FIT5225 Assignment3 2024 S1

An AWS-powered Serverless Image Storage System
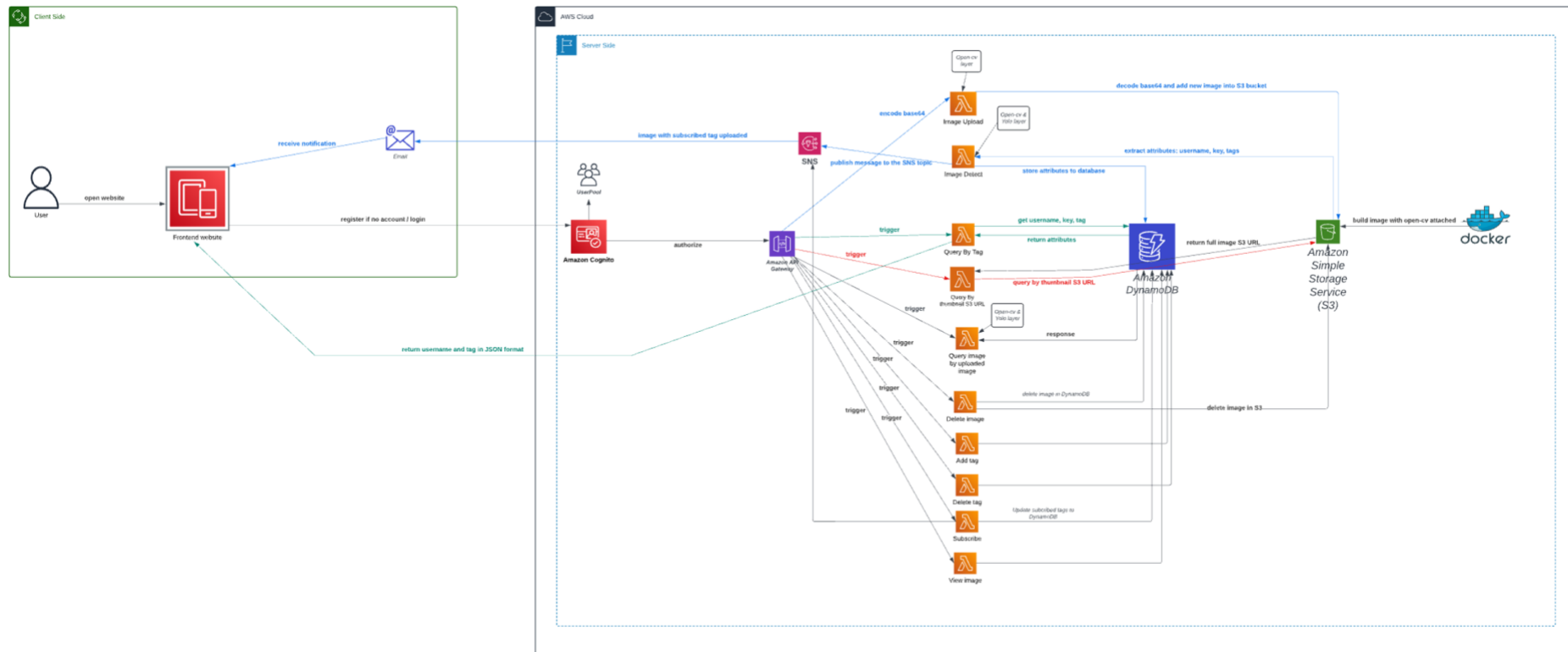with Advanced Tagging Capabilities

Group Report

Group 77

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1. The architecture diagram

The user interacts with the application through a web interface or API gateway. When a user uploads an image, it triggers the following sequence of events:

1. The image is stored in an S3 bucket.
2. A Lambda function is triggered to create a thumbnail for the uploaded image and store it in another S3 bucket.
3. Another Lambda function is triggered to detect objects in the image using the YOLO script. The detected objects (tags) and the URLs of the image and its thumbnail are stored in an Amazon DynamoDB database.

The application supports several queries through API Gateway endpoints:

1. Find images based on tags: The user can provide a list of tags, and a Lambda function queries the database to find the URLs of thumbnail images containing all the specified tags.
2. Find full-size image based on thumbnail URL: The user can input a thumbnail URL, and the application retrieves the corresponding full-size image URL from the database.
3. Find images based on tags from an uploaded image: The user can upload an image, and a Lambda function detects objects (tags) in the image. Another Lambda function queries the database to find thumbnail URLs of images containing the same set of tags.
4. Add or remove tags: The user can add or remove tags for specific image URLs through an API endpoint.
5. Delete images: The user can provide a list of thumbnail URLs, and the application removes the corresponding images and thumbnails from S3 and the database entries.

The diagram also shows that users can receive notifications via Amazon SNS when new images with specific tags are added or updated in the system.

