

AI 620 Emerging Topics in Artificial Intelligence

HOS01A Introduction to Amazon Rekognition

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Before You Start

- The directory path shown in screenshots may be different from yours.
- Some steps are not explained in the tutorial. If you are not sure what to do:
 1. Consult the resources listed below.
 2. If you cannot solve the problem after a few tries, ask a TA for help.

Learning Outcomes

Students will be able to learn:

- Introduction to Amazon Rekognition
- Amazon rekognition setup

Resources

- AWS, (n.d), *Amazon Rekognition*, what is Amazon Rekognition?, <https://docs.aws.amazon.com/rekognition/latest/dg/what-is.html>
- flowers.zip

Introduction to Amazon Rekognition

Amazon Rekognition is a pre-trained computer vision AWS deep learning algorithm which can pull and index insights from images and videos. Amazon Rekognition is fully customized and can detect things like objects, scenes, faces, text pornography, violence, foul language, drug, alcohol use, and inappropriate content in images to automate the process of content moderation. Amazon Rekognition pricing operates on a pay-as-you-go model, and it provides the following services:

- Automated content moderation
- Facial recognition

- Sentiment analysis
- Labeling/metadata
- Text detection
- Celebrity recognition
- Video segment detection

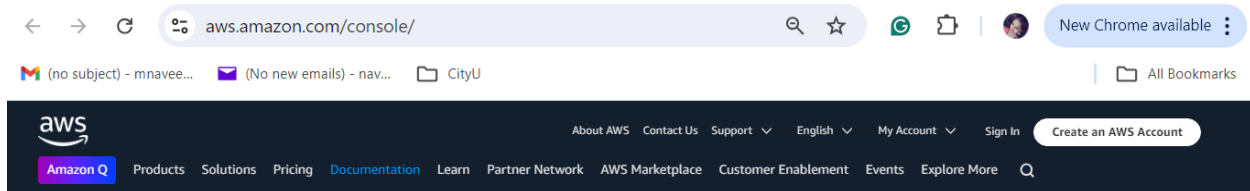
Amazon Rekognition custom labels demonstration

Let's train a machine learning model using Amazon Rekognition to analyze images.

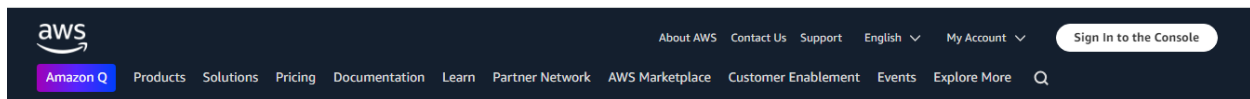
Note: - We need to have an AWS account. Please create an account if you don't have.

<https://aws.amazon.com/>

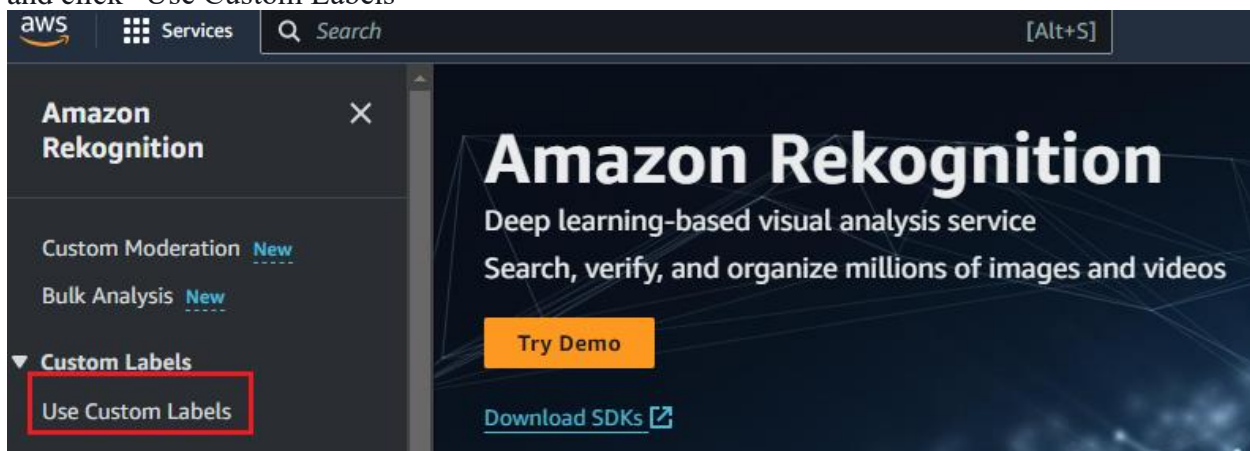
When you create your AWS account, you may be prompted to enter your credit card number. Please do so as you will be granted 1-year free-tier and Amazon Rekognition is provided in the free-tier plan.



