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Objective detection using Azure custom vision AI

Open Lab | Digital Summit 2024

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Goal

In this hands-on lab, you will learn how to develop and train an **object detection model** using **Azure Custom Vision AI**. The model will be trained to accurately identify and locate multiple objects within images based on predefined categories (e.g., cars, people, animals, etc.). You will work with labeled training data to teach the model how to recognize and classify objects in new, unseen images. By the end of this lab, you will understand how to evaluate the model's performance and deploy it for real-time applications, enabling automated image analysis and object identification in practical scenarios.

Pre-Requisites

- Microsoft Azure Billing account (Custom Vision AI)

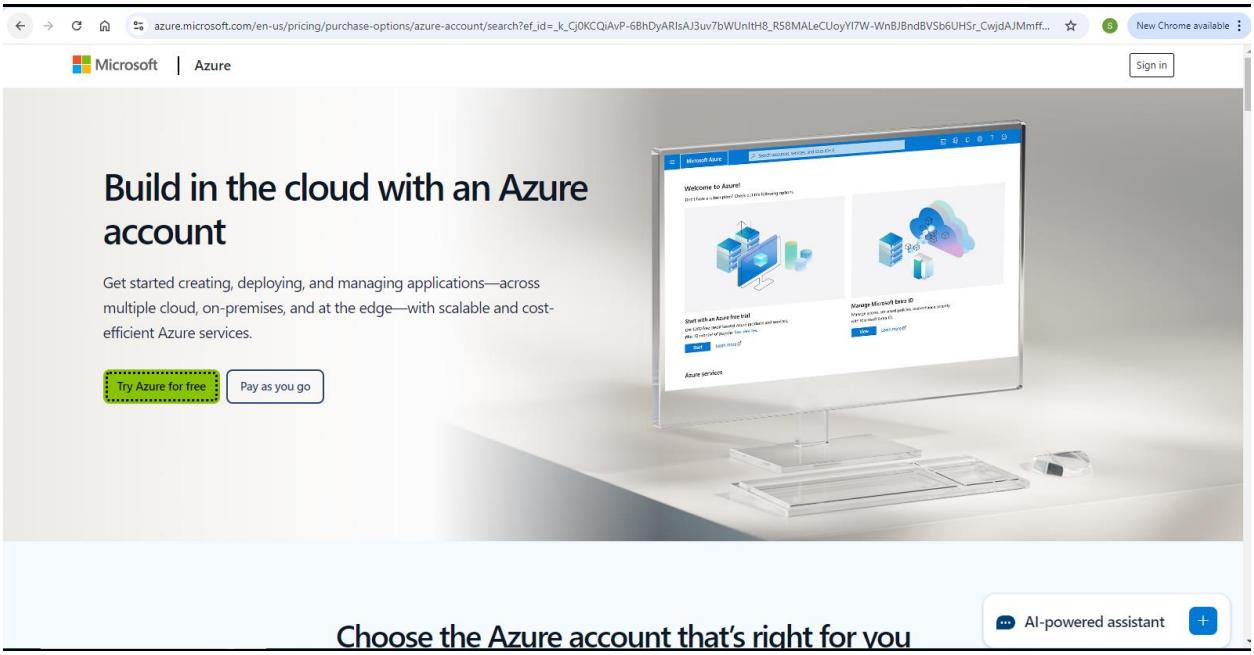
Technology Involved

- Object Detection (AI)

Steps to Get Started

Step 1 | Create an Azure Billing Account

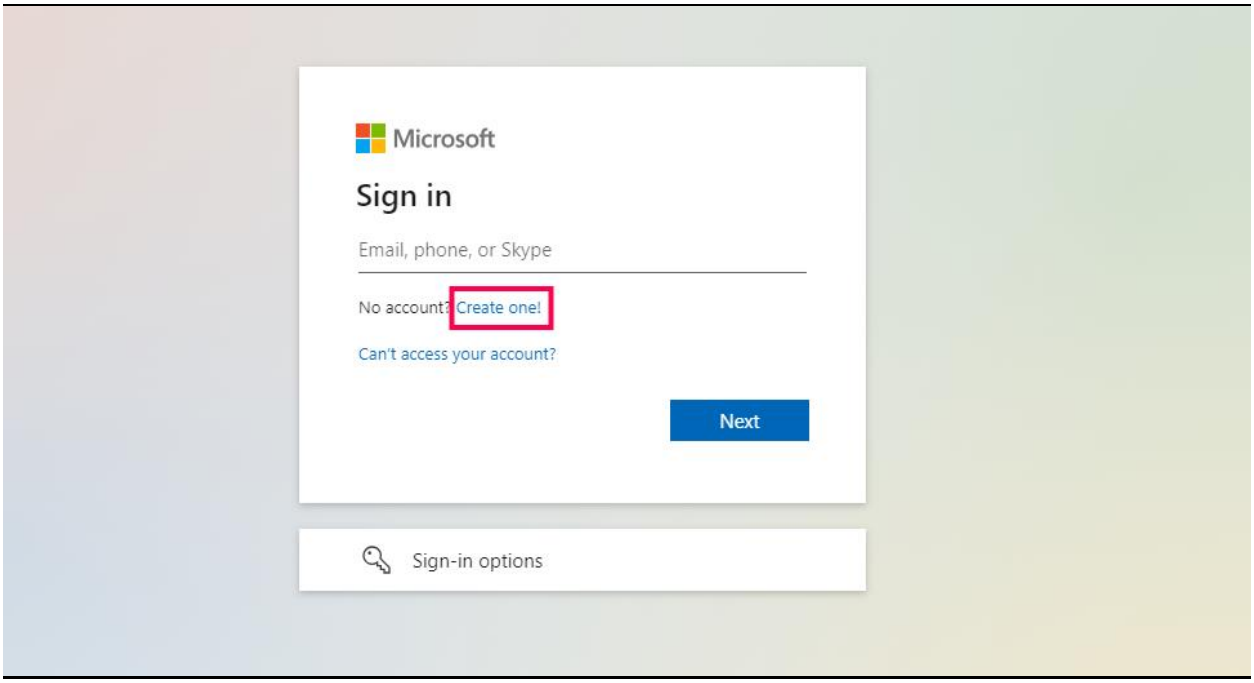
The project requires an Azure account



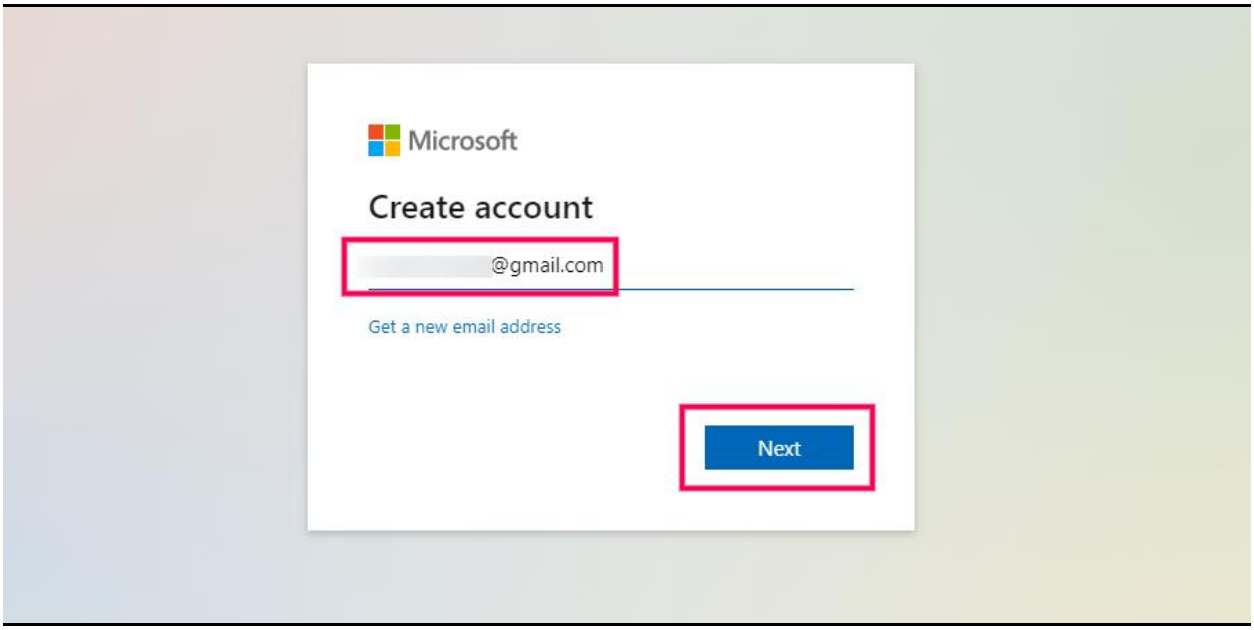
If you don't have an account, you can create a free account using the link below:

Link [microsoft signup link]

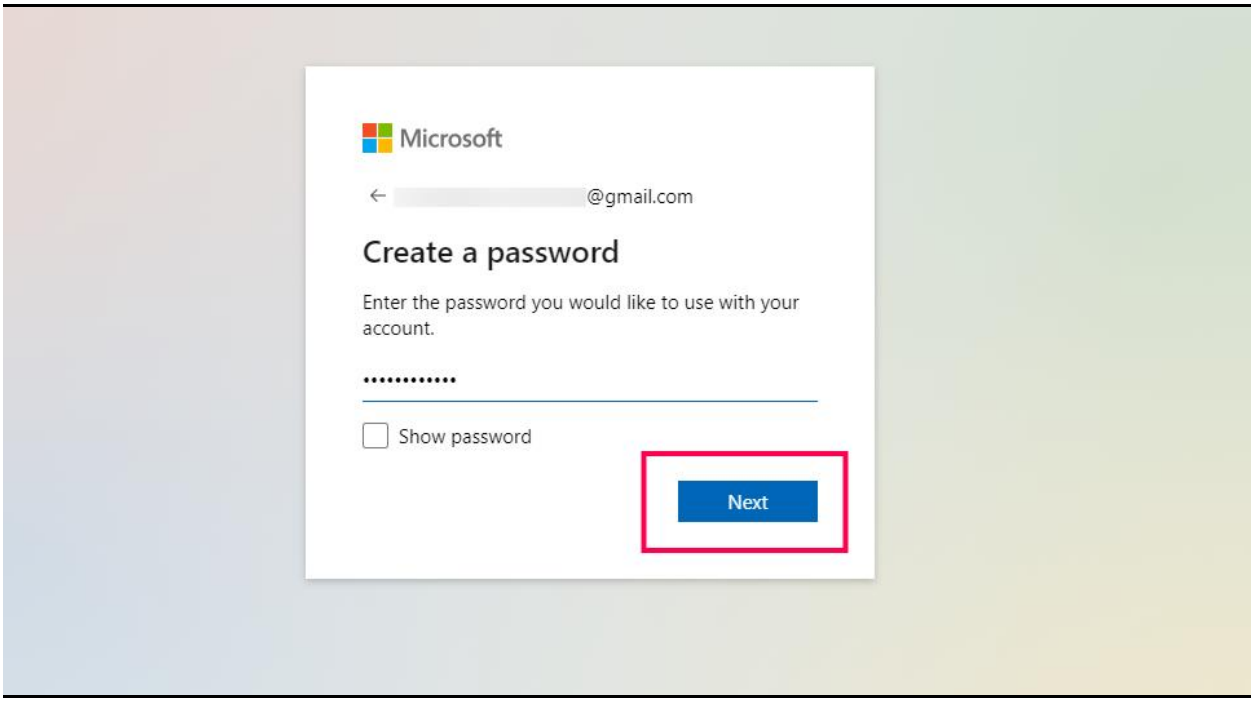
Click on **create New** to set up a new account.



