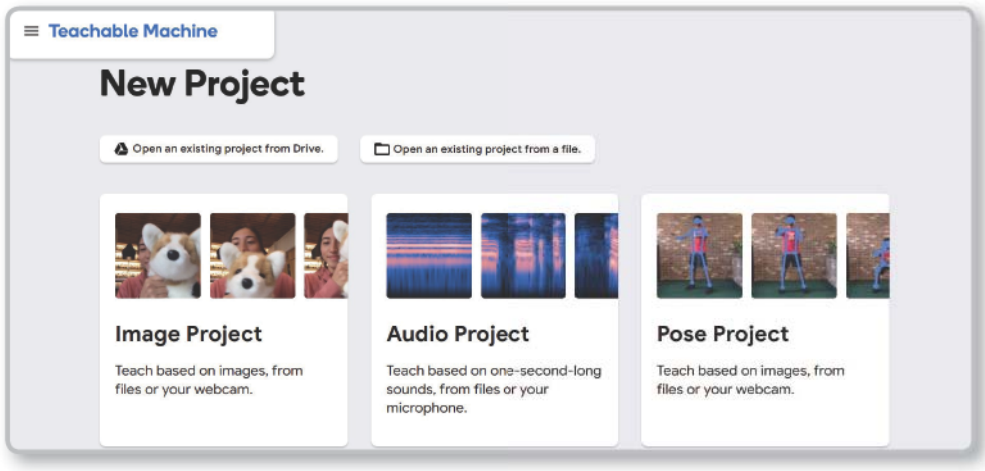
Activity 1: Creating a CNN Model for Smoke and Fire Detection using Teachable Machine

The goal of this activity is to use Computer Vision (CV) technology to create a Convolutional Neural Network (CNN) model that can identify smoke and fire in images. This model helps automate fire detection by classifying images into different categories using Teachable Machine.

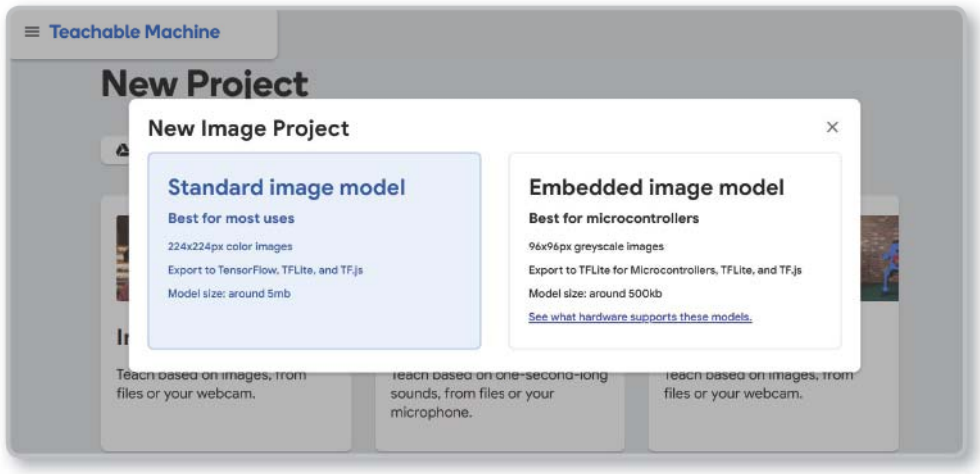
The steps to create a smoke and fire detection model using Teachable Machine are as follows:

