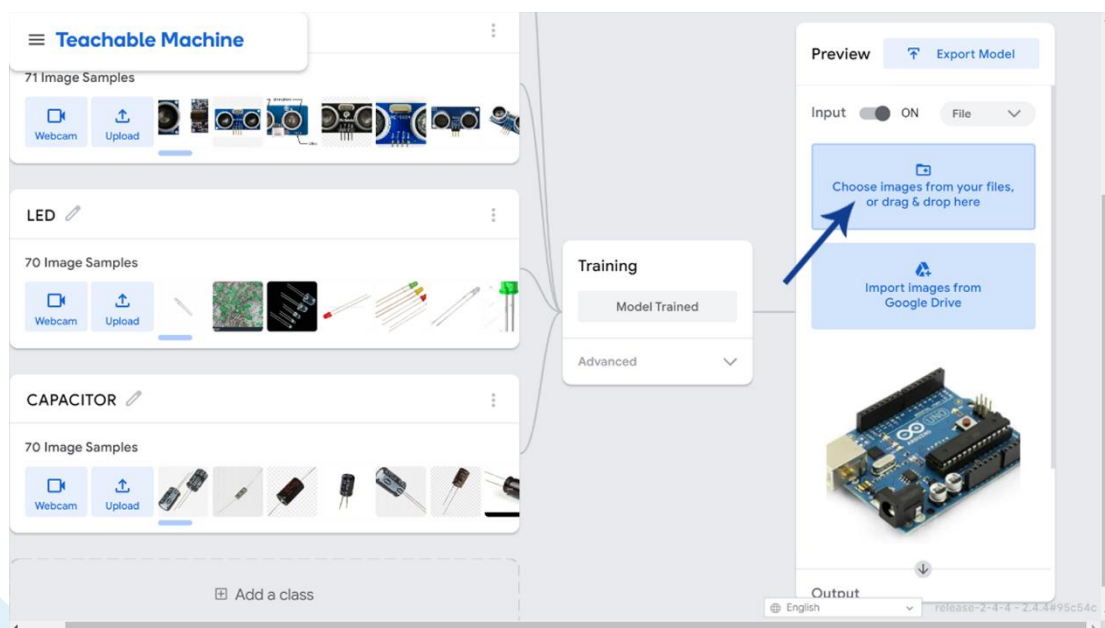
Notice the output bars in the output section. The output bar for the component that the AI model recognizes will show the **highest value**. This **percentage** level displays the **accuracy level** of AI model in recognizing the component from the image.



The AI model will show the highest value for Arduino component as it has successfully recognized it from the image.

Step 32

Now let us **test** the AI model for another ATL component, **Capacitor**. Click on the **“File”** option at the top of the preview panel and select option to choose images from your files.



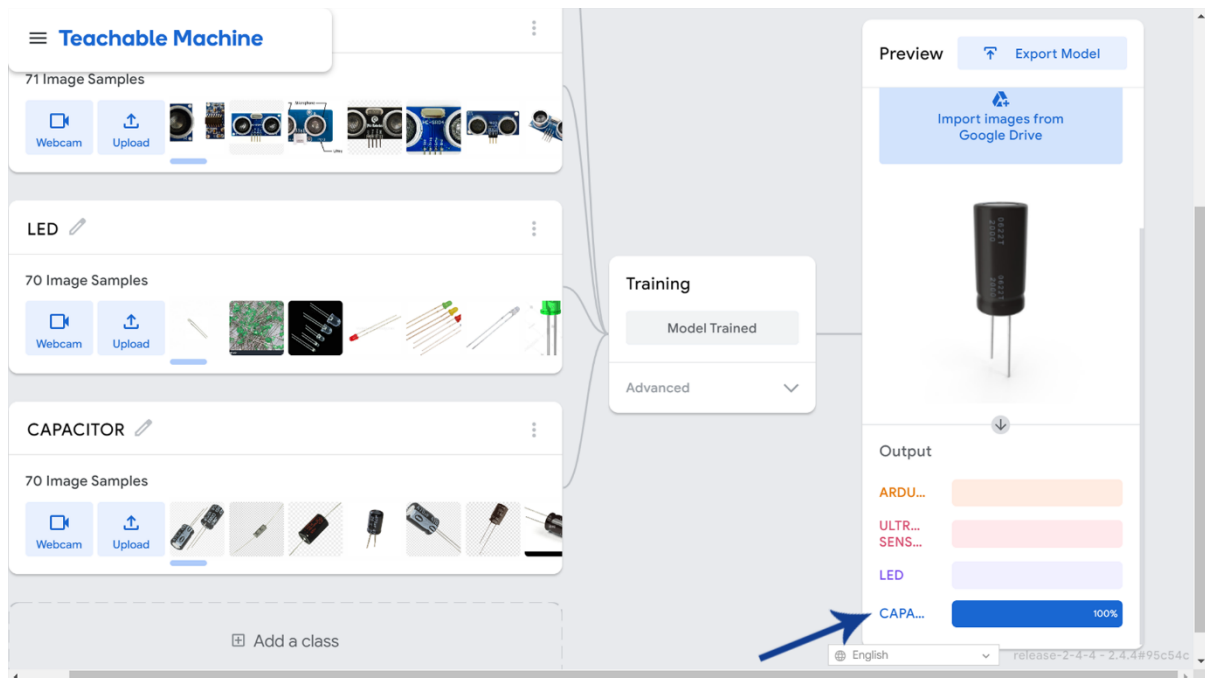
Step 33

Choose a random new image of **Capacitor** from your images folder



Step 34

Notice the **output bars** in the output section.



Did your AI model recognize the capacitor?

Step 35

Try this:

You can now test out how your AI model works with different images of the components and it will be more fun to find out where it doesn't work.

Congratulations! You have now successfully created an AI model that can recognize the basic 4 ATL components in your ATL Lab. Please share the model with your schoolmates so that they can use it in the ATL Lab.

WHAT CAN YOU DO WITH THIS PROJECT?

You can actually export your model to make things and use it in multiple projects! For example, you can export this model and include it as part of your website where you can help the users in identifying the electronic components.

We recommend adding some reflections questions if possible.