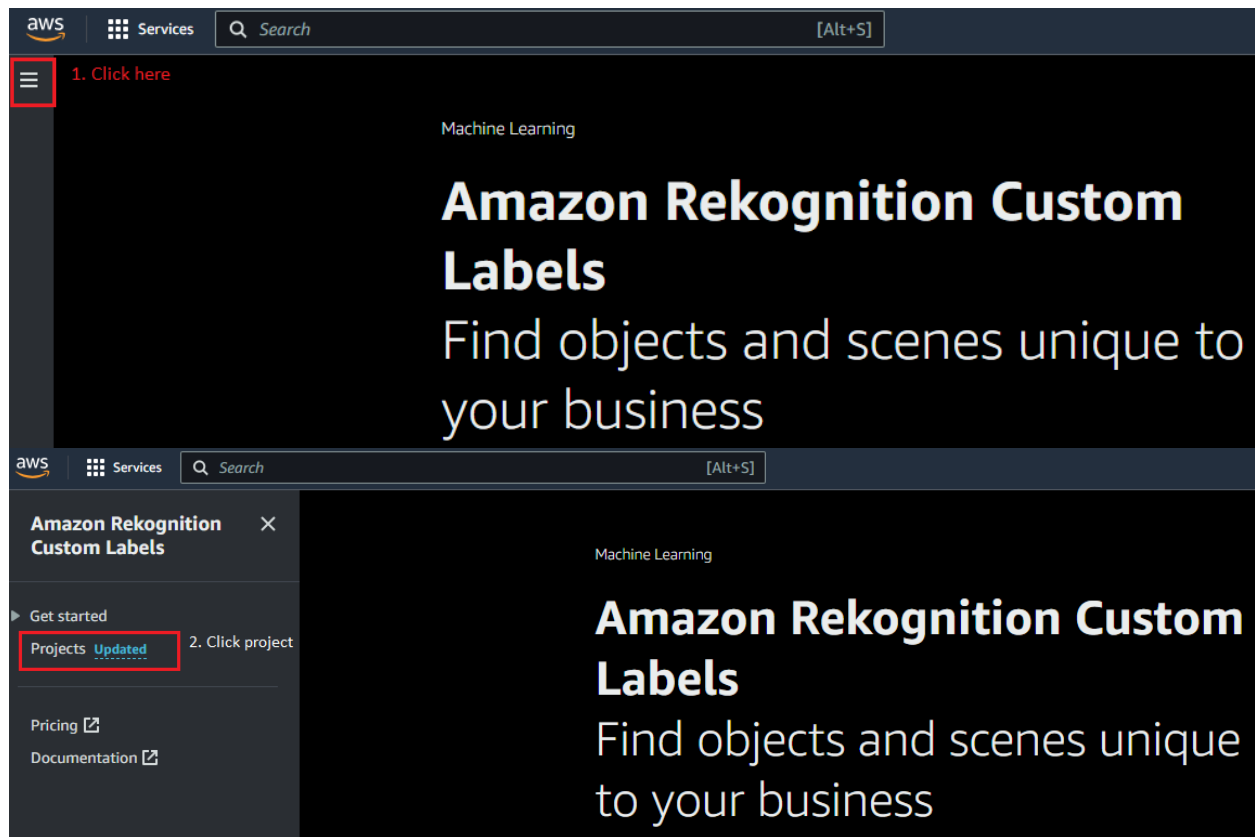
Step 1: Sign into the Console <https://aws.amazon.com/console/>



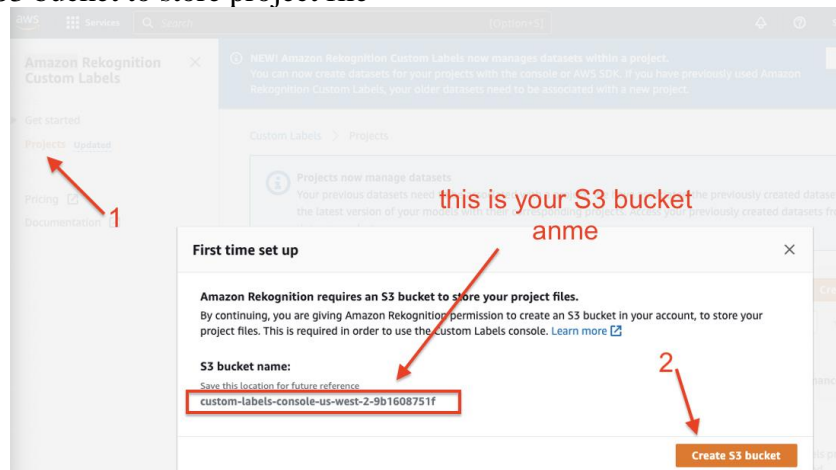
Step 2: Open the Amazon Rekognition console at <https://console.aws.amazon.com/rekognition/> and click "Use Custom Labels"



Step 3: Click on the icon at the left side to open Get Started and then click on the projects.