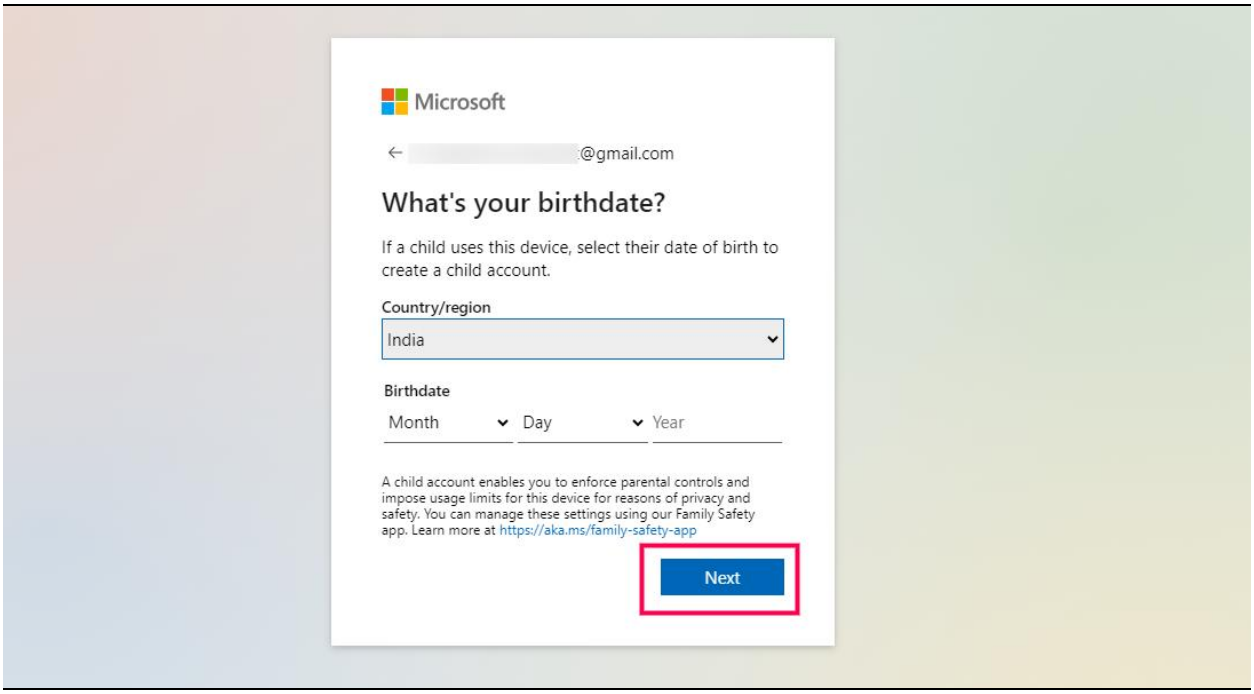
Enter your email address and click the **Next** button.



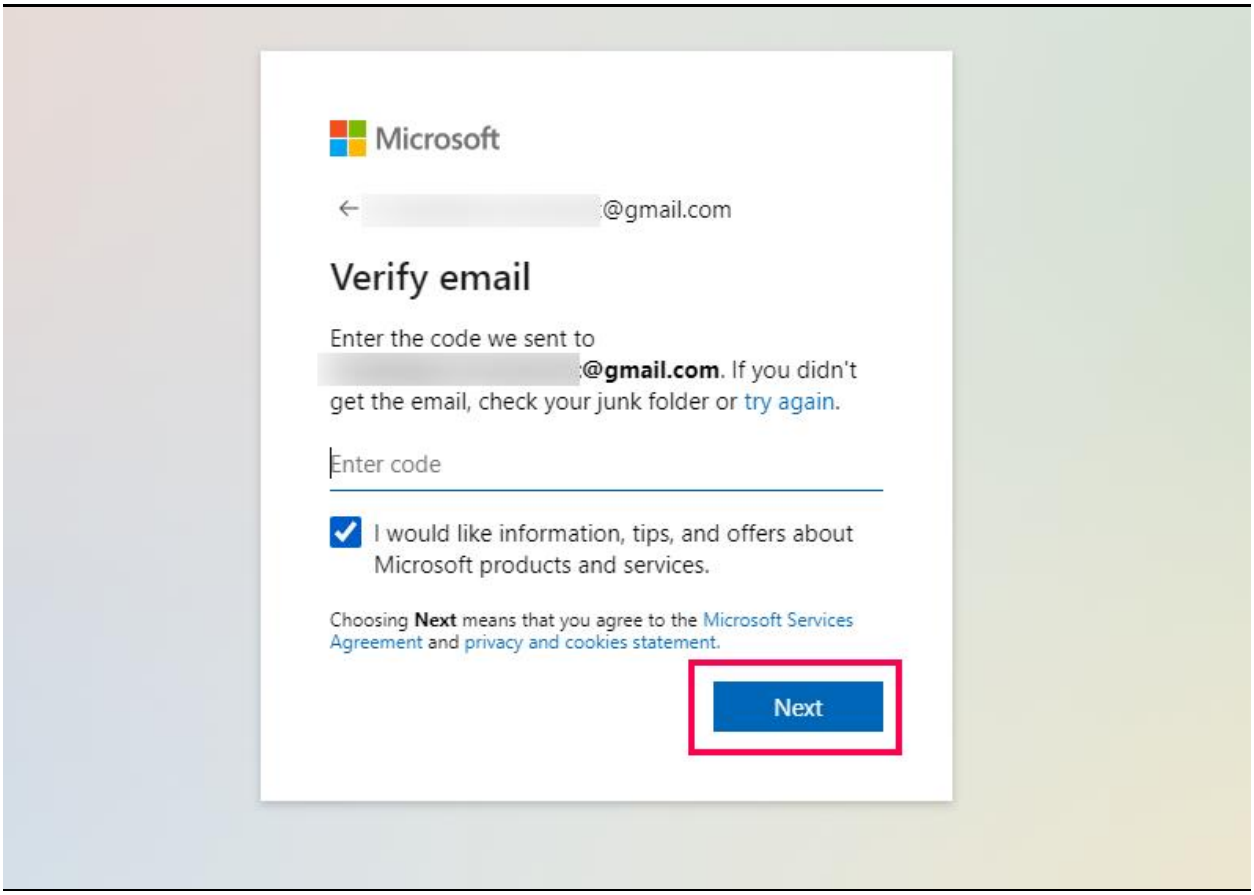
Create a new password and click the **Next** button.



Select your country, enter your date of birth, and click the **Next** button.

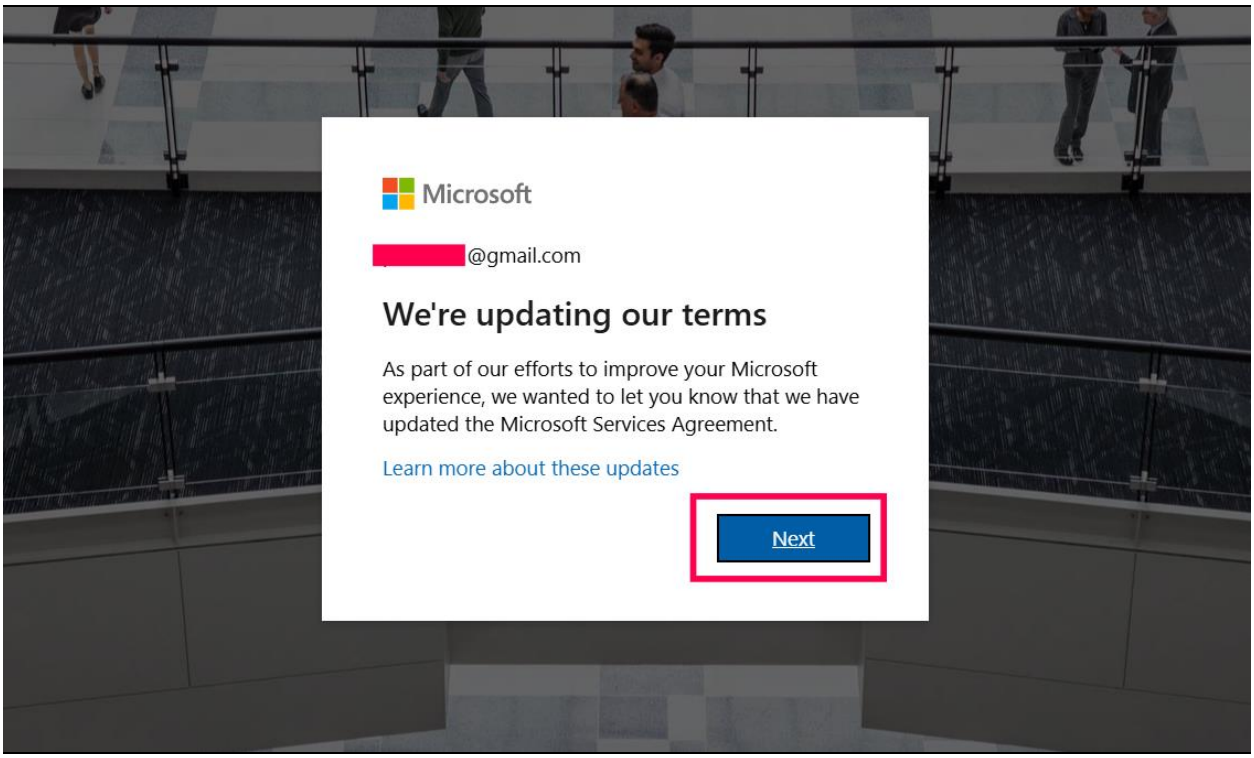


Enter the verification code sent to your email, select the checkbox, and click the **Next** button.



If all the details are entered correctly, a pop-up will appear as shown in the image below.

Now, click the **Next** button.

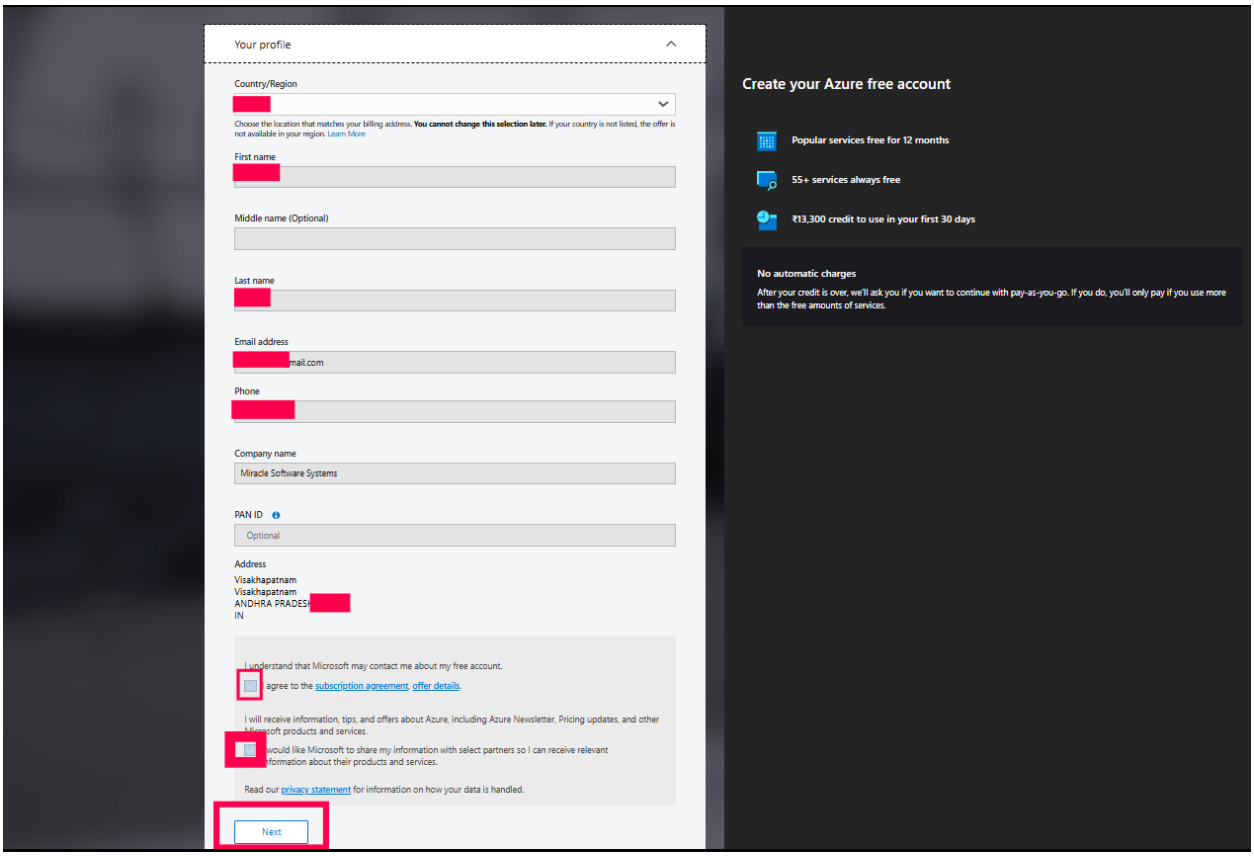


If you already have an account, sign in with your credentials and add a credit card.

Enter the credit card details shown in the image below.