Step 1 Visit: https://teachablemachine.withgoogle.com/ and click **Get Started**

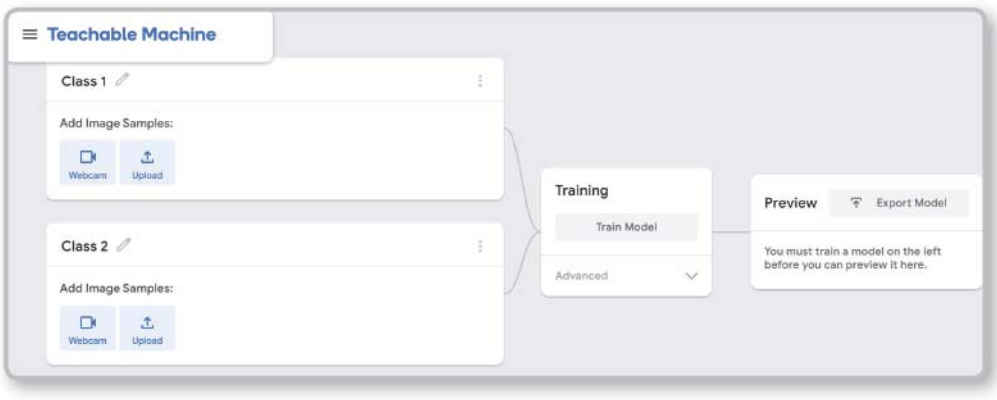
Step 2 Open the Option Image Project



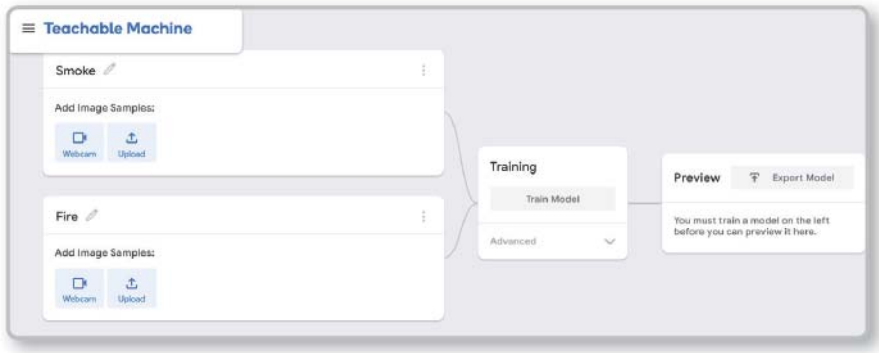
Step 3 The next screen gives you the option to select **Standard image model** or **Embedded image model**. It's recommended that you select the **Standard image model**, as that gives you a better resolution option.



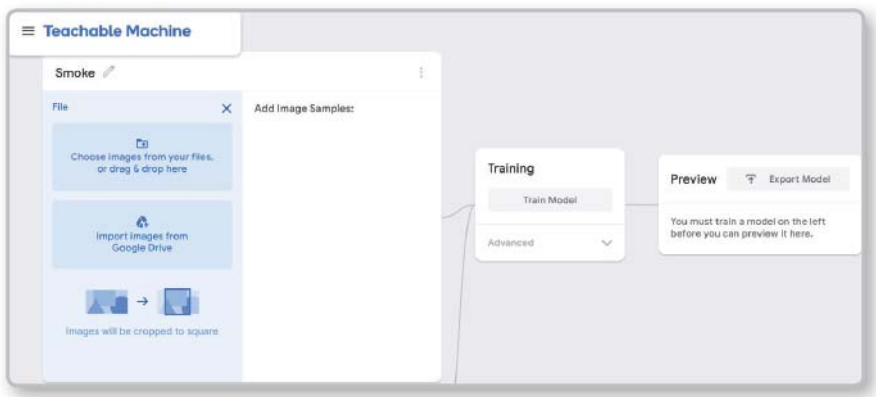
Step 4 Name the two **Classes**, which should ideally represent the objects or elements you want to train the machine learning model on.