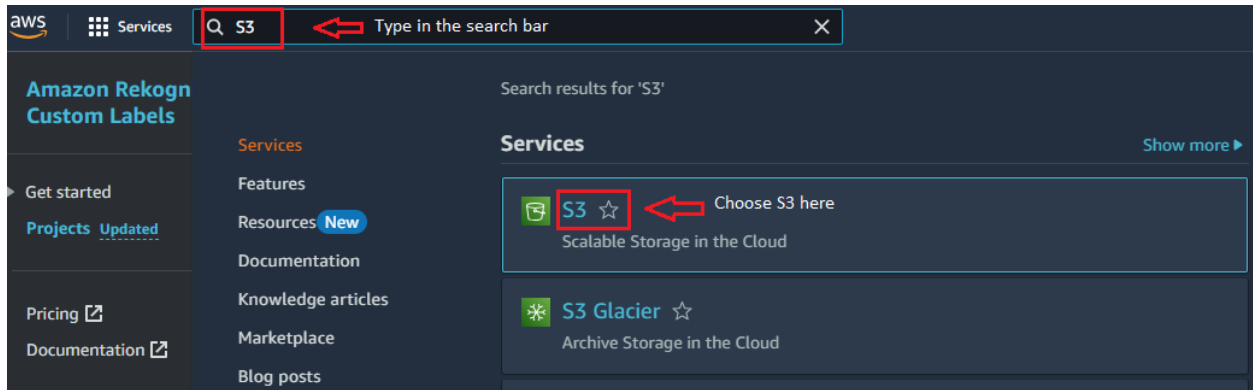


Step 4: Create S3 bucket to store project file

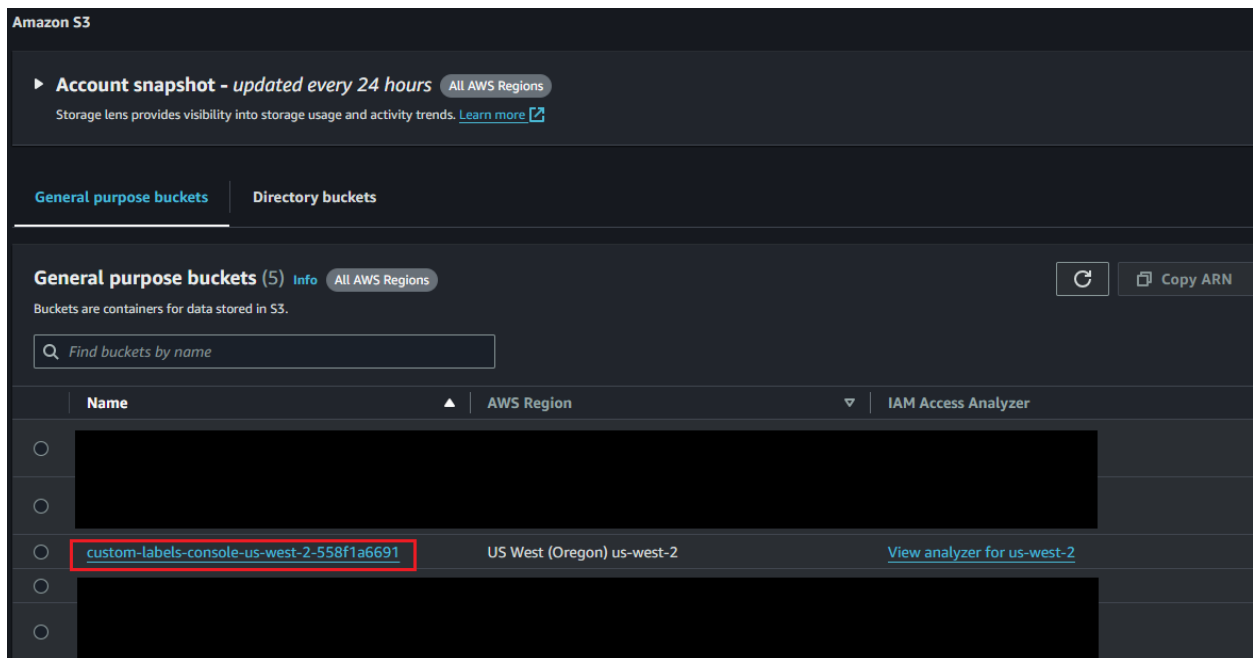


Step 5: Go to your AWS S3 service and upload image to S3 bucket name.