- **Country/Region:** Name of the country
- **First Name:** Enter your first name
- **Middle Name:** Enter your middle name(optional)
- **Last Name:** Enter your Last name
- **Email:** Enter your Email ID
- **Phone:** Enter your phone number
- **Company Name:** Enter your company name
- **PAN ID:** Enter your PAN ID(Optional)

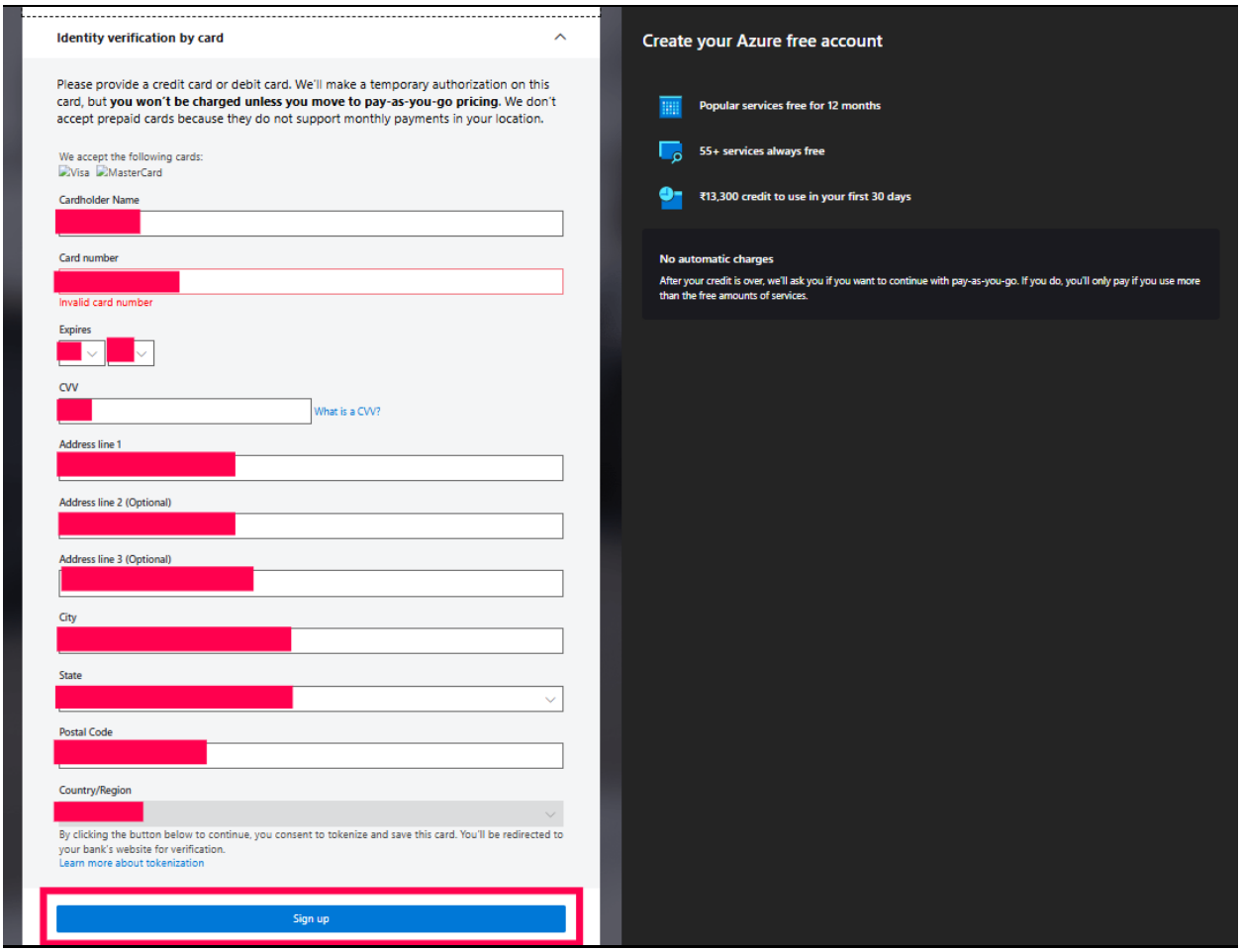
Check both checkboxes and then click on **Next**.



Enter the details below on the next page

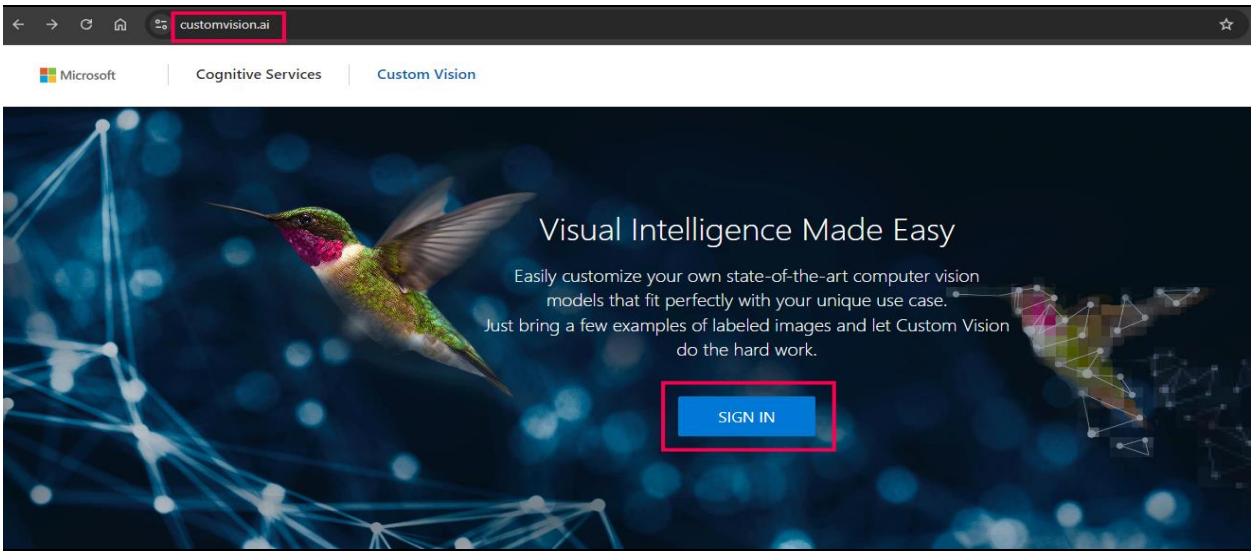
- **Cardholder Name:** Enter the cardholder's name
- **Card Number:** Enter card Number
- **Expires:** Enter the Expiry date
- **CVV:** Enter CVV number
- **Address:** Enter Address
- **City:** Enter City
- **State:** Enter State
- **Postal Code:** Enter postal Code
- **Country/Region:** Enter country

Finally, click the **Sign Up** button.

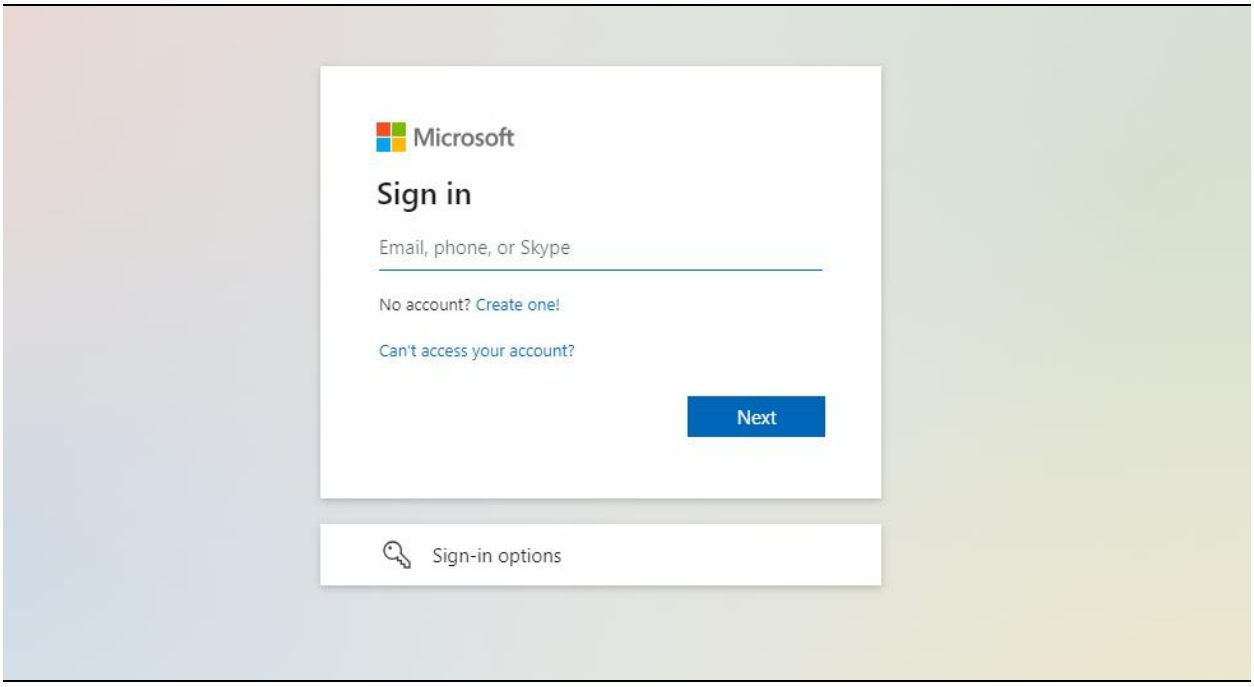


After adding a credit card, you should be able to create the project using Azure Custom Vision AI.

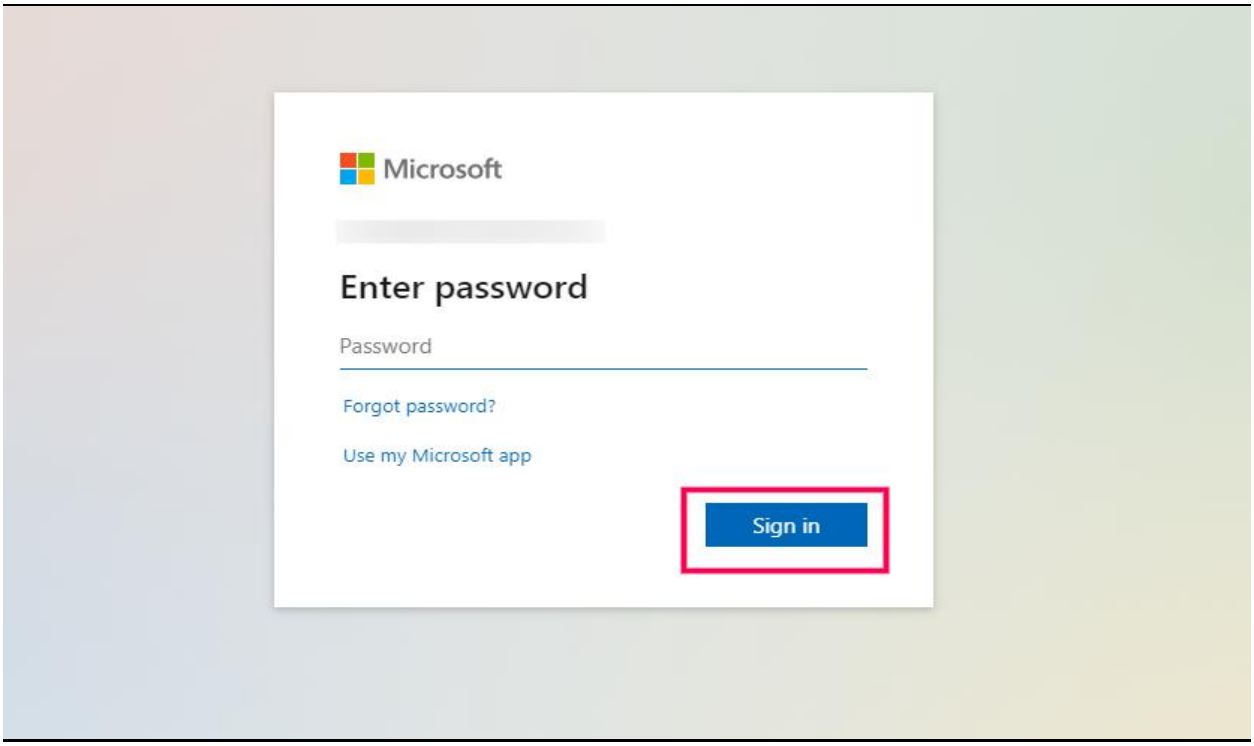
- To Create a Project in Azure Custom Vision AI, visit the following link: [Azure Custom Vision]
- If you already have a billing account, Sign in with your credentials. by clicking the Sign in button



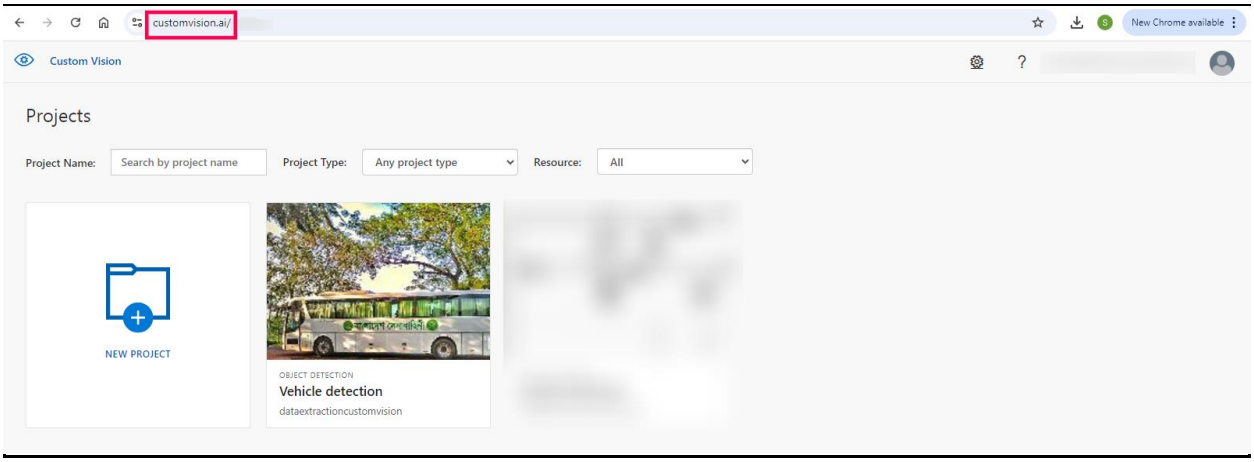
When you click the Sign In button, a pop-up will appear, similar to the image below. Enter your email or phone number and click the Next button.