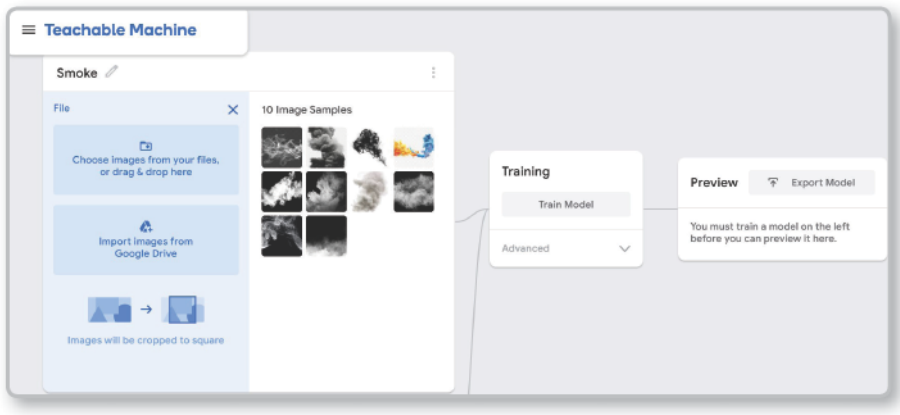
Step 5 For this project, we are comparing **Smoke** and **Fire**, so we name the two classes accordingly.



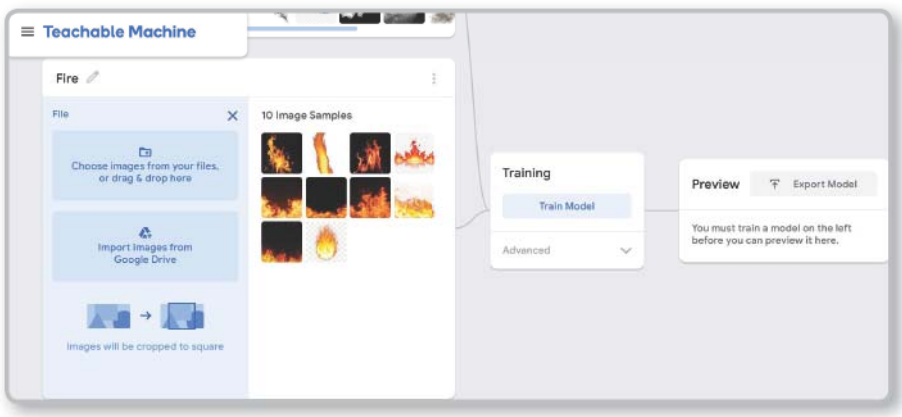
Step 6 Once we have named the Class, we need to get the subject images for the model to run ML on. Download free images of the Smoke and of the Fire separately, so that they are clearly distinguishable in the respective images. You can save them on your system hard drive or on Google Drive. We can upload images of the subject from both the system or Google Drive.



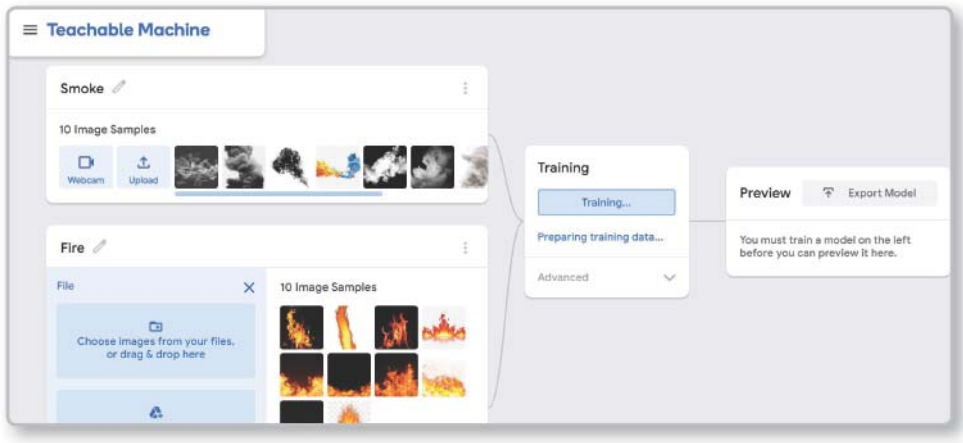
Step 7 You can upload multiple images in one go.



Step 8 Now you have to repeat Step 7 for uploading fire images.