1. In the search bar, type S3. Under the Services list, select S3.



2. Select the bucket created in Step 4. It should have the prefix: custom-labels*








3. Inspect the dataset for model training.

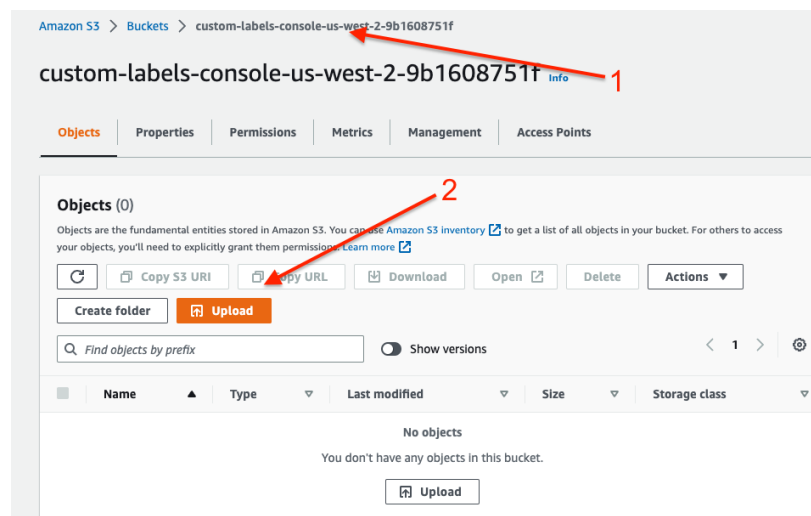
When you clone the HOS repository, there is already a ZIP file named “flowers.zip”, containing images of 5 flower species: daisy, dandelion, rose, sunflower, tulip. Each folder consists of 100 flower images, making the total number of images 500.

Note: - The original dataset is from [this](#) link. We cut down the number of images due to the original dataset size (approximately 4000 images).

Extract the zip file, you will see the following folders.

Downloads > HOS Reviews > AI620 > 01 > flowers			
Name	Date modified	Type	Size
 daisy	9/14/2024 11:16 AM	File folder	
 dandelion	9/14/2024 11:17 AM	File folder	
 rose	9/14/2024 11:18 AM	File folder	
 sunflower	9/14/2024 11:19 AM	File folder	
 tulip	9/14/2024 11:20 AM	File folder	

You will need to upload the images to the S3 bucket. After selecting the bucket, click Upload.



Step 6: Click “Add folder”. Navigate to the “flower” folder you just extracted and click Upload. You might need to wait for 5 minutes until all images are uploaded.

Amazon S3 > Buckets > **custom-labels-console-us-west-2-558f1a6691** > Upload

Upload Info

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. [Learn more](#)

Drag and drop files and folders you want to upload here, or choose [Add files](#) or [Add folder](#).

Files and folders (500 Total, 33.7 MB)

All files and folders in this table will be uploaded.

Find by name

<input type="checkbox"/>	Name	Folder
<input type="checkbox"/>	11545123_50a340b473_m.jpg	flowers/dandelion/
<input type="checkbox"/>	155646858_9a8b5e8fc8.jpg	flowers/dandelion/
<input type="checkbox"/>	151979452_9832f08b69.jpg	flowers/dandelion/
<input type="checkbox"/>	493696003_f93ffb3abd_n.jpg	flowers/dandelion/
<input type="checkbox"/>	486234138_688e01aa9b_n.jpg	flowers/dandelion/
<input type="checkbox"/>	451965300_619b781dc9_m.jpg	flowers/dandelion/
<input type="checkbox"/>	510677438_73e4b91c95_m.jpg	flowers/dandelion/
<input type="checkbox"/>	501987276_744448580c_m.jpg	flowers/dandelion/
<input type="checkbox"/>	479115838_0771a6cdf.jpg	flowers/dandelion/
<input type="checkbox"/>	126012913_edf771c564_n.jpg	flowers/dandelion/

Destination Info

Destination
s3://custom-labels-console-us-west-2-558f1a6691

► **Destination details**
Bucket settings that impact new objects stored in the specified destination.

► **Permissions**
Grant public access and access to other AWS accounts.

► **Properties**
Specify storage class, encryption settings, tags, and more.

Cancel **Upload**

Note: - The uploaded image status should be changed to **Succeeded**. Once the Upload status is successful, click Close to go back to the bucket.

Upload succeeded
View details below.

Upload: status

The information below will no longer be available after you navigate away from this page.

Summary

Destination	Succeeded	Failed
s3://custom-labels-console-us-west-2-558f1a6691	500 Files, 33.7 MB (100.00%)	0 Files, 0 B (0%)

Step 7: Copy the **S3 URI** from the uploaded folder

The first screenshot shows the Amazon S3 console for a bucket named 'custom-labels-console-us-west-2-9b1608751f'. The 'Objects' tab is selected. A red arrow labeled '1' points to the bucket name in the breadcrumb. Another red arrow labeled '2' points to the 'Download' button. The 'flowers/' folder is listed in the table.