Now, enter your password and click the Sign in button.

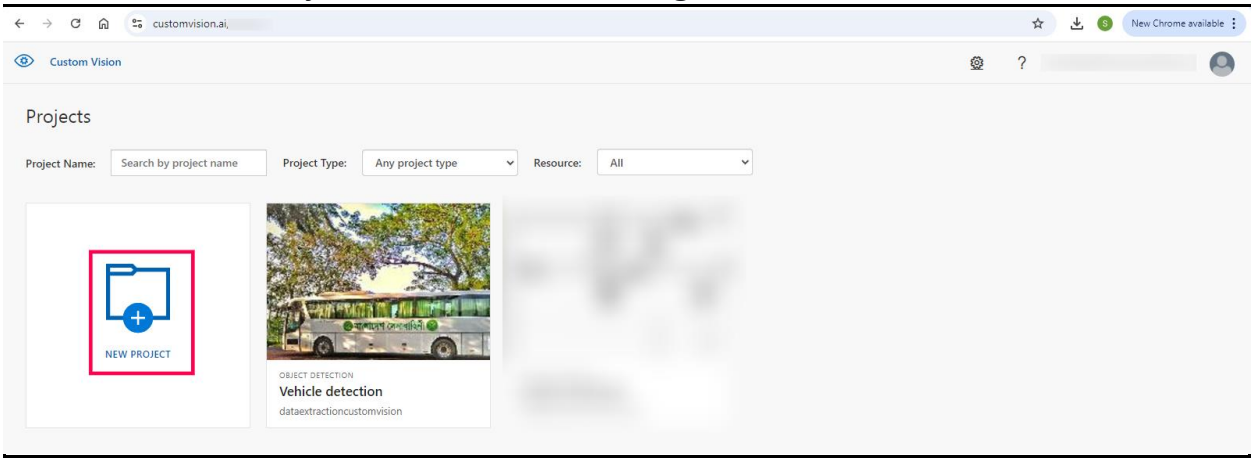


After clicking the sign-in button, the dashboard will appear, similar to the image below.



Step 2 | Create New Project

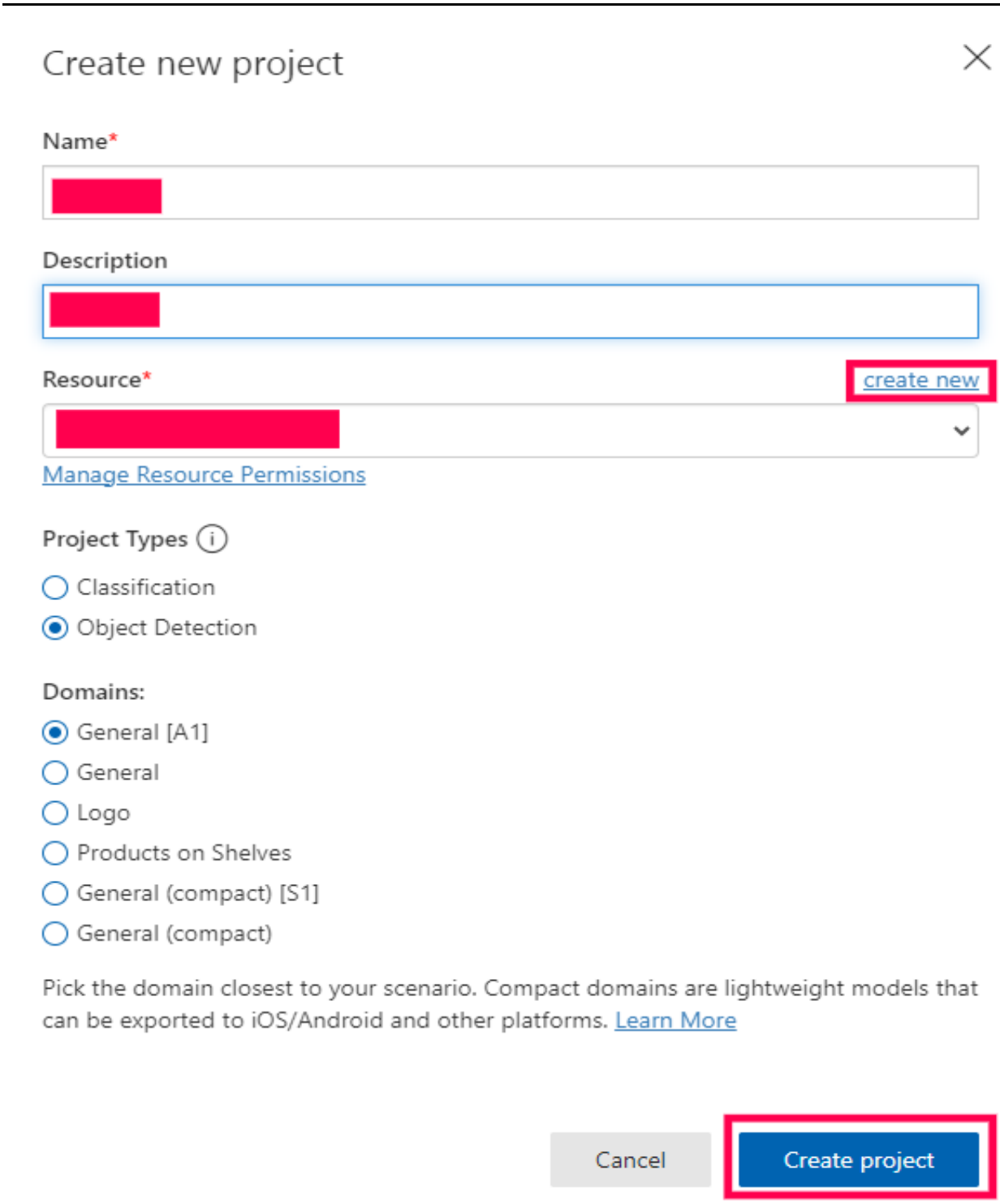
Click on New Project as shown in the image below.



When you click on New Project a screen similar to the image below will appear. Fill in the required fields as follows:

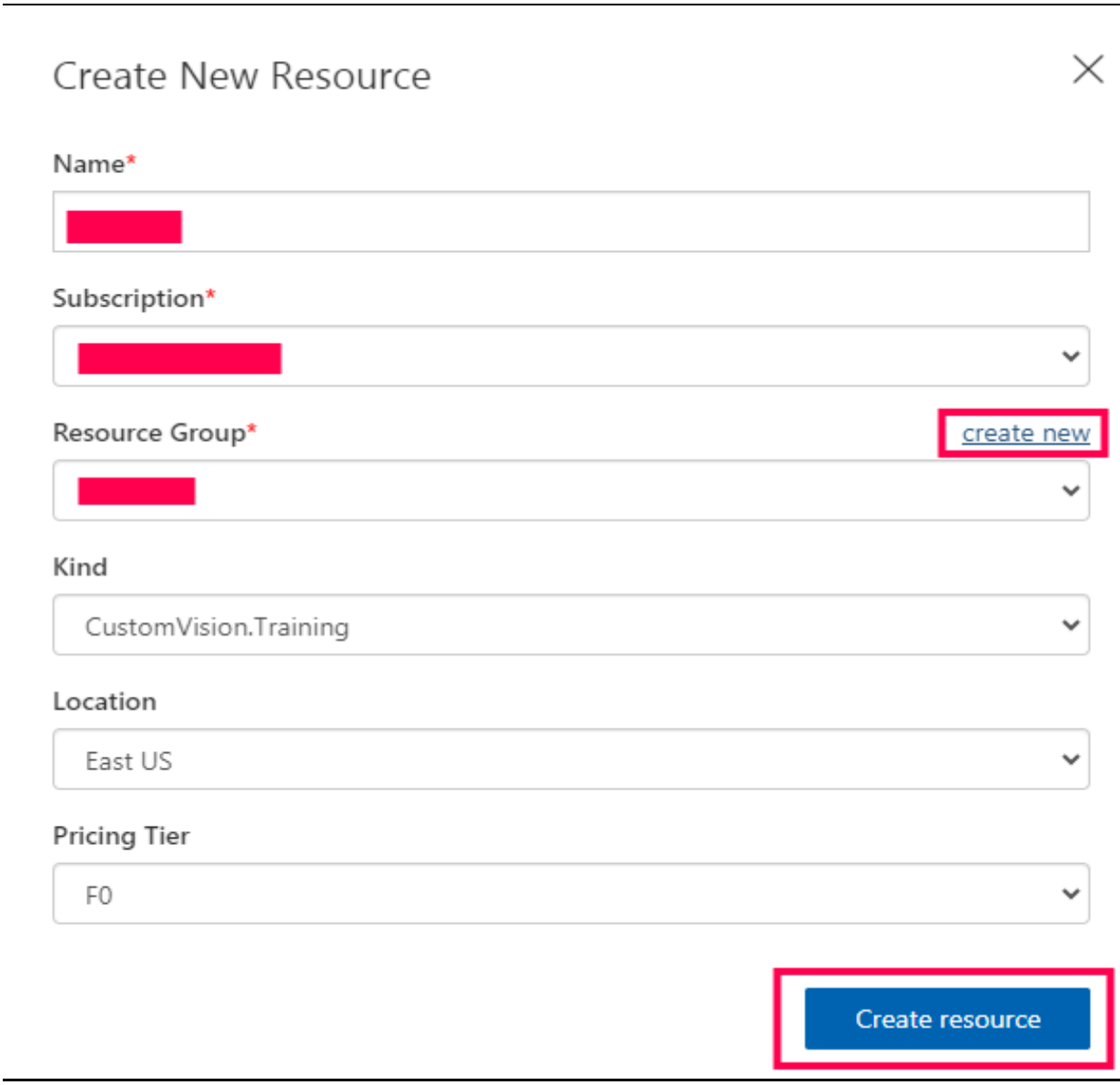
- **Name**: Enter a custom name for your project
- **Description**: (Optional) Provide a meaningful description for the project
- **Resource**: Select the created resource from the dropdown. If no resource is available, click Create New and refer to the images below for guidance on creating a resource
- **Project Type**: Select **Object Detection**
- **Domains**: Choose **General [A1]**

If a resource has already been created, click "Create Project." Otherwise, follow the steps and images below.


Create new project
Name*
Description
Resource*
create new
Manage Resource Permissions
Project Types
Classification
Object Detection
Domains:
General [A1]
General
Logo
Products on Shelves
General (compact) [S1]
General (compact)
Pick the domain closest to your scenario. Compact domains are lightweight models that can be exported to iOS/Android and other platforms. Learn More
Cancel
Create project

To Create New Resource

- **Name**: Enter a custom name for your resource
- **Subscription**: Select the appropriate subscription from the dropdown



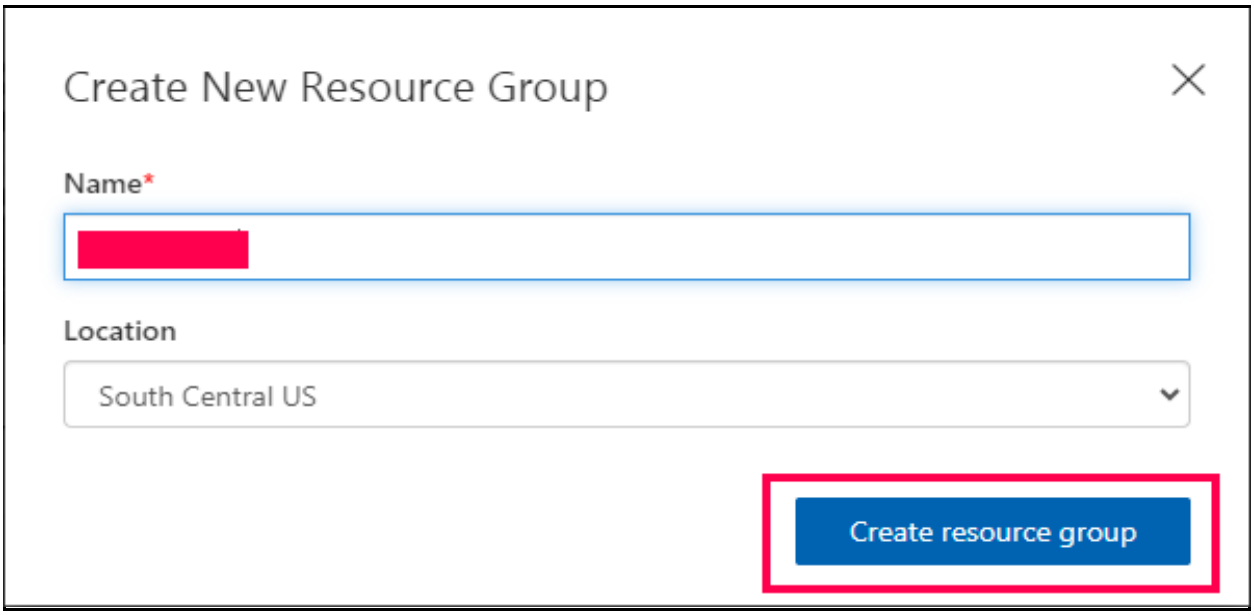
- **Resource Group**: If an existing resource group is available, select it from the dropdown. Otherwise, click Create New and follow the next step
- **Kind**: Select **CustomVision.Training**

- **Location**: Choose **East US**

To Create a New Resource Group:

- **Name**: Enter a custom name for your Resource Group
- **Location**: Select a location from the dropdown

Finally, click on the **Create Resource Group** button.