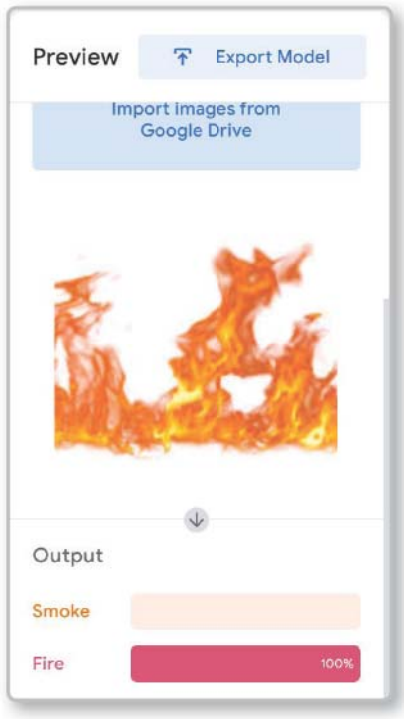


Step 9 Once the images of Smoke and Fire are uploaded, then we click on **"Train Model"**, and the learning process starts, which might take some time.

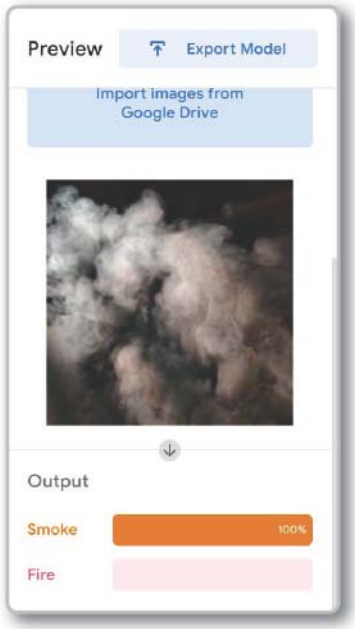


Step 10 Once the Training is completed, we are ready to test the model. To test we can upload the images that we want to test to see if the model is able to distinguish between the Fire and smoke and with how much accuracy.

Step 11 When the test image is uploaded, it will show under Output, as to how much it is confident about the image. In this case, it is 100% confident that it is fire.

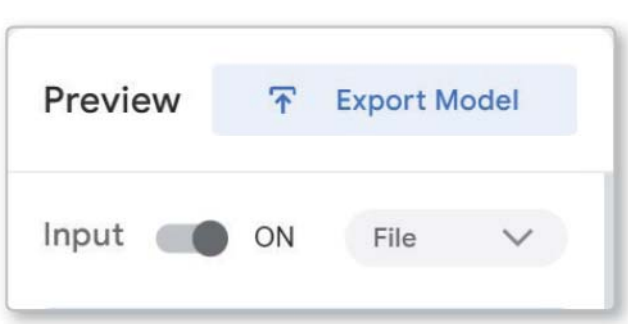


Step 12 We can test the same with images of the smoke, and also with the combined image of smoke and fire, like we have done below.

