Automatic Shopping Guide

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Introduction

Since Machine Learning technology is becoming more reliable and accurate, there is more information that can be detected from the image and videos. Meanwhile, online shopping is also becoming more and more popular nowadays, especially during the COVID-19 period. Thus we now have an idea to create an application that can online detect the items in the given images and generate some shopping links for our users.

Some relative applications

Currently, if customers want to purchase items on Amazon, they have to type the keywords such as the brand name, item category and even the specific model number. However, most people don't know the full information they are looking for. For example, when I see a nice chair in the library and want to purchase a similar chair like that, the only keyword I have is the simple word "chair". It definitely will take me a lot of time to pick online. Now, Google has the functionality to read the information from an image and generate some relative links for the clients. It might be the only solution that can contribute people to buy products online. However, the biggest online shopping website in China, www.taobao.com has the functionality that allows clients to upload images to find products, it is a more efficient way for shopping.

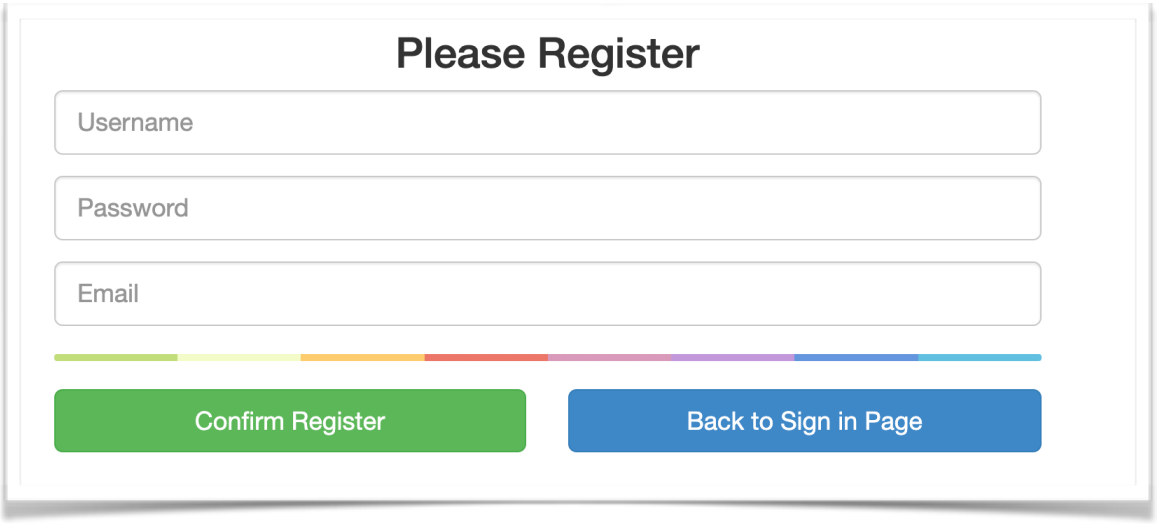
Technical functionality for our application

· allow users to register accounts
· user login by username and password, recover password by email
· user can change password
· store user infomation on AWS dynamoDB
· allow user to upload local images
· use AWS Rekognition to detect the products
· generate products' links for user
· keep uploaded images and generated links on AWS S3
· allow user to delete uploaded images and links
· image saved on AWS S3 only
· monitor number of accounts and number of image uploaded
· send database detail to administrator by email