Now, select the resource group from the dropdown under Resource Group in the Create New Resource section, and then click the Create Resource button.

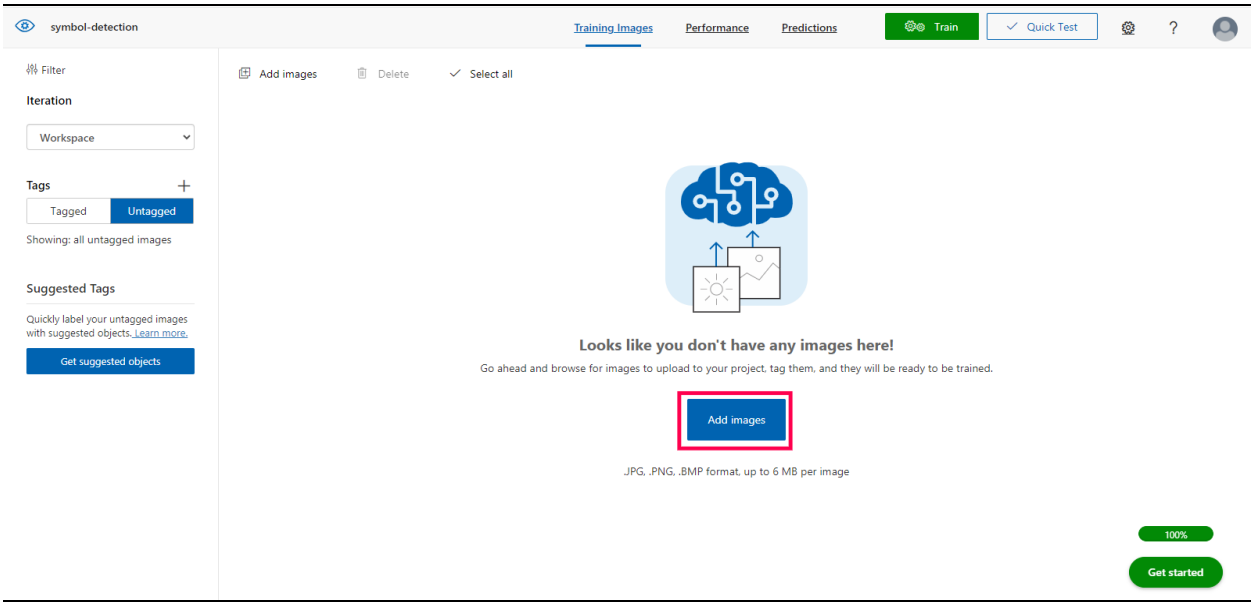
After creating a new resource, select the Resource Name from the dropdown under **Resource** in the Create New Project section.

Click the **Create Project** button as shown on the above **Create Project** step.

The newly created project will open, as shown in the image below.

Step 3 | To Insert Data into the Project

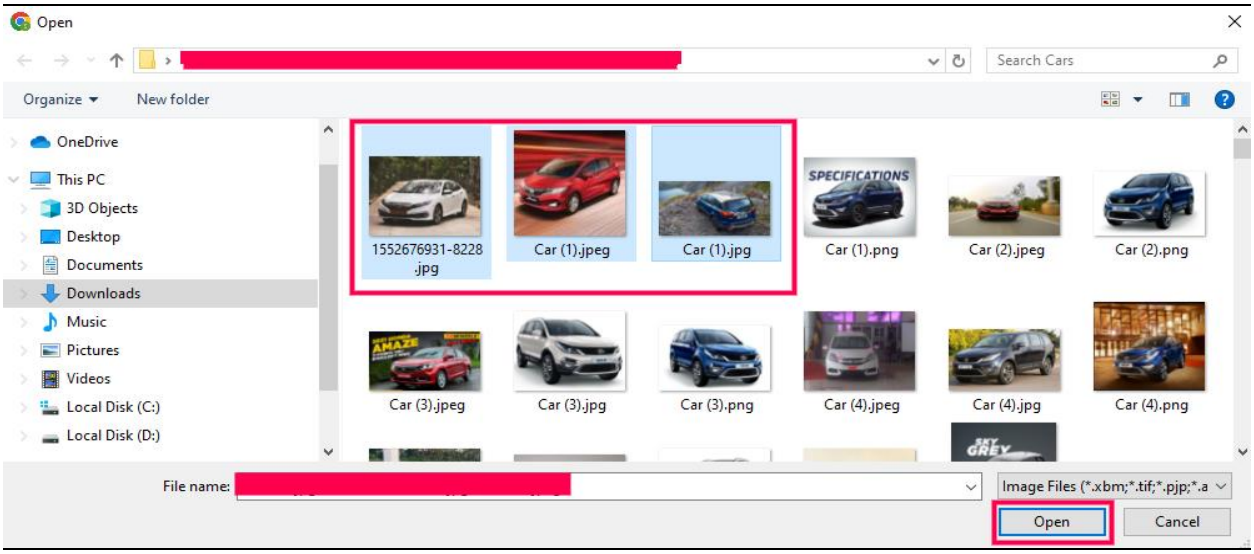
Click on the All Images button to upload images into the project



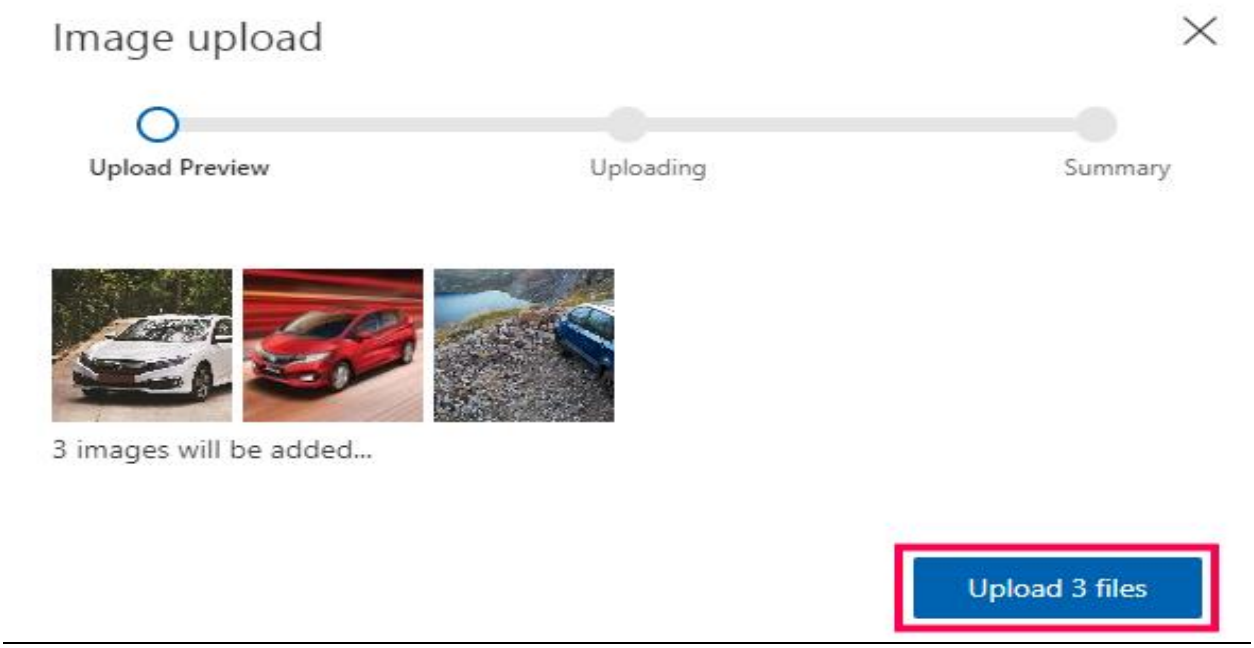
Clicking the button will open the window as shown below. You can upload either multiple images at once or a single image to the project. After selecting the images, click the **Open** button.

First, download the ZIP folder from GitHub to upload the images using the link below.

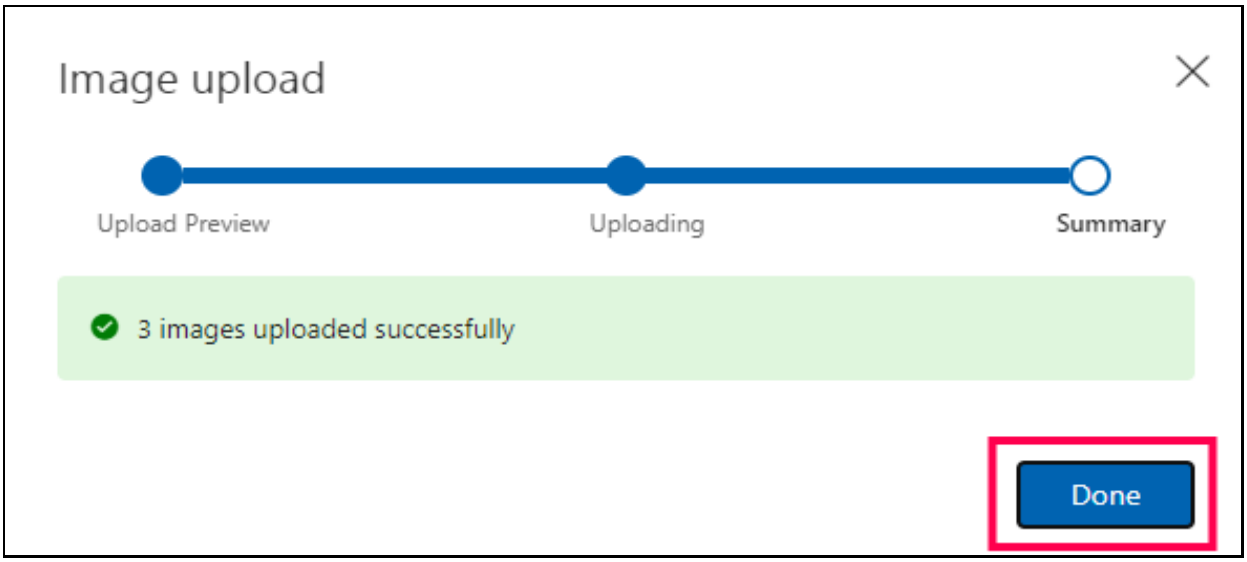
Link: Demo Images



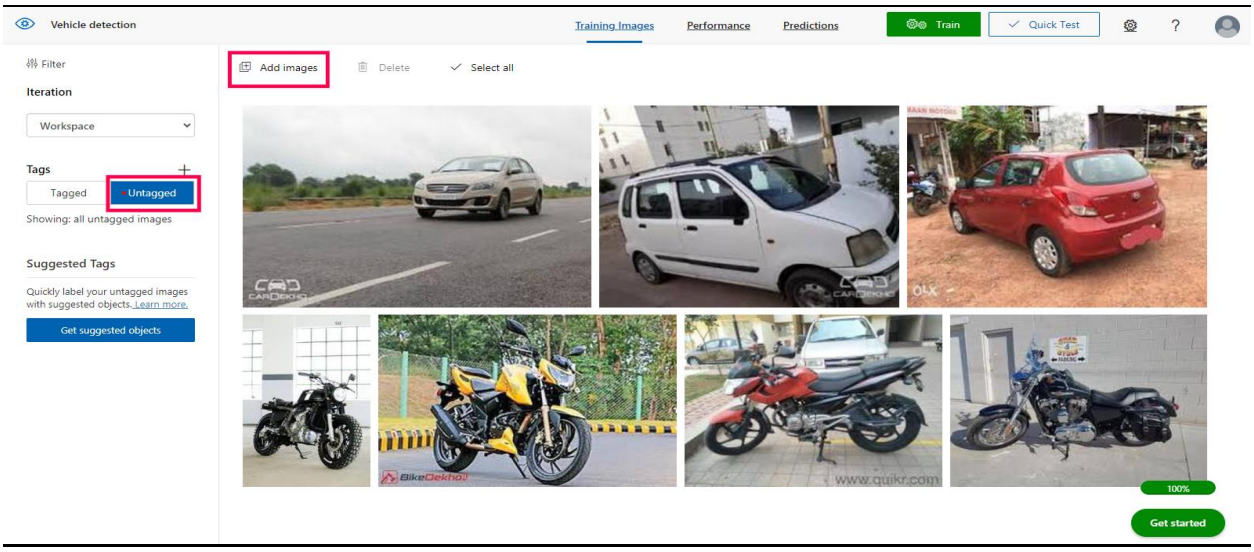
Click the **Open** button, and a pop-up will appear as shown below. Then, click the **Upload**.