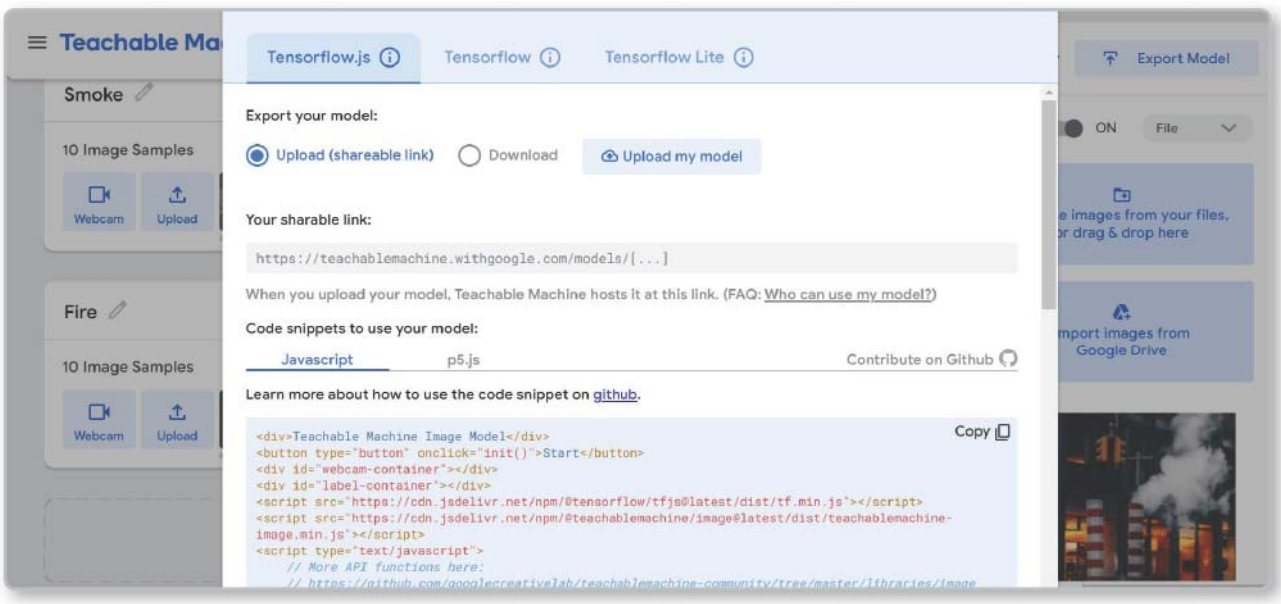


If you feel the results are not appropriate, you need to get more images of smoke and fire and upload them and train the Model again, till you get the appropriate result.

Step 13 Once you are sure of the functioning of the model and its output, you can export the Model.



Step 14 The Model js code can be shared through a shareable link or can be downloaded for further use.



Activity 2: Building an Image Classifier with Teachable Machine

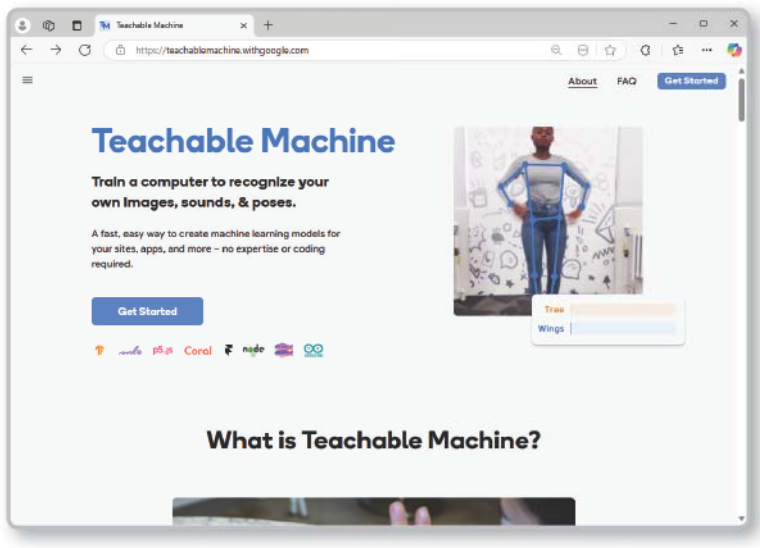
The goal of this activity is to leverage Computer Vision (CV) technology to automate and improve image classification tasks.

The steps to build an image classifier using teachable machine are as follows:

Step 1 Visit the https://teachablemachine.withgoogle.com/ website.

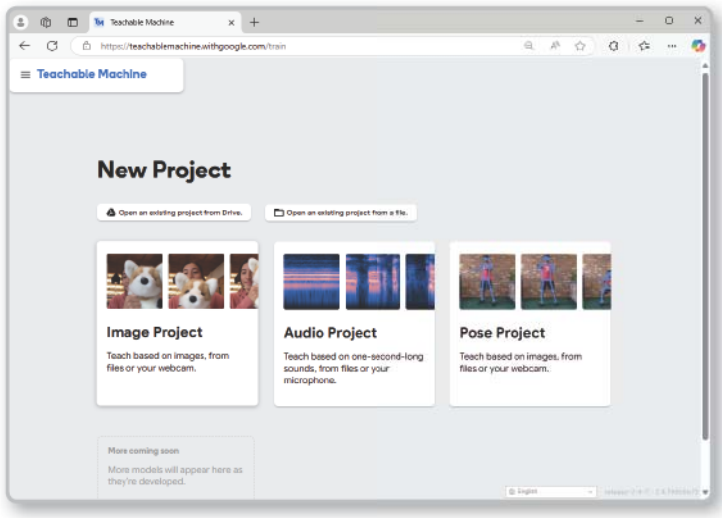
The **Teachable Machine** website opens.