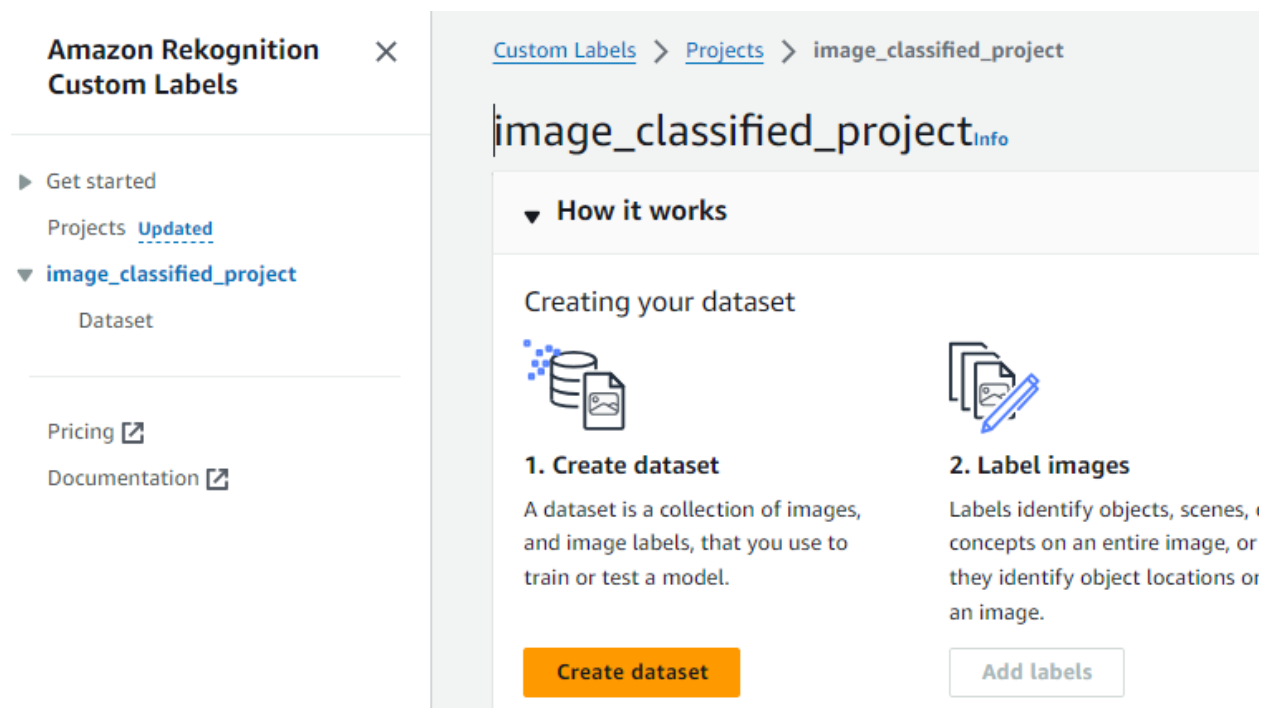
The second screenshot shows the 'flowers/' folder selected. A red arrow labeled '1' points to the breadcrumb. A red arrow labeled '2' points to the 'Copy S3 URI' button. The table lists five folders: daisy/, dandelion/, rose/, sunflower/, and tulip/.

NOTE: For submission, Take the screenshot for all steps from step 8 and save it in your local repository.

Step 8: Go to Amazon Rekognition > Use Custom Labels > Projects and click on “Create project”. Name the project “image_classified_project”

The screenshot shows the Amazon Rekognition console. In the left sidebar, 'Projects' is selected under 'Get started'. A red arrow points to 'Projects'. The main area shows the 'Create project' page. A red arrow points to the 'Create project' button. The 'Project details' section shows the 'Project name' field with the value 'image_classified_project'. A red arrow points to this field with the text 'You can type your own name'. Another red arrow points to the 'Create project' button.

Step 9: Click on “Create dataset”



Amazon Rekognition Custom Labels

Get started

Projects [Updated](#)

▼ **image_classified_project**

Dataset

Pricing [↗](#)


Documentation [↗](#)

[Custom Labels](#) > [Projects](#) > image_classified_project

image_classified_project [Info](#)

▼ How it works


Creating your dataset



1. Create dataset

A dataset is a collection of images, and image labels, that you use to train or test a model.

[Create dataset](#)