If the images are successfully uploaded, click the **Done** button.

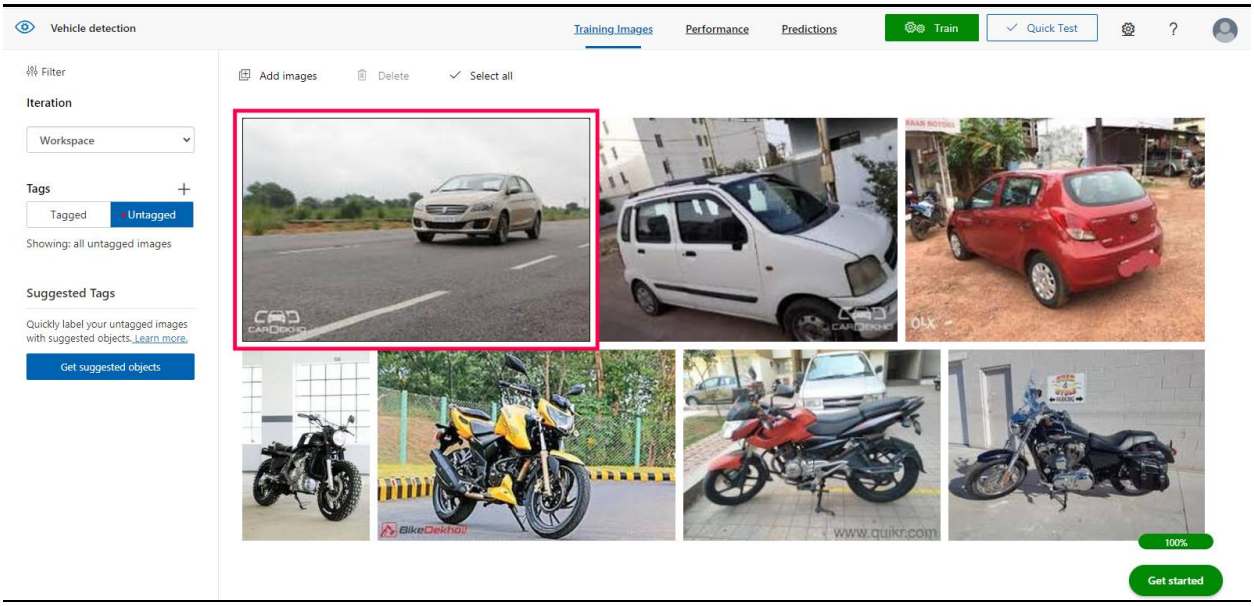


If the user wants to upload images again, click the **Add Images** button and repeat the process mentioned earlier. The uploaded images will appear under **Untagged**.

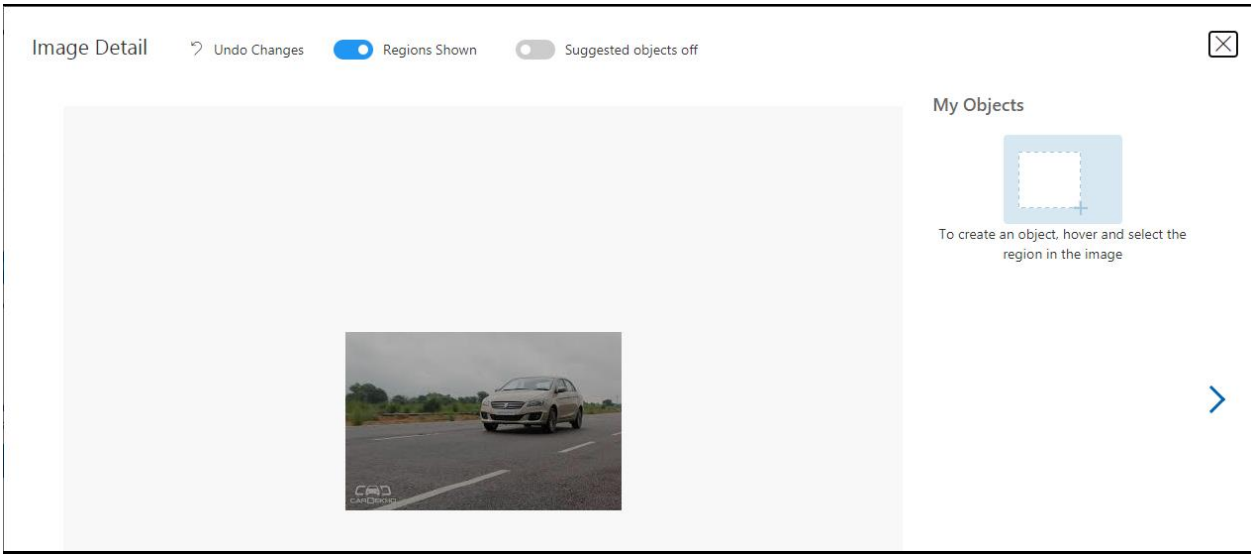


Step 4 | Tag Objects Present in the Images

If a user wants to tag the objects in an image, select the specific image listed under **Untagged**.

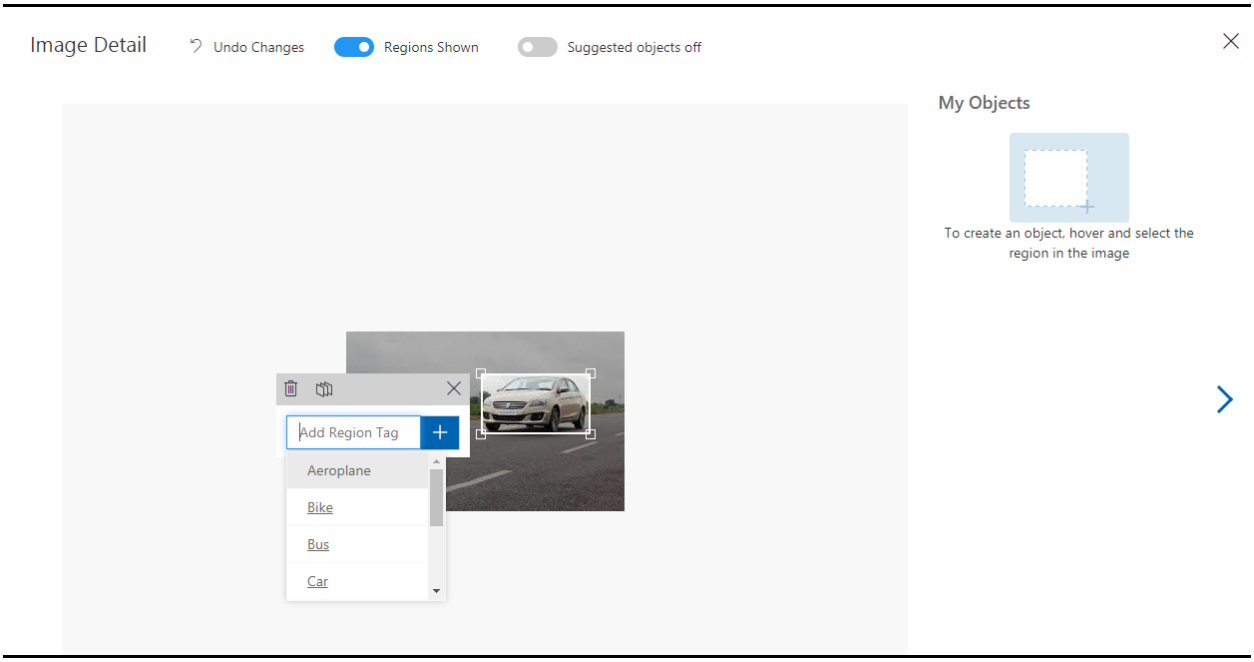


It will open as shown in the image below.



To select objects in the image, the user must draw a rectangular or square box around each object and add a **Region Tag** for that object. Repeat this process for all objects in the image.

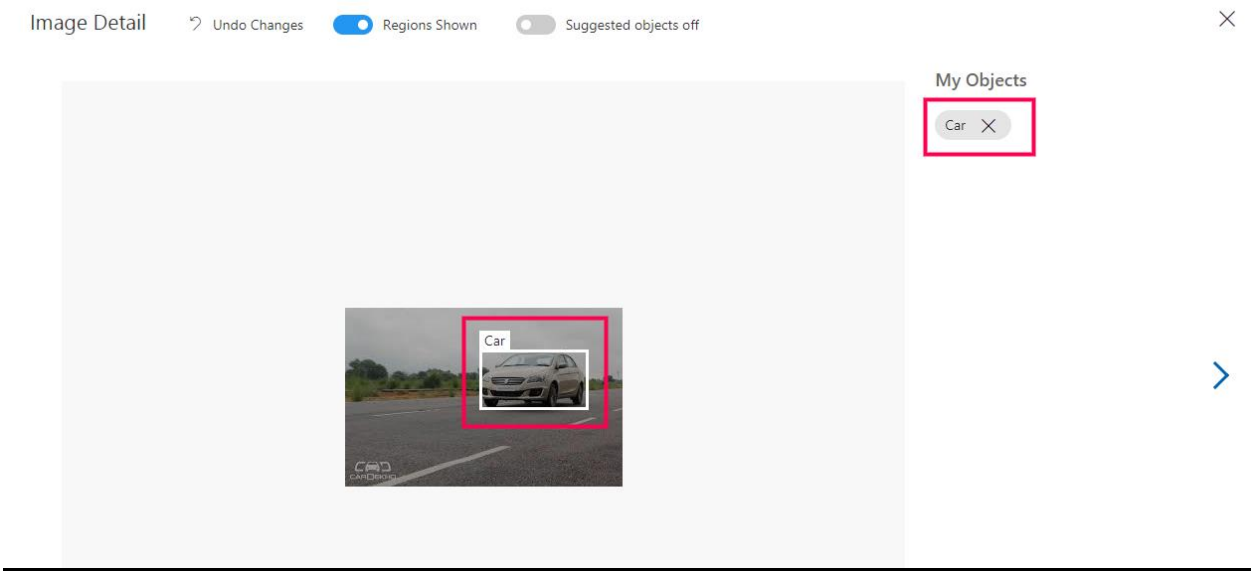
For reference, see the image below.



Once all the tags are added for the objects in the image, the user will be able to see the unique objects listed on the right side of the image under **My Objects**.

For reference, see the image below.

Repeat the same process for all images in the **Untagged** state.

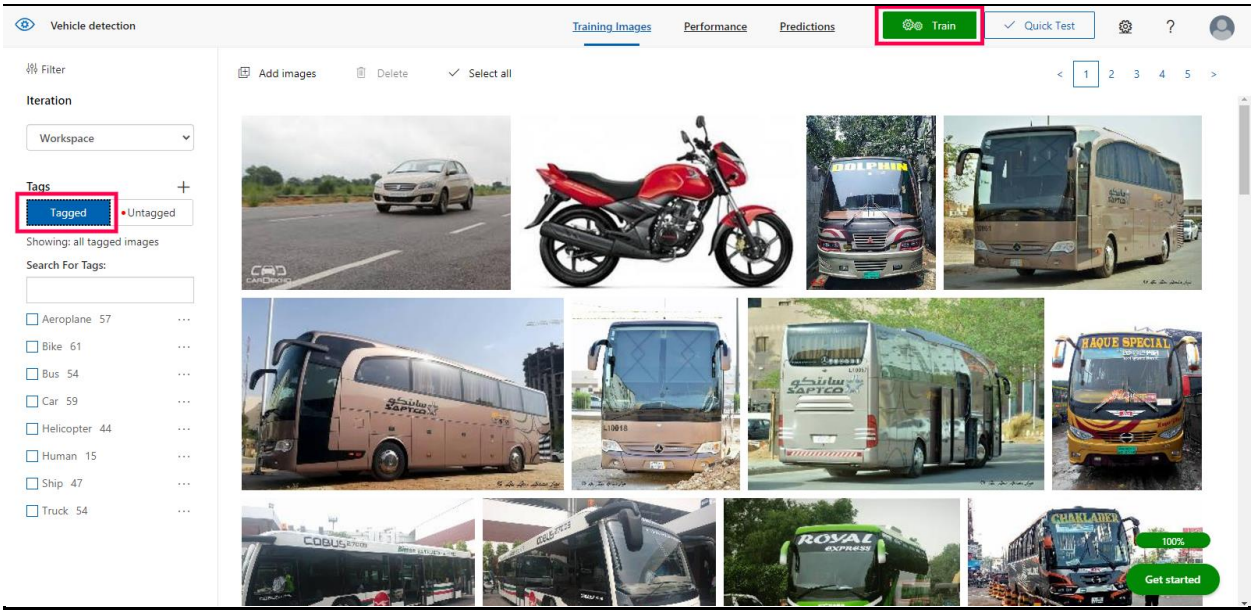


- Once all the tags are added, the images will move to the **Tagged** state
- For reference, see the image below
- For each object or tag, the minimum count should be 50 to achieve better accuracy, ensuring the model predicts with high precision

Step 5 | Train the model with Tagged images

Once the labeling process is completed, click the **Train** button.