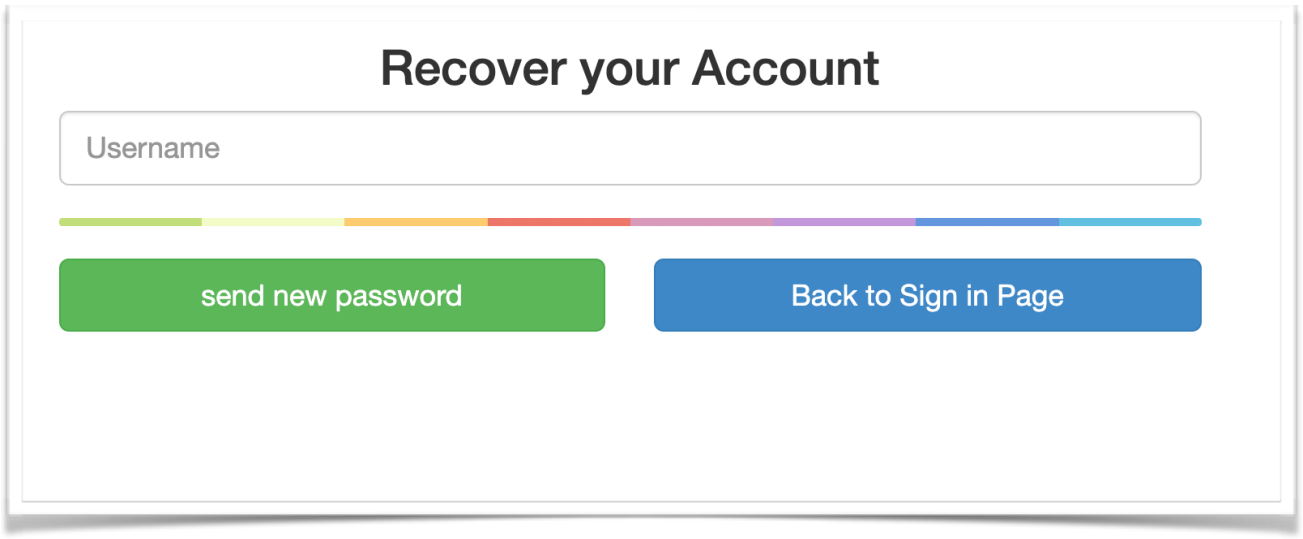
Application user instruction

Website link: https://4k4f1wahxg.execute-api.us-east-1.amazonaws.com/dev

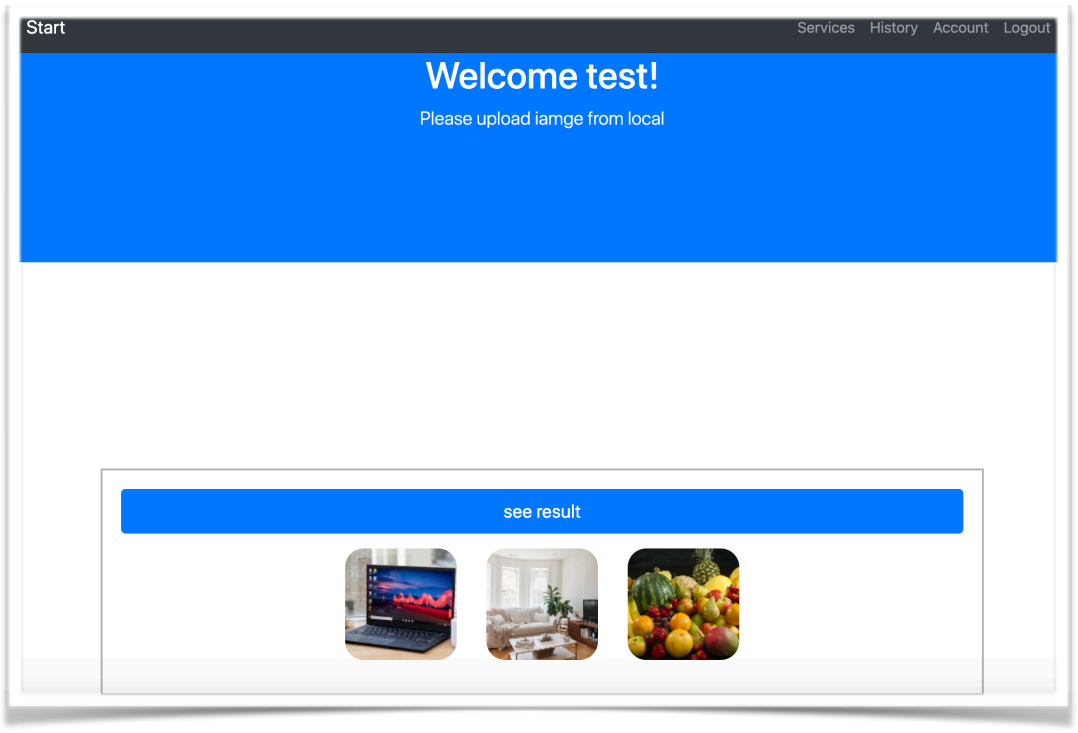
Enter the username and password and click the “Sign in” to login to index page
Click “Register new Account” to create account
Click “Forgot password” to reset password