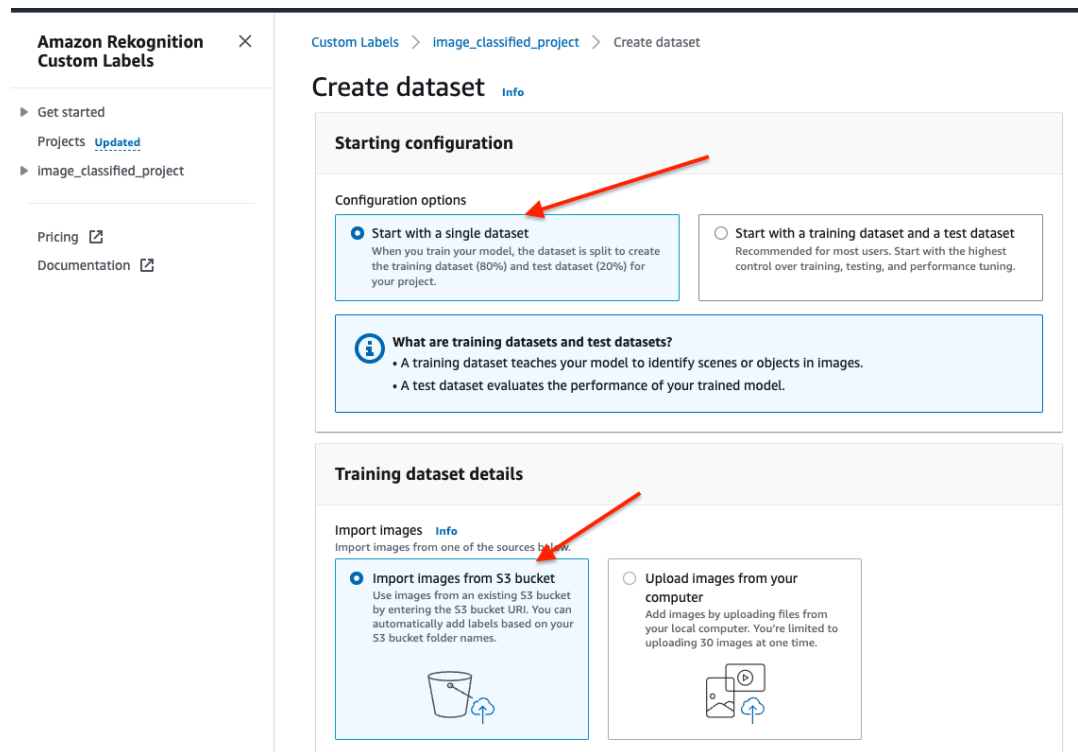


2. Label images

Labels identify objects, scenes, concepts on an entire image, or they identify object locations on an image.

[Add labels](#)

Step 10: Select “Start with a single dataset” and “Import images from S3 bucket”



Amazon Rekognition Custom Labels

Get started

Projects [Updated](#)

▶ image_classified_project

Pricing [↗](#)

Documentation [↗](#)

[Custom Labels](#) > [image_classified_project](#) > Create dataset

Create dataset [Info](#)

Starting configuration

Configuration options

☒ **Start with a single dataset**

When you train your model, the dataset is split to create the training dataset (80%) and test dataset (20%) for your project.

☐ **Start with a training dataset and a test dataset**

Recommended for most users. Start with the highest control over training, testing, and performance tuning.

[What are training datasets and test datasets?](#)

- A training dataset teaches your model to identify scenes or objects in images.
- A test dataset evaluates the performance of your trained model.


Training dataset details

Import images [Info](#)

Import images from one of the sources below.


☒ **Import images from S3 bucket**

Use images from an existing S3 bucket by entering the S3 bucket URL. You can automatically add labels based on your S3 bucket folder names.