The application follows an authentication and authorization workflow using AWS Cognito for user sign-up, sign-in, and access control to various services.

2. Team member contribution(allocate form include 100 words)

1 Authentication/Authorization

User Verification: Cognito/User Pool -> Frontend communicates with Cognito- If user is not logged in, block access to all pages/endpoints except registration service and redirect to "sign-up.html" for new account registration- Third-party login

2 Image Upload – (S3 bucket, thumbnails, Lambda function for image recognition and database upload)

Upload image -> API gateway -> S3 bucket -> trigger Lambda function -> recognize content and store in database

3 User Query – (user sends request to Gateway, user can navigate to correct URL)

4 Image Search by Thumbnail

- User inputs a thumbnail S3 URL in the system
- System finds corresponding full-size image based on input thumbnail URL
- System returns full-size image S3 URL to user or displays directly in UI

5 Image Search by Image URL

User can upload an image, system recognizes tags in the image and returns URLs of matching images

6 Add/Remove Image Tags

End-users can add/remove extra tags to images and database is updated accordingly (bulk mode)
- Design Lambda function, API endpoint, REST method and JSON messages

7 Direct Image Deletion

- User can delete images (bulk mode)
- Design Lambda function, API endpoint, REST method

8 Notification System

- User can select tags of interest
- User receives email notification when new images with those tags are added to the system

9 Frontend Pages

- Design login/registration, image upload, search, etc. user interfaces

10 Written Report
System Architecture Diagram

Name & ID	Percentage of Contribution

|	
Qihang Wang 33026459	60% for 3 , 40% for 2 , 60% for 6 , 10% for 8 , 40% for 9 , 30% for 10
Tianli Gao 32987978	100% for 4 , 100% for 5 , 40% for 3 , 20% for 9 , 20% for 10
Beichen Ling 33577935	80% for 7 , 80% for 8 , 20% for 10 ,20% for 6
Ziqi Pei 33429472	100% for 1 , 60% for 2 , 20% for 6 , 20% for 7 , 10% for 8 , 40% for 9 , 30% for 10