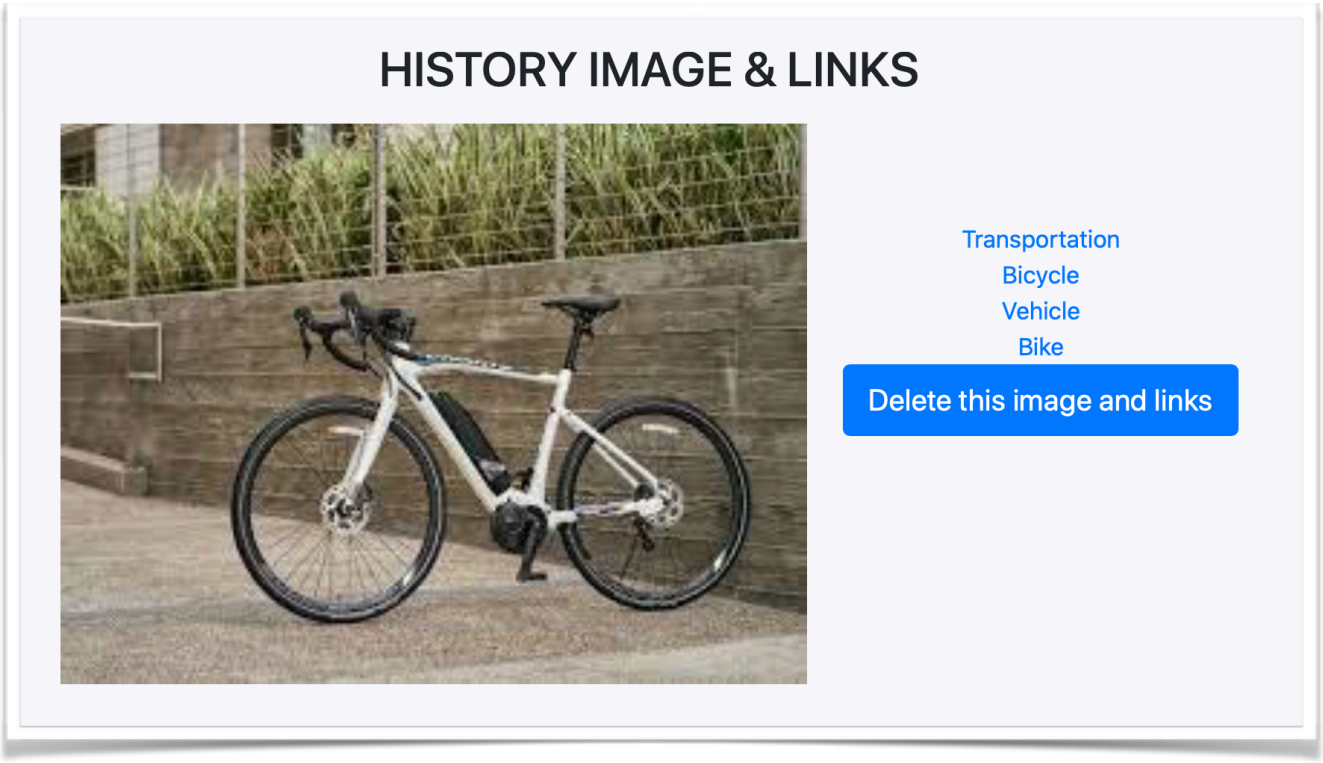
Fill up the username, password and email and click “Confirm Register” to create account
Click “Register new Account” can switch back to login page



Enter the username to reset the password, the new password will automatically send to the registration email address



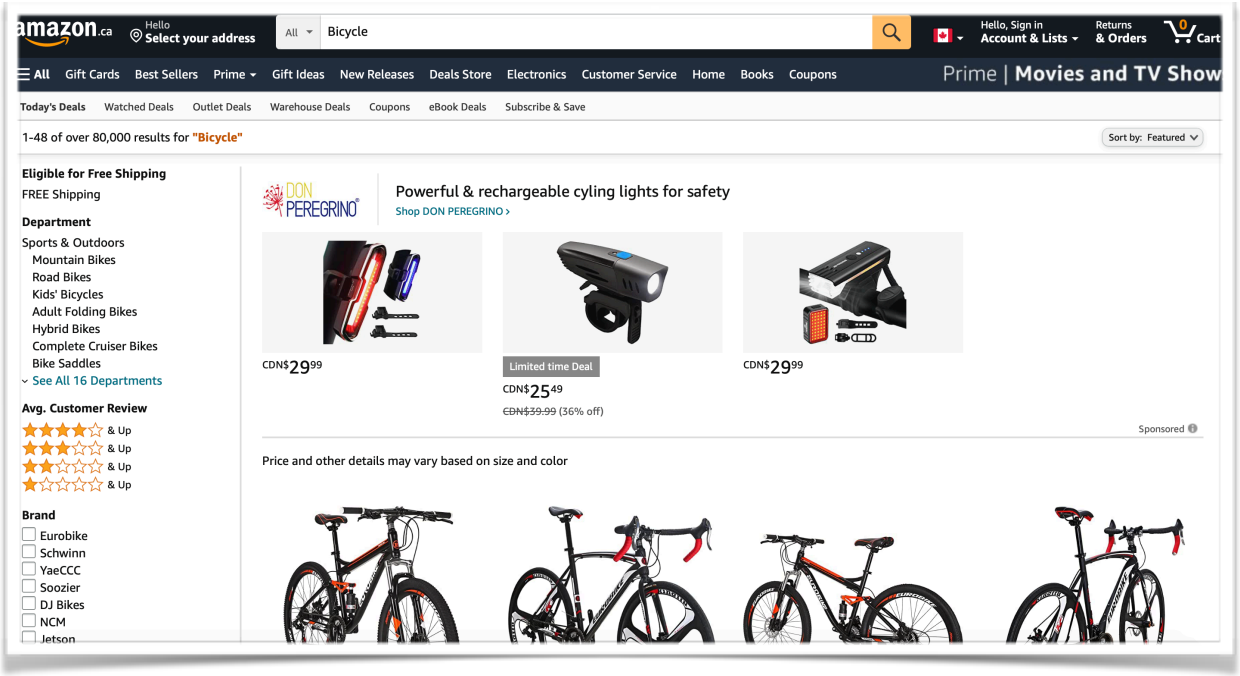
User can drag an image from local or click the box to select image to upload
The application allow user to upload multiple images
Click “see result” to see the detection results