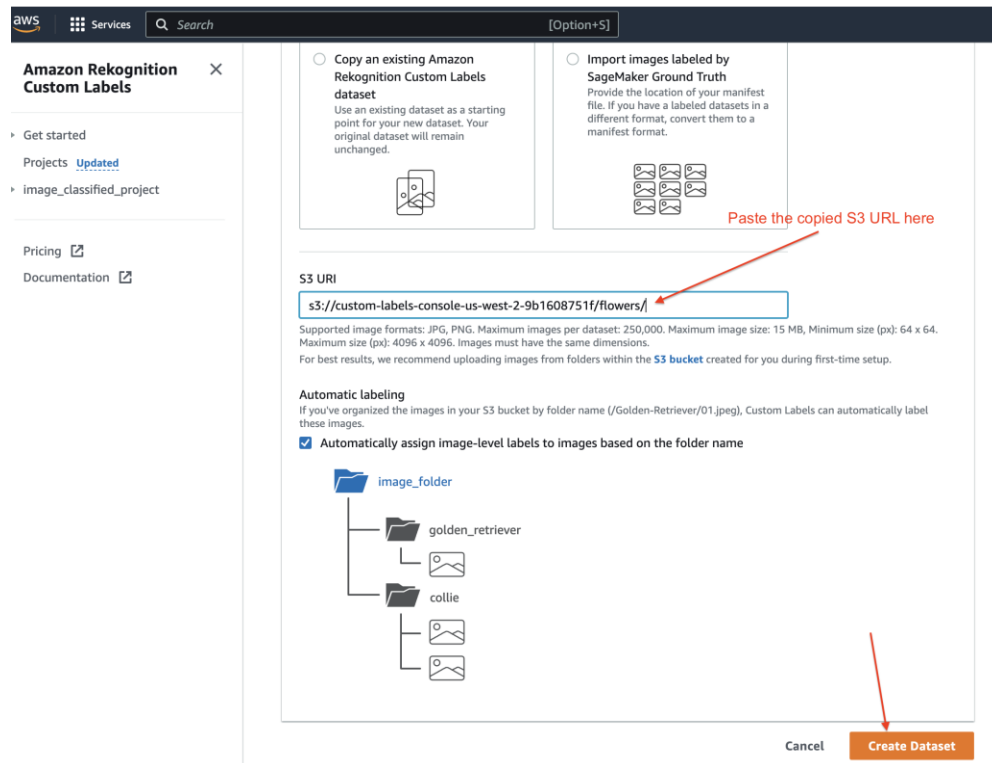


☐ **Upload images from your computer**

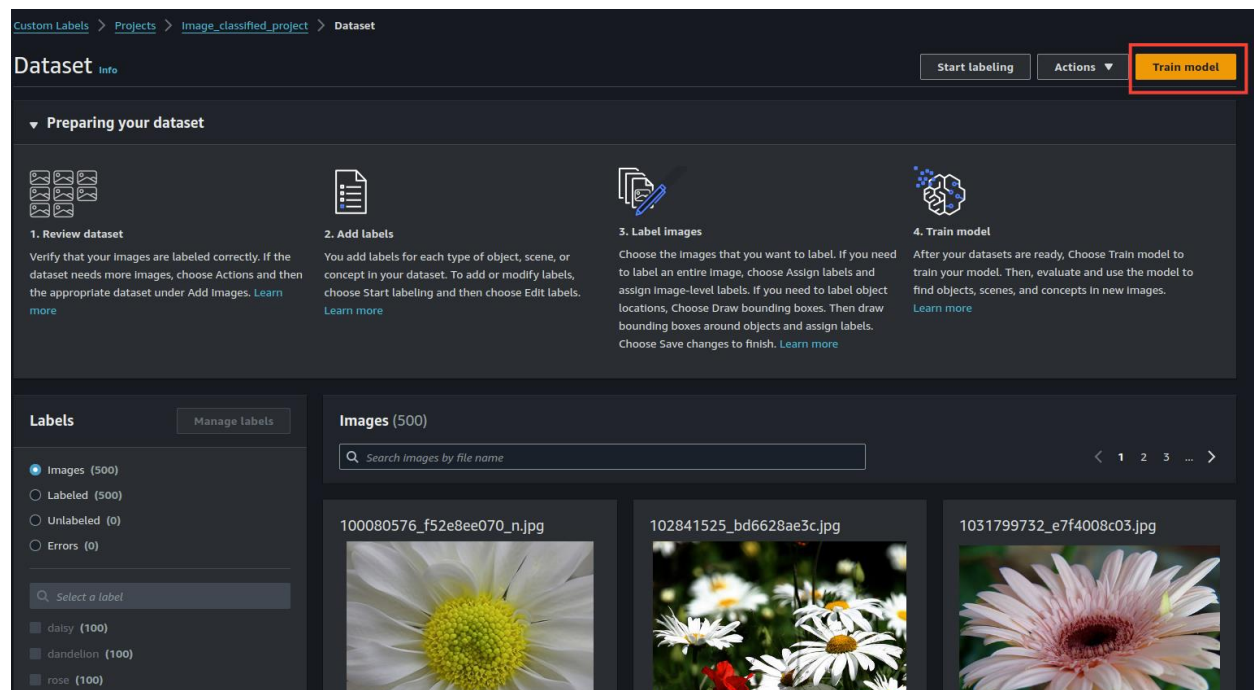
Add images by uploading files from your local computer. You're limited to uploading 30 images at one time.



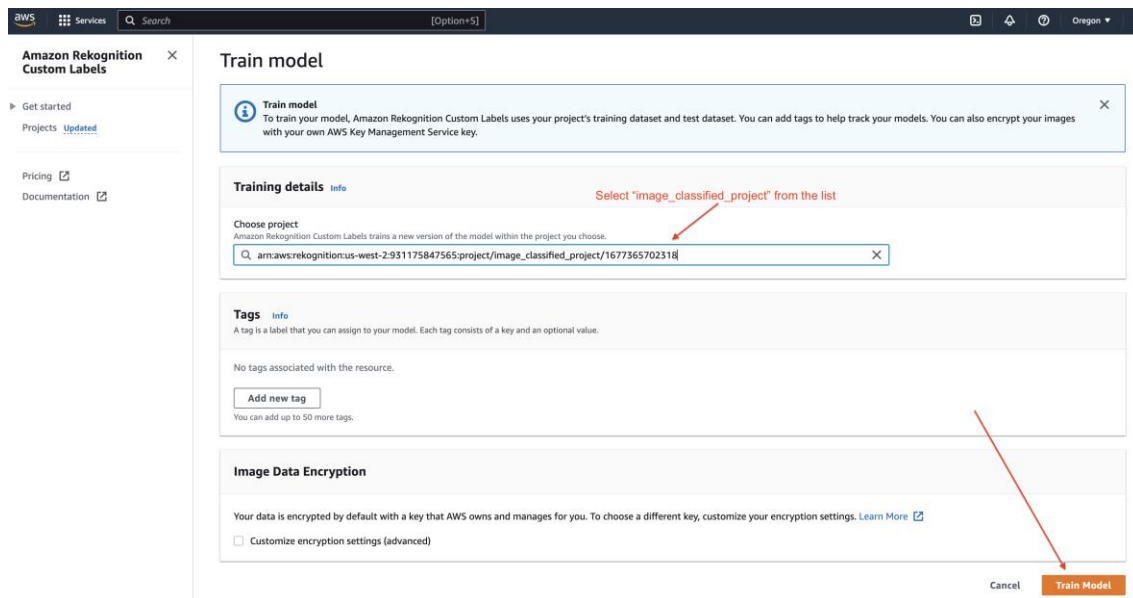
Step 11: Turn on Automatic labeling and click on Create Dataset button to upload the image from S3.