3. A simple user guide
1. Access Login page
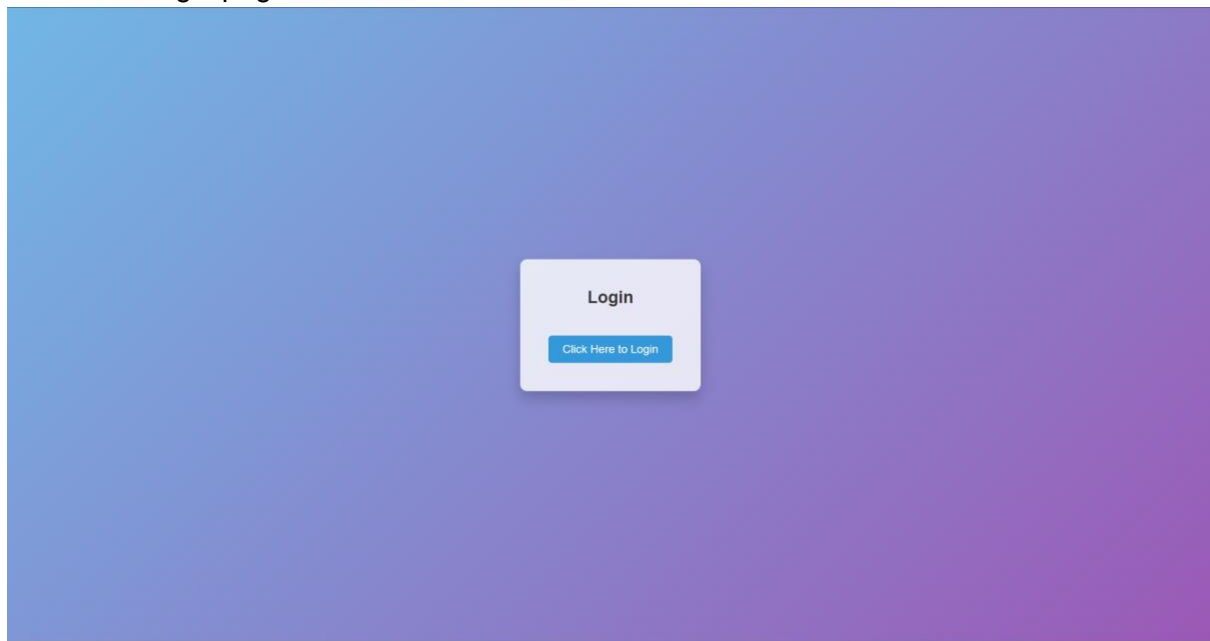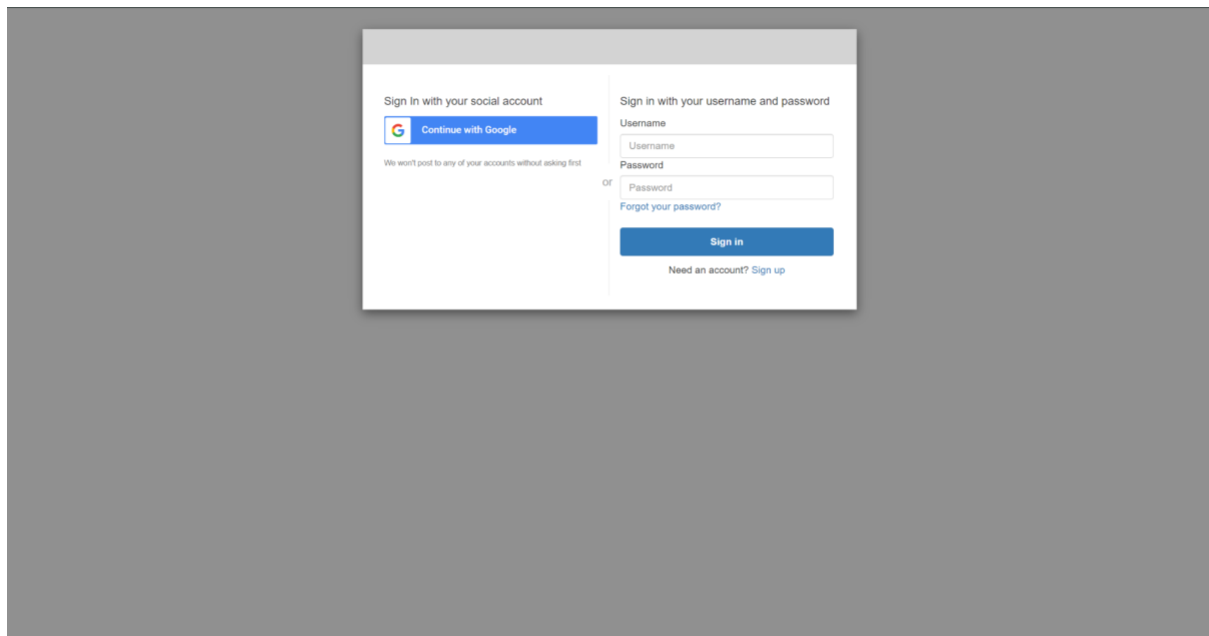
1. Before the first time you use this application, sign in works without any problem