Step 2 Click on the **Get Started** button.

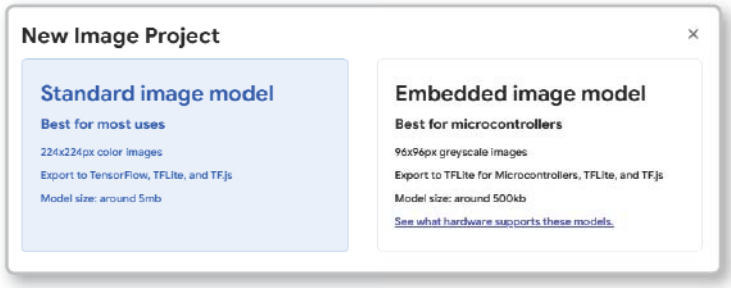


As you know, teachable machine allows you to create three types of projects, i.e., Image project, Audio Project and Pose Project.

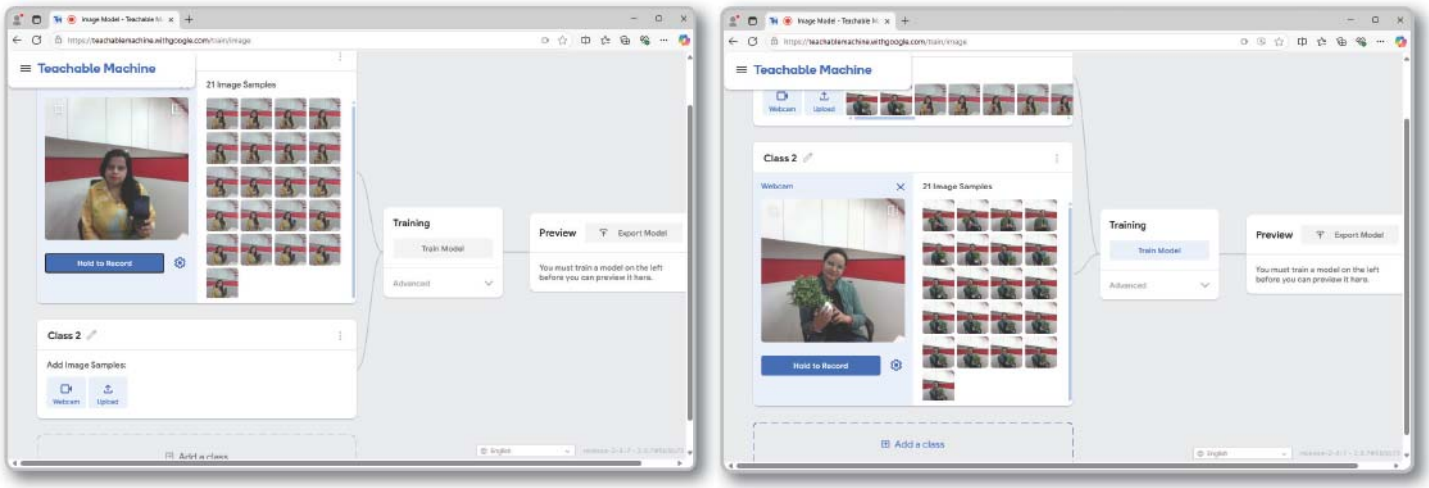
Step 3 Click on the **Image Project** button.