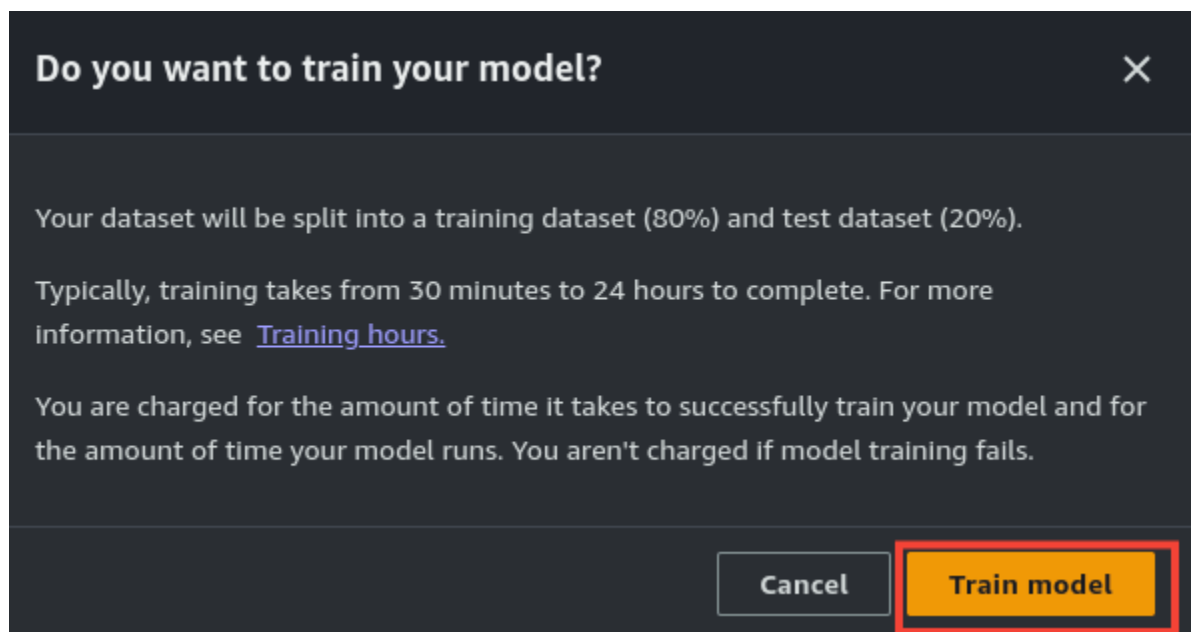
Step 12: Train the model



Step 13: Select the image_classified_project and click on the “train new model” button



When you are prompted “Do you want to train your model?”, click “Train model”.



You might need to wait until the model status changes from TRAINING_IN_PROGRESS to TRAINING_COMPLETED.

Step 14: Check the performance of the trained model

The screenshot displays the Amazon Rekognition Custom Labels console. The top section, 'image_classified_project', provides an overview of the workflow: 'How it works' (Creating your dataset, Label images, Training your model, Evaluating your model), 'Project details' (Project name, Created date, Dataset size, Models count), and 'Models (1)'. A red arrow points to the 'Check metrics' button in the 'Evaluating your model' step. Below this, the 'Models (1)' table lists the trained model: 'image_classified_project.2023-02-25T15.16.32' with a date of 'February 25, 2023' and a model performance (F1 score) of '0.956'. A red arrow points to the '0.956' value, labeled 'This is F1 score'. Another red arrow points to the 'TRAINING_COMPLETED' status, labeled 'Training is completed'. A third red arrow points to the model name, labeled 'Click here to see the detail of the trained model'.

The bottom section, 'image_classified_project.2023-02-25T15.16.32', shows the 'Evaluation' tab. It includes an 'Evaluation' information box and 'Evaluation results' for the trained model. The 'Evaluation results' section displays the following metrics:

- F1 score:** 0.956
- Average precision:** 0.966
- Overall recall:** 0.946

Additional details include 'Date completed: February 25, 2023' and 'Training dataset: 5 labels, 3,452 images'. The 'Testing dataset' is '5 labels, 865 images'. Below this, the 'Per label performance (5)' table shows the performance for five labels:

Label name	F1 score	Test images	Precision	Recall	Assumed threshold
daisy	0.940	153	0.953	0.928	0.185
dandelion	0.981	211	0.981	0.981	0.663
rose	0.934	157	0.920	0.949	0.329
sunflower	0.972	147	0.993	0.952	0.812
tulip	0.950	197	0.984	0.919	0.912

HOS submission instructions:

1. Please install the GitHub Desktop: https://cityuseattle.github.io/docs/git/github_desktop/
2. Clone, organize, and submit your work through GitHub Desktop: <https://cityuseattle.github.io/docs/hoporhos>