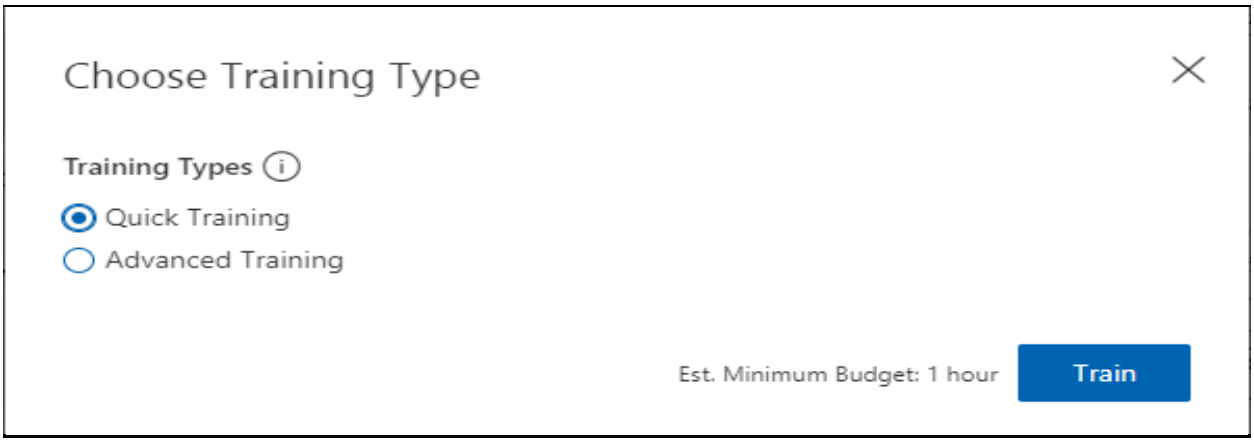
Refer to the image below.



Once you click the **Train** button, a window will open as shown in the image below.

There are two training types available. The user can select either options. If the user wants to use **Quick Training**, they should select it and then click the **Train** button.

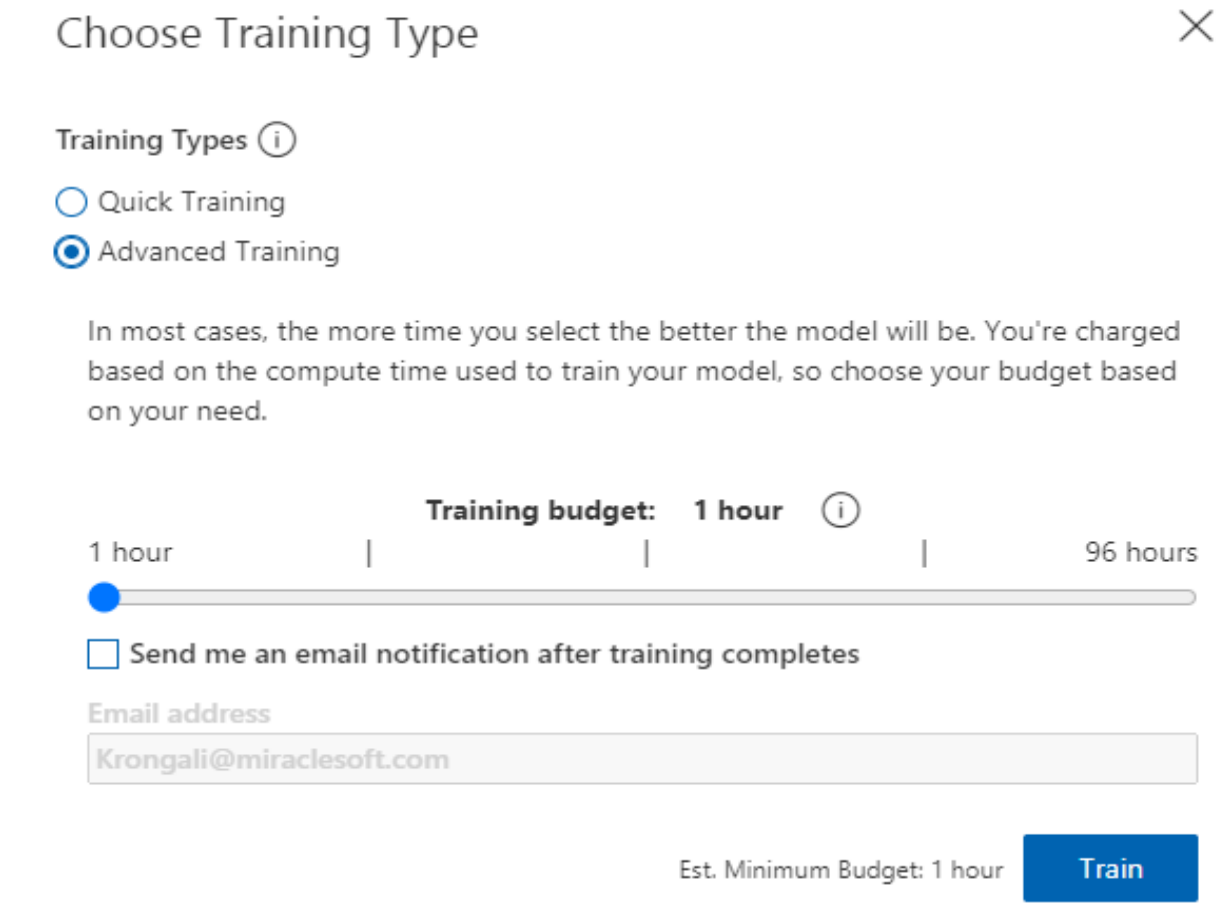
For reference, see the image below.



If users want to use Advanced Training, they should select Advanced Training and then choose the number of hours to train the model.

The user will be charged based on the selected hours, with a minimum of 1 hour required for training.

For this demo, use only **Quick Training** and **do not** use **Advanced Training**.



After choosing **Quick Training** and clicking the **Train** button, the training will take approximately 15 to 20 minutes. The training time depends entirely on the number of tagged images. If there are fewer tagged images, the training time will be shorter, and if there are more tagged images, the training time will be longer. The training duration is directly related to the number of tagged images.

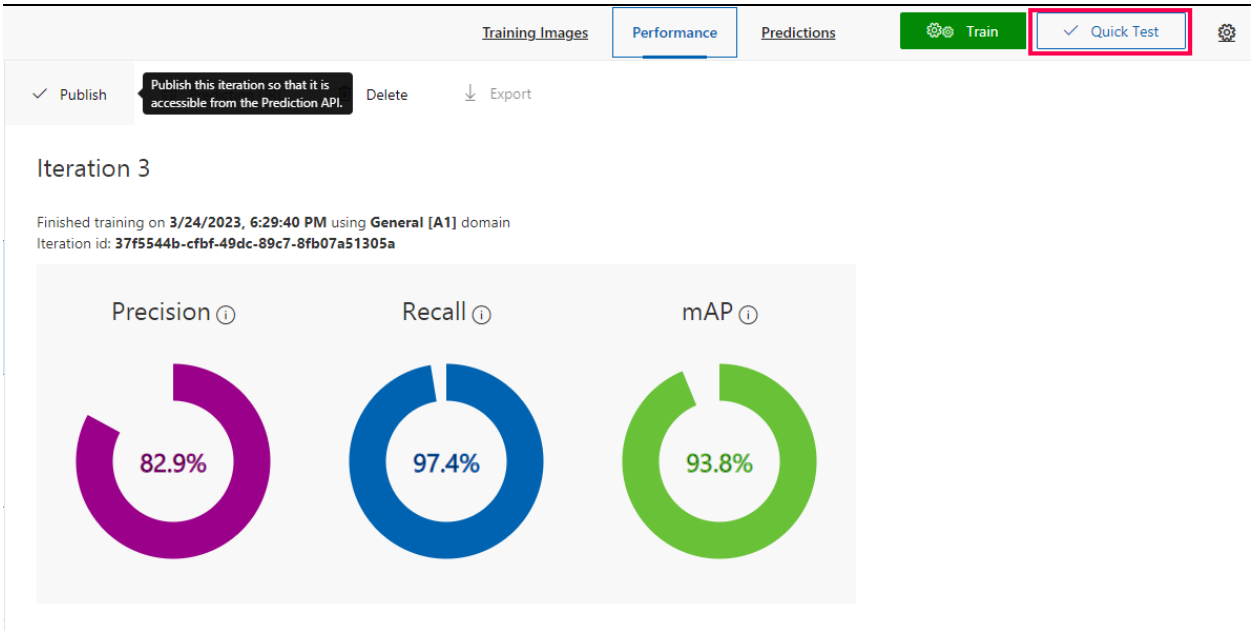
Please refer to the following link for pricing details:

Link: [Custom Vision Pricing]

Once the training is completed, it will open as shown in the image below.

Step 6 |Test the trained model.

Now, click on the **Quick Test** button to test the model after the training is complete.

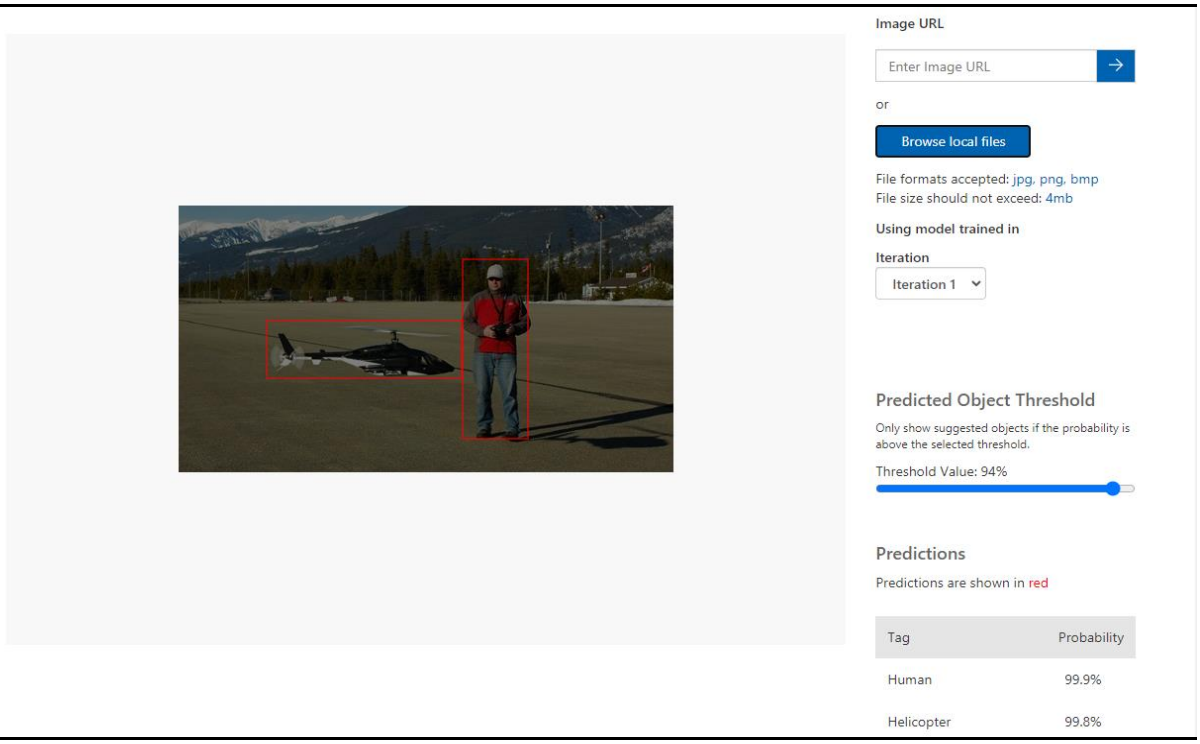


After clicking the **Quick Test** button, it will open as shown in the image below.

To upload images, the user can either provide a URL or upload images by browsing local files.