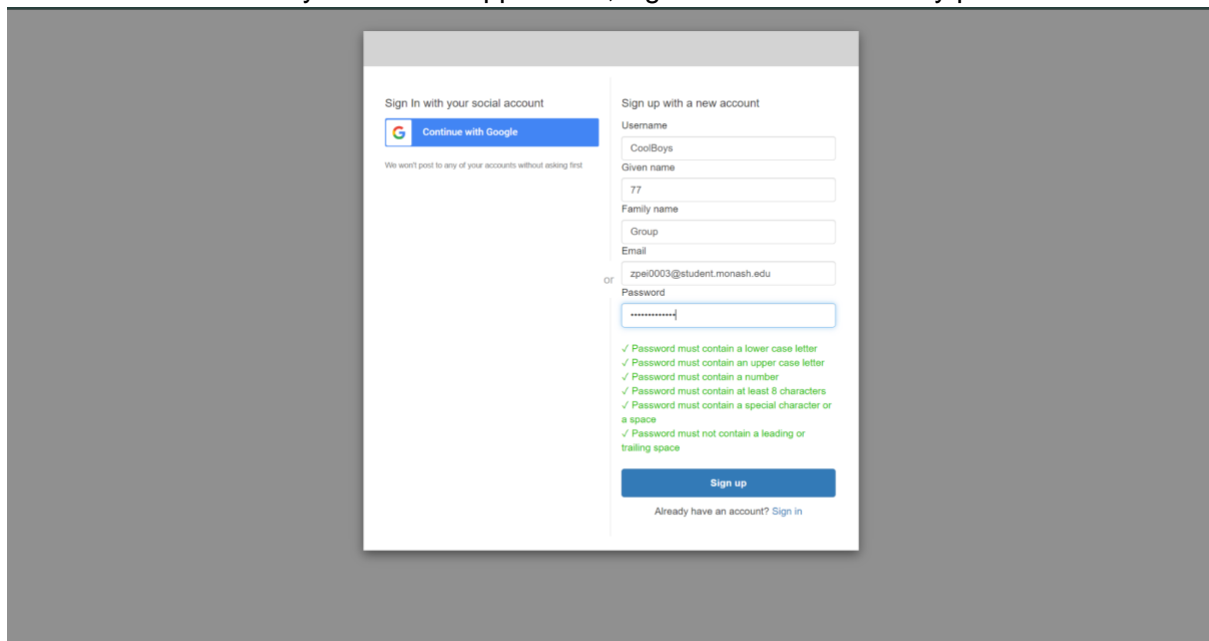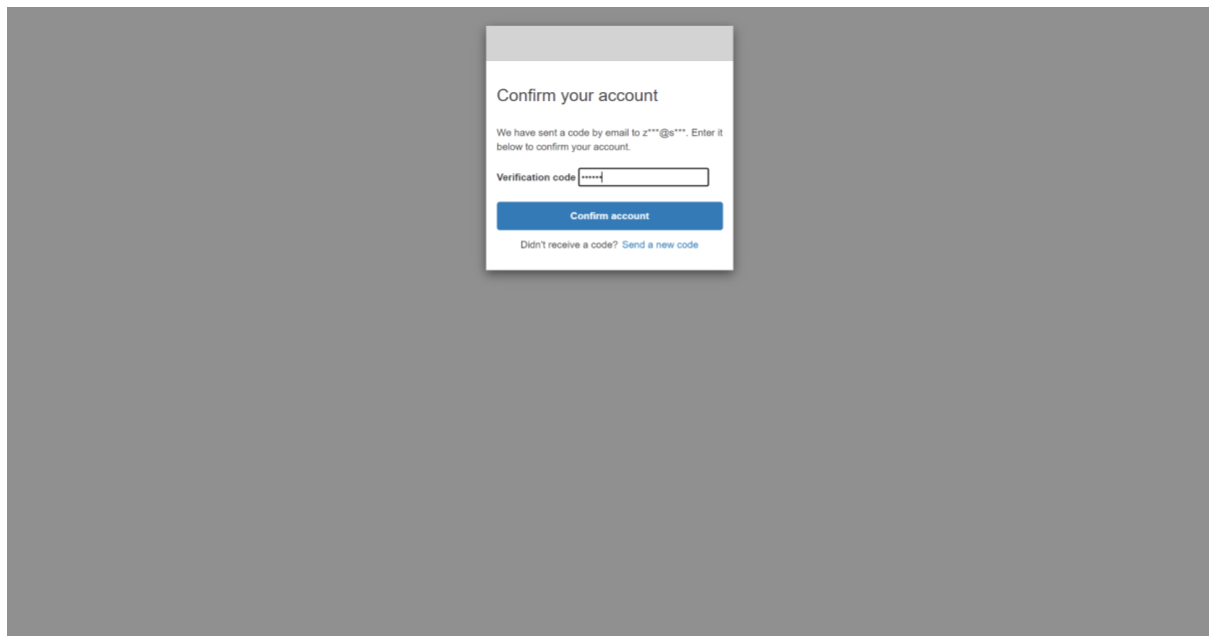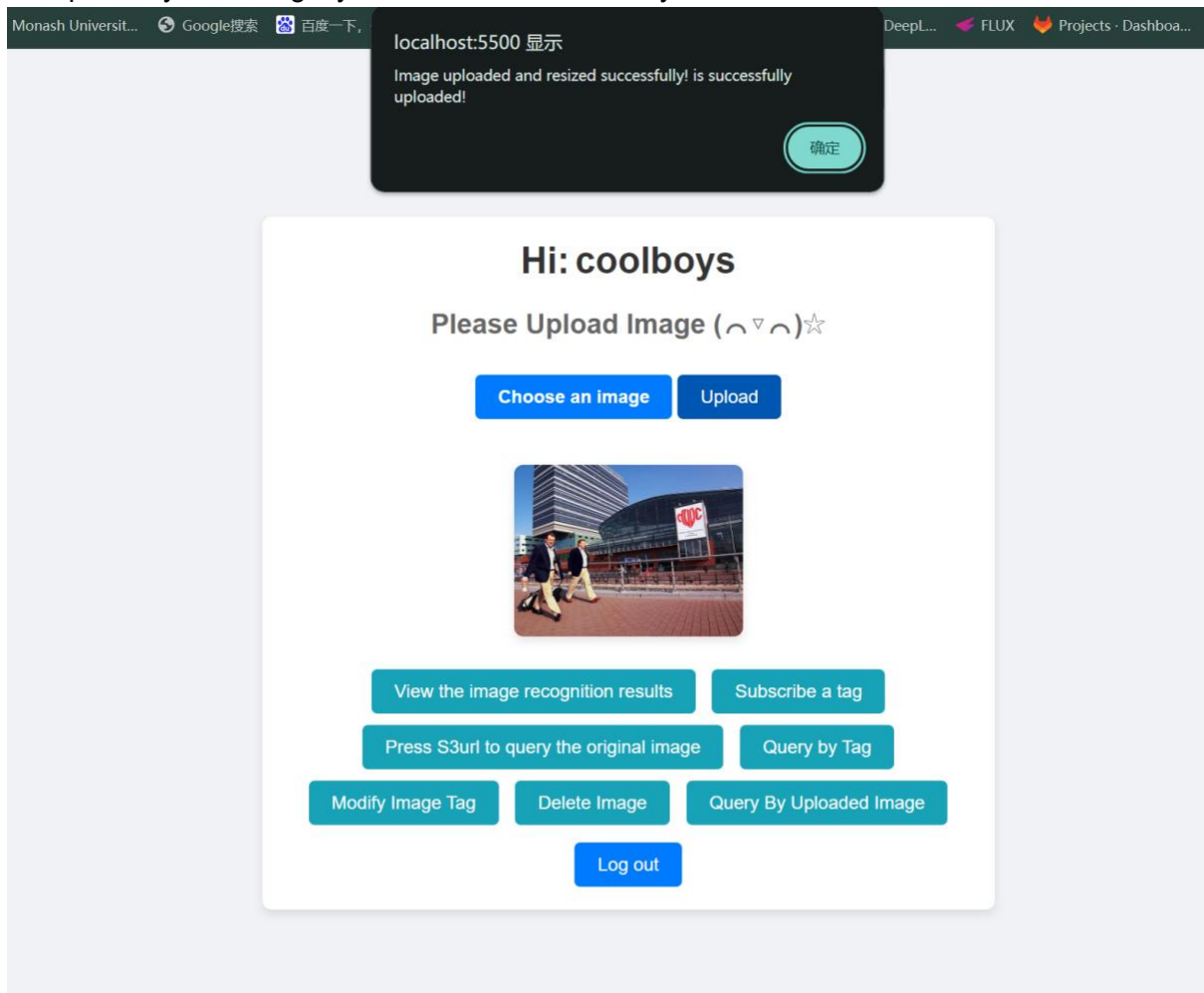
2.If you second times login you need to paste your email as a username