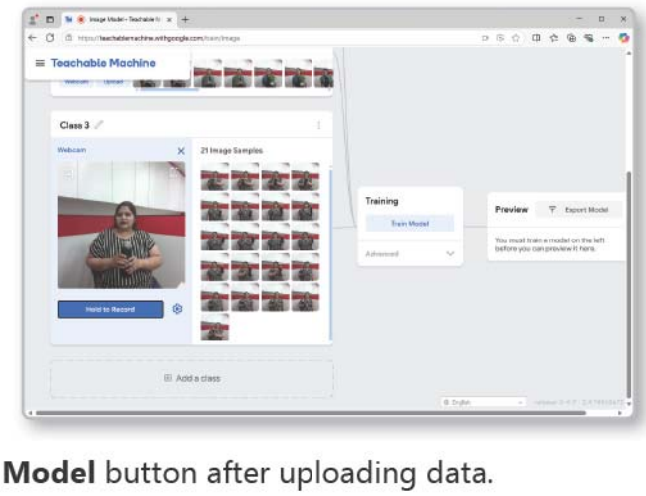
Step 4 Select the **Standard Image Model** option.



Step 5 Use your webcam to capture images or upload images for each class.
Ensure you capture diverse images for better accuracy.

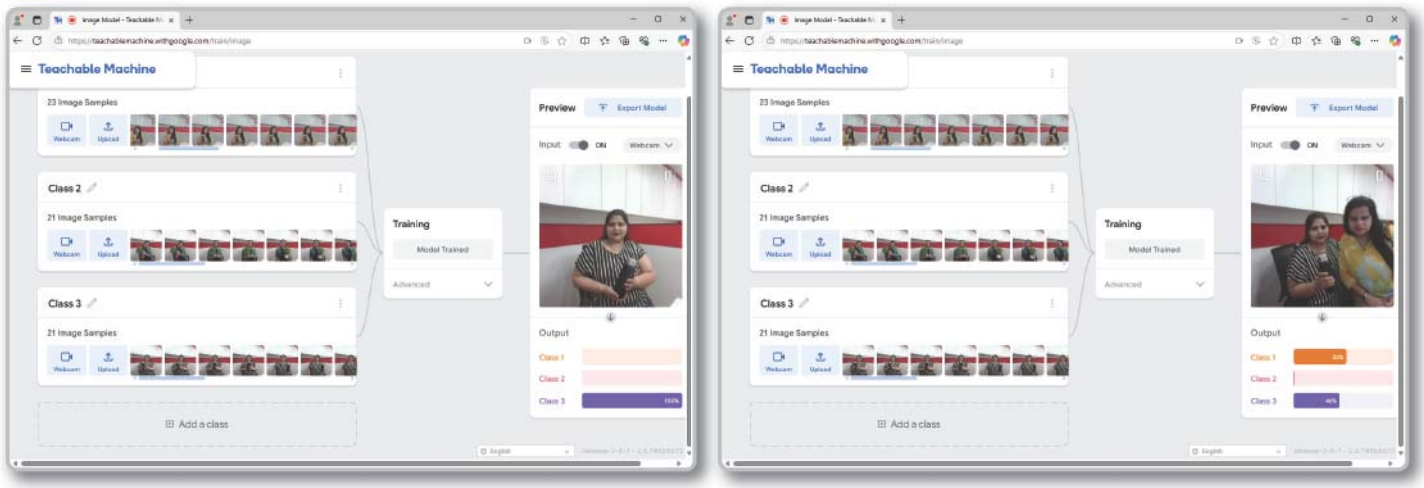


Step 6 Click on the **Add a Class** button to add more classes.



Step 7 Click on the **Train Model** button after uploading data.
Teachable Machine will automatically process the data and train the model.

Step 8 Click on the **Webcam** or uploading test images to check the model's performance.



Step 9 Export your model by selecting one of the following options:
Download: Save the model files for offline use.
Host: Use Google's hosting to generate a sharable link or API for integration.

Step 10 Integrate the model into your applications, such as websites, apps, or IoT devices, to classify images in real time.