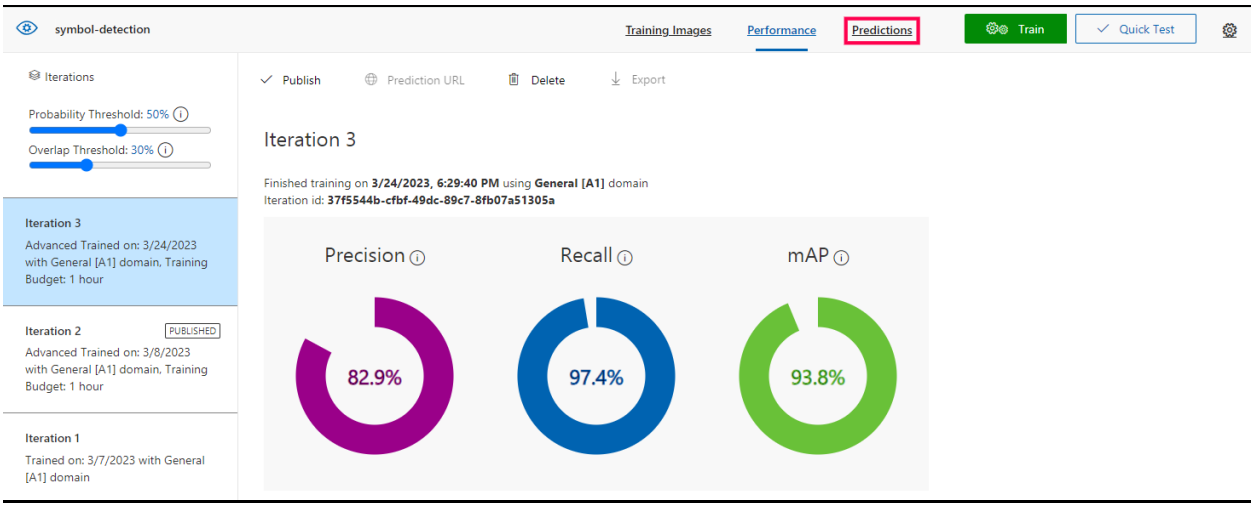
Once an image is uploaded for testing, the model will automatically identify the objects in the image and display the accuracy percentage for each prediction.

For reference, see the image below.

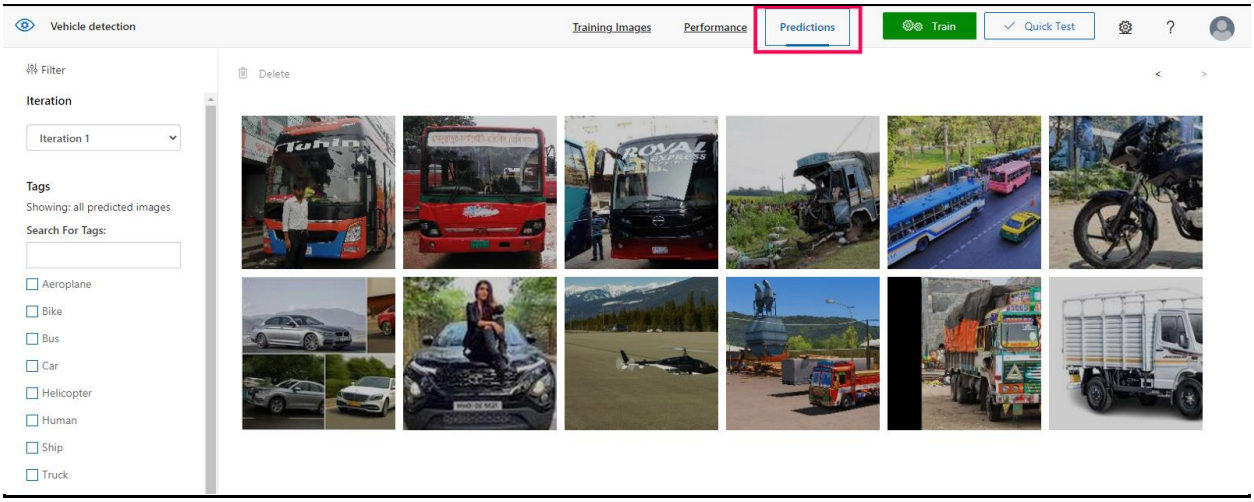


The tested images will appear under **Predictions**. To view the predictions, click the **Predictions** button.

For reference, see the image below.

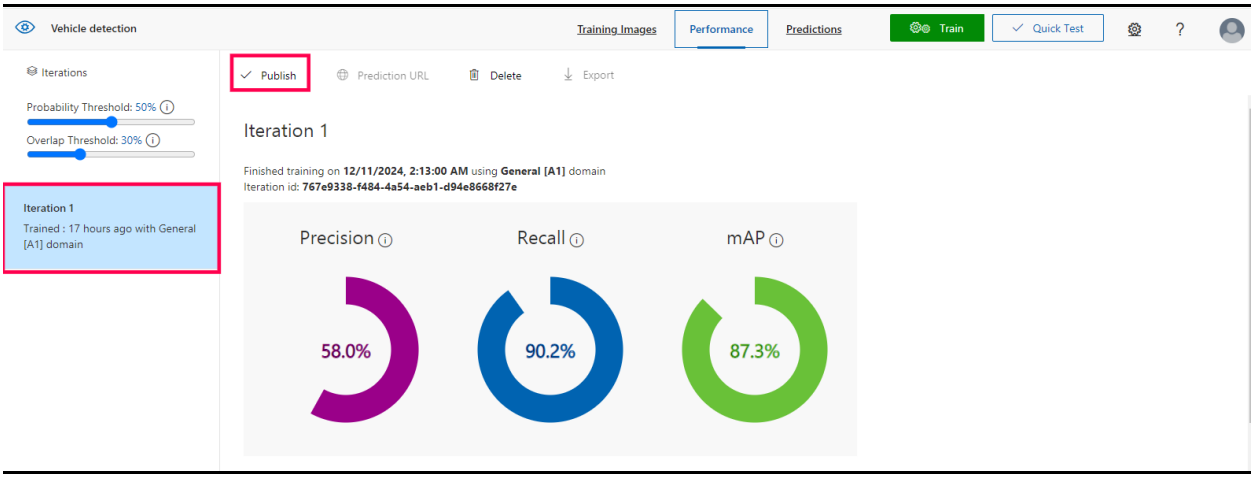


After clicking the **Predictions** button, it will open as shown in the image below.



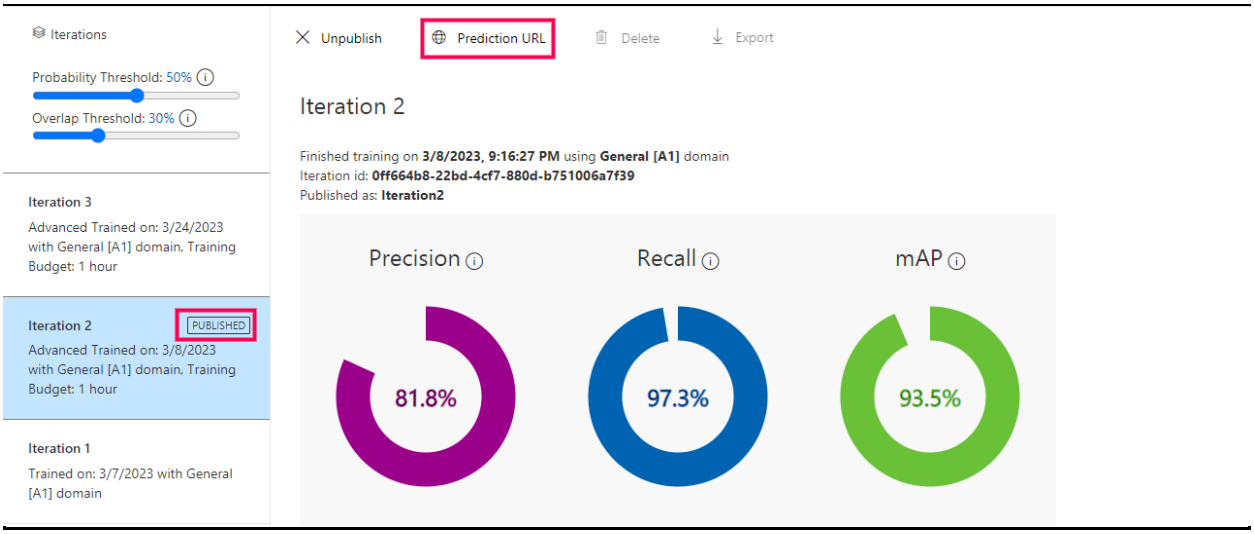
Step 7 | Train the Model with Tagged Images

If the user wants to publish the model, they need to click on the specific **Iteration** of the model and then select the **Publish** button to publish it.



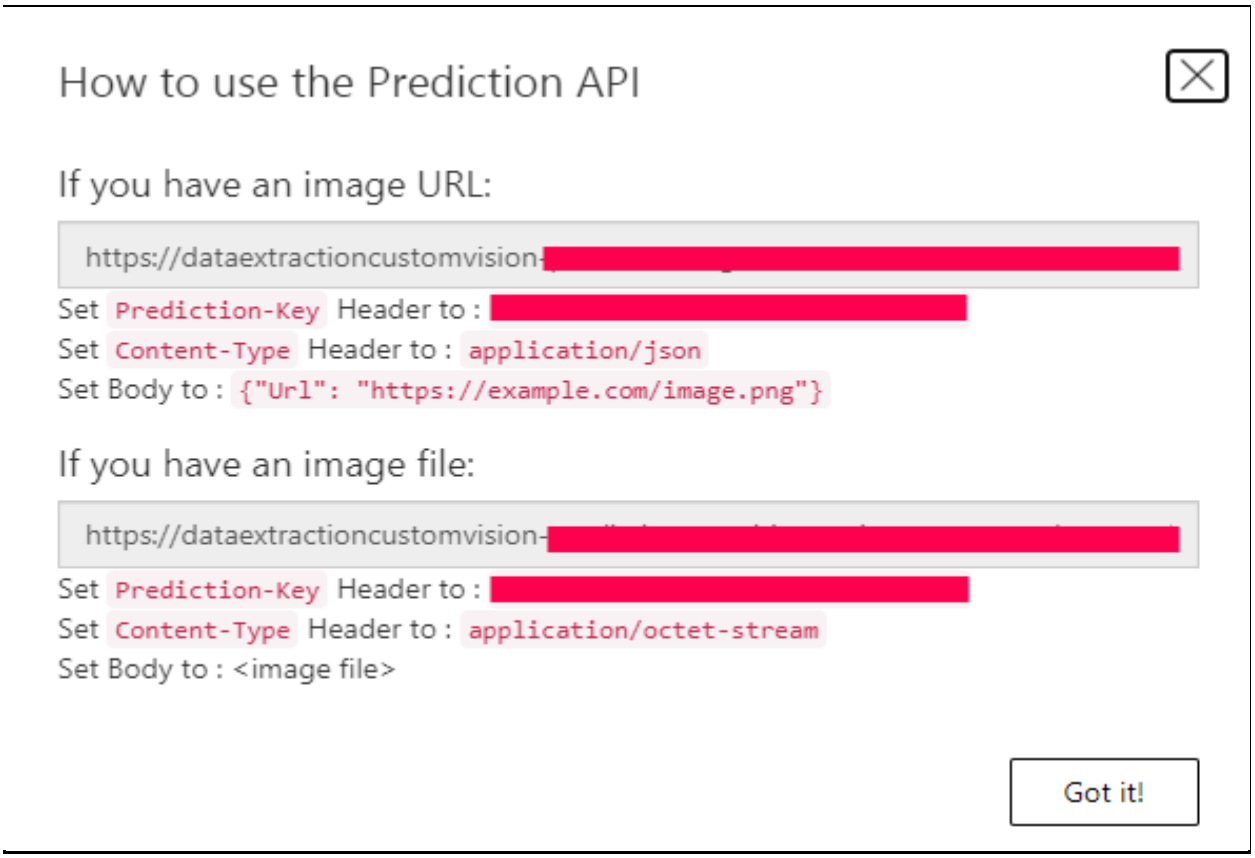
After the user selects the **Publish** button, the **Prediction URL** will be activated, and the corresponding iteration will be marked as **Published**.

For reference, see the image below.



If the user clicks on the **Prediction URL**, a pop-up will appear as shown in the image below.

From the image below, we can see two endpoints. One endpoint is used when the user provides an input as an image URL, and the other is used when the input is an image file.


How to use the Prediction API
If you have an image URL:
https://dataextractioncustomvision-
Set Prediction-Key Header to :
Set Content-Type Header to : application/json
Set Body to : {"Url": "https://example.com/image.png"}
If you have an image file:
https://dataextractioncustomvision-
Set Prediction-Key Header to :
Set Content-Type Header to : application/octet-stream
Set Body to : <image file>
Got it!