Google authentication is supported and you can directly access this app with your Google
account.
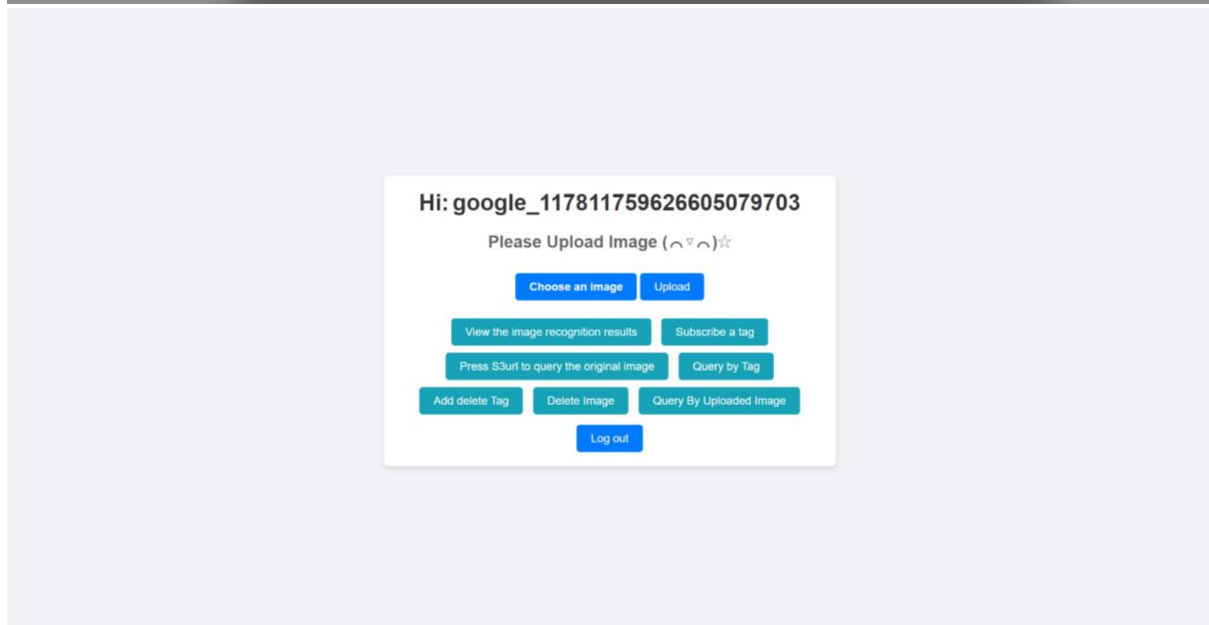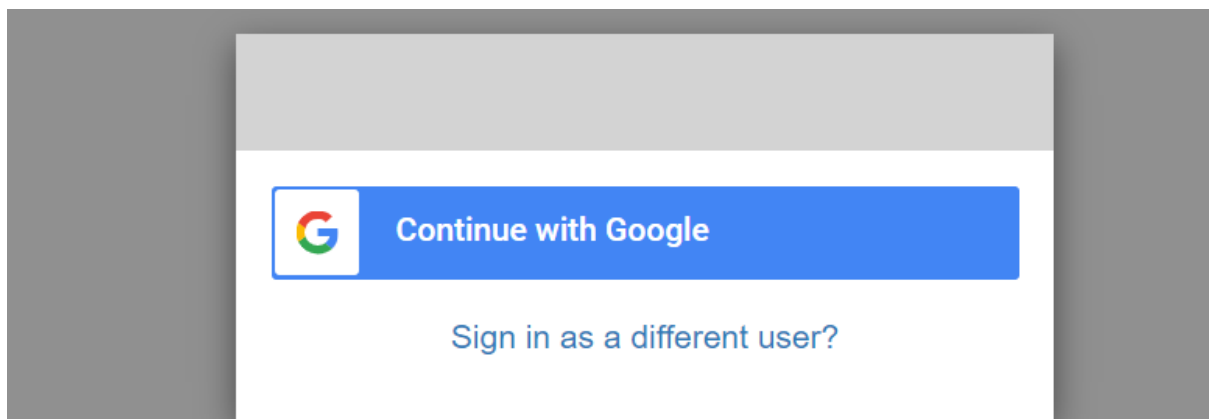
Userpool, if you not login you can't use function anymore

4. Upload and view uploaded images to s3

After you successfully login, you can upload an image in the local resource by pressing the "Choose an image" button, then click the "upload" button to upload the image you choose. The image and tags detected are going to be stored in the database and you will be notified by a pop-up message. You can view all your uploaded images with detection results by clicking the "View the image recognition results" button. Thumbnails

User Image Gallery

Image Name: 12f736ce248811efb5512b66f55c31db.jpg
S3 URL: s3://fit5225a3-group77/images/coolboys/12f736ce248811efb5512b66f55c31db.jpg
Image URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/12f736ce248811efb5512b66f55c31db.jpg
See Full Image
Image Tags:
suitcase (Accuracy: 0.54)

Image Name: 1677ee78248811ef91652b66f55c31db.jpg
S3 URL: s3://fit5225a3-group77/images/coolboys/1677ee78248811ef91652b66f55c31db.jpg
Image URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/1677ee78248811ef91652b66f55c31db.jpg
See Full Image
Image Tags:
car (Accuracy: 0.93)
traffic light (Accuracy: 0.65)
person (Accuracy: 0.38)
person (Accuracy: 0.38)
car (Accuracy: 0.37)
car (Accuracy: 0.33)
person (Accuracy: 0.31)

Image Name: 1b27bd43248811ef92eb2b66f55c31db.jpg
S3 URL: s3://fit5225a3-group77/images/coolboys/1b27bd43248811ef92eb2b66f55c31db.jpg
Image URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/1b27bd43248811ef92eb2b66f55c31db.jpg
See Full Image
Image Tags:
microwave (Accuracy: 0.86)
tvmonitor (Accuracy: 0.56)

5. Add and Delete tags queries are designed to be flexible enough to accept multiple tags. You can also add or delete tags of an image through the "Modify Image Tag" button. Entering the web page with the same name, you can delete a tag of any image with the "delete" button and add a tag to add a new tag to this image.

Update Image Tags

Image Name: 12f736ce248811efb5512b66f55c31db.jpg
Image S3 URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/12f736ce248811efb5512b66f55c31db.jpg
Image Tags:
suitcase (Accuracy: 0.54) Delete
New Tag   Add Tag

Image Name: 1677ee78248811ef91652b66f55c31db.jpg
Image S3 URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/1677ee78248811ef91652b66f55c31db.jpg
Image Tags:
car (Accuracy: 0.93) Delete
traffic light (Accuracy: 0.65) Delete
person (Accuracy: 0.38) Delete
person (Accuracy: 0.38) Delete
car (Accuracy: 0.37) Delete
car (Accuracy: 0.33) Delete
person (Accuracy: 0.31) Delete
New Tag   Add Tag

Image Name: 1b27bd43248811ef92eb2b66f55c31db.jpg
Image S3 URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/1b27bd43248811ef92eb2b66f55c31db.jpg
Image Tags:
microwave (Accuracy: 0.86) Delete
tvmonitor (Accuracy: 0.56) Delete
New Tag   Add Tag

Image Name: f25ba7cb248711efa1cc4fa131368109.jpg
Image S3 URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/f25ba7cb248711efa1cc4fa131368109.jpg
Image Tags:

Image Name: 12f736ce248811efb5512b66f55c31db.jpg
Image S3 URL: https://fit5225a3-group77.s3.amazonaws.com/images/coolboys/12f736ce248811efb5512b66f55c31db.jpg
Image Tags:
suitcase (Accuracy: 0.54) Delete
traveler (Accuracy: 1.00) Delete
New Tag   Add Tag

6. Delete Images

If you do not want to see an image in this app any more, "Delete Image" button enables you to directly delete images from the cloud. This button redirects you to your images with the "delete image" button beside them. If it is deleted, the website will notify you.
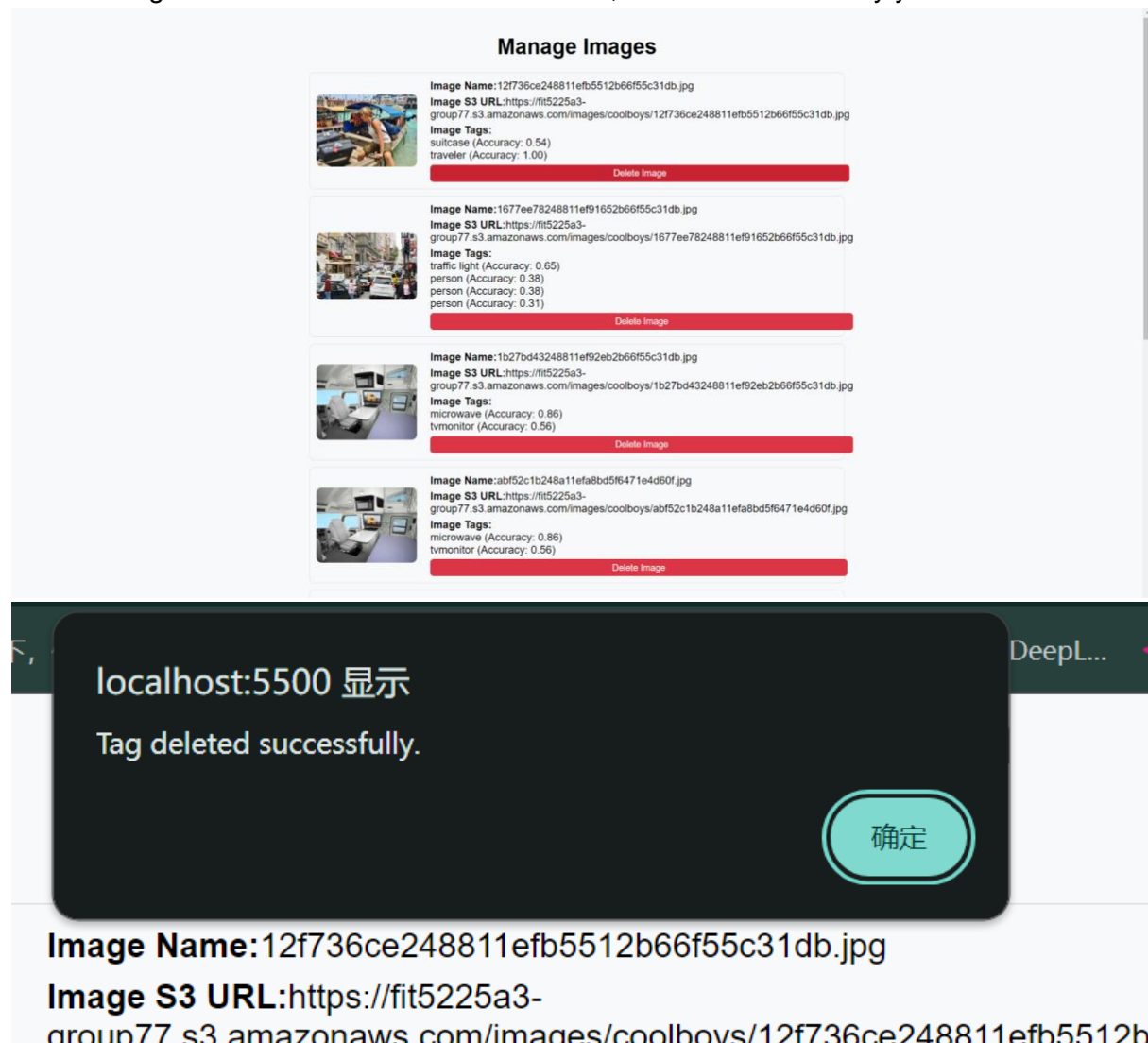
7. Query by tag

The button called "Query by Tag" is used to make a query based on tags. You can find all your images in the cloud with the same tag. You can set the minimum number of a tag in format "<tag>, <number>" shown in the image below. Multiple tags can be input by isolating them by semicolon.

8.Query by S3 url

If you click the "press the s3url to query the original image" button, you will enter a new page where you can input the S3 url you get in the view image page to have the corresponding image shown in the page.

9. Query by uploaded image

"Query By Uploaded Image" enables you to upload an image in a new page and the pages containing the same tags are shown below.

10. Notification by subscribed tag

You can subscribe to specific tags so that when you upload images which contain one of the corresponding tags, you will be notified by email.

When you try to subscribe to a tag for the first time, you will receive an email and please confirm the subscription through the email. Only after that can you subscribe tags, and only input one tag at a time.

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:920361656072:group77

To confirm this subscription, click or visit the link
below (If this was in error no action is necessary):
Confirm subscription

Please do not reply directly to this email. If you wish to
remove yourself from receiving all future SNS subscription
confirmation requests please send an email to sns-opt-out

Input Tag and Post

Enter Tag:

Submit

Subscription successful!

AWS Notifications 14:59
发给我 ˅

翻译成中文

Hello

A new image has been recognized with the
label: orange.
imagename is images/coolboys/b25f1cb0248a11
ef8fe3e18c94b52c04.jpg

···

↩ 回复   → 转发

99+

11-sign up works without any problem.

Log out
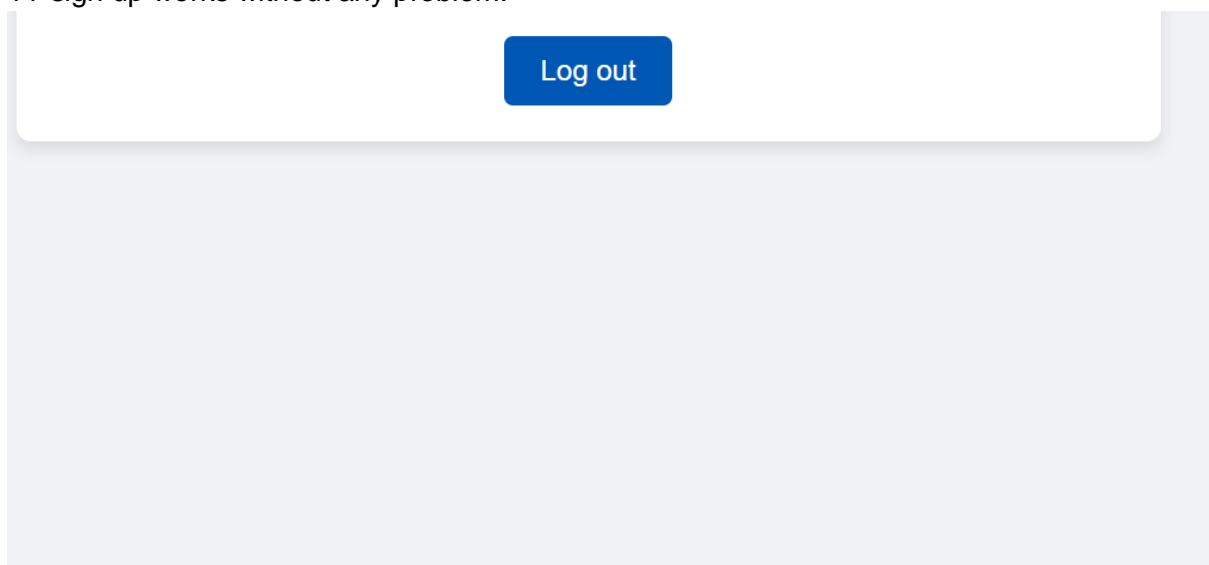
12 record database
images

	username (String)	key (String)	tags
☐	lbc	images/lbc/0c6c47da…	[{"label": "person", "accuracy": 0.9833722114562988, "rectangle": {"height": 1…
☐	lbc	images/lbc/fcb95c8f…	[{"label": "orange", "accuracy": 0.5968321561813354, "rectangle": {"height": 2…
☐	google_11781…	images/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…
☐	google_1178117596…	images/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…
☐	google_1178117596…	images/google_1178…	[{"label": "elephant", "accuracy": 0.8170346021652222, "rectangle": {"height":…
☐	google_1178117596…	images/google_1178…	[{"label": "suitcase", "accuracy": 0.5395866632461548, "rectangle": {"height": …
☐	google_1178117596…	images/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…

Completed. Read capacity units consumed: 0.5

Items returned (11)

	username (String)	key (String)	tags
☐	lbc	resized/lbc/0c6c47da…	[{"label": "person", "accuracy": 0.9833722114562988, "rectangle": {"height": 1…
☐	lbc	resized/lbc/fcb95c8f2…	[{"label": "orange", "accuracy": 0.5968321561813354, "rectangle": {"height": 2…
☐	google_1178117596…	resized/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…
☐	google_1178117596…	resized/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…
☐	google_1178117596…	resized/google_1178…	[{"label": "elephant", "accuracy": 0.8170346021652222, "rectangle": {"height":…
☐	google_1178117596…	resized/google_1178…	[{"label": "suitcase", "accuracy": 0.5395866632461548, "rectangle": {"height": …
☐	google_1178117596…	resized/google_1178…	[{"label": "car", "accuracy": 0.4763776361942291, "rectangle": {"height": 19, "l…
☐	google_1178117596…	resized/google_1178…	Π

4. Gitlab Link: https://git.infotech.monash.edu/fit5225-fit5225-s1-2024-group-77/assignment-3