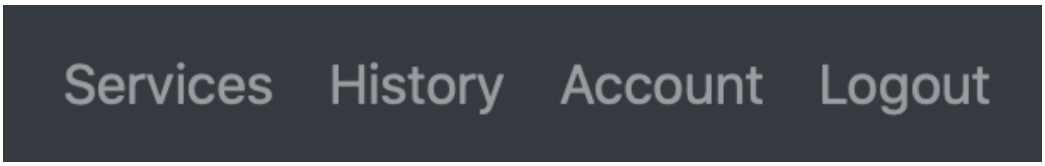
Result and history will showed this way

Click “Delete this image and links” to delete all data from S3 and dynamoDB

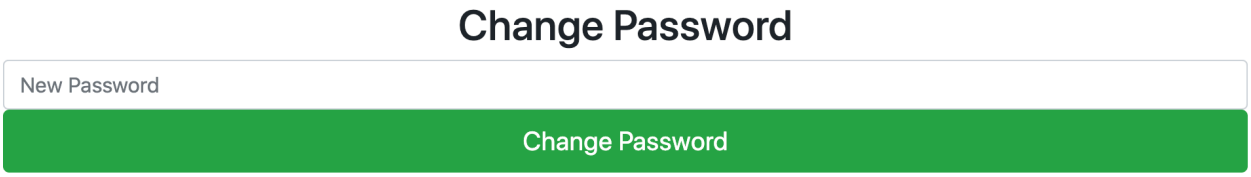
Click “Bicycle” will open the link on amazon



Example shopping website on Amazon

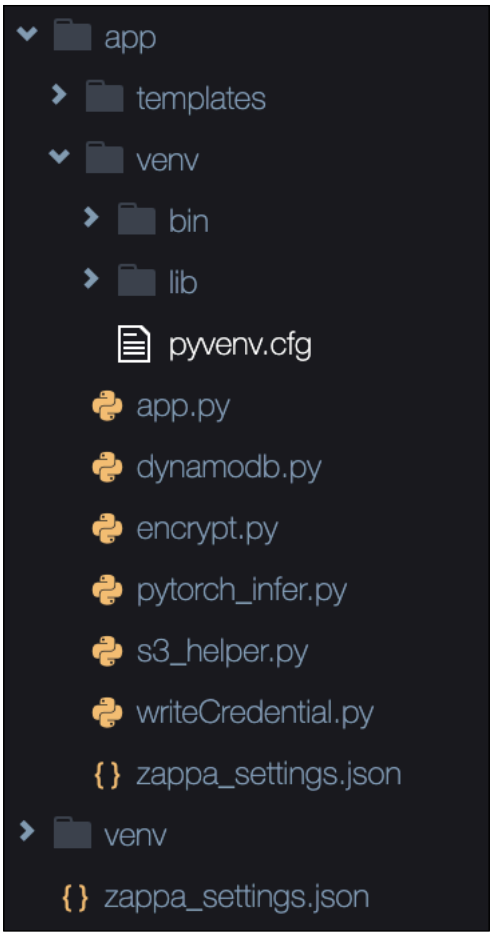


We have navigation bar for scrolling the web page.



On the bottom of the index page, enter the new password and click “change password” Will change the login password

Architecture of application



All html, css, javascript files are stored in templates directory.

app.py does the routing for flask and interact with dynamodb.py, encrypt.py, pytorch_infer.py, s3_helper.py.

dynamodb.py connect the application with AWS dynamoDB, create table for account info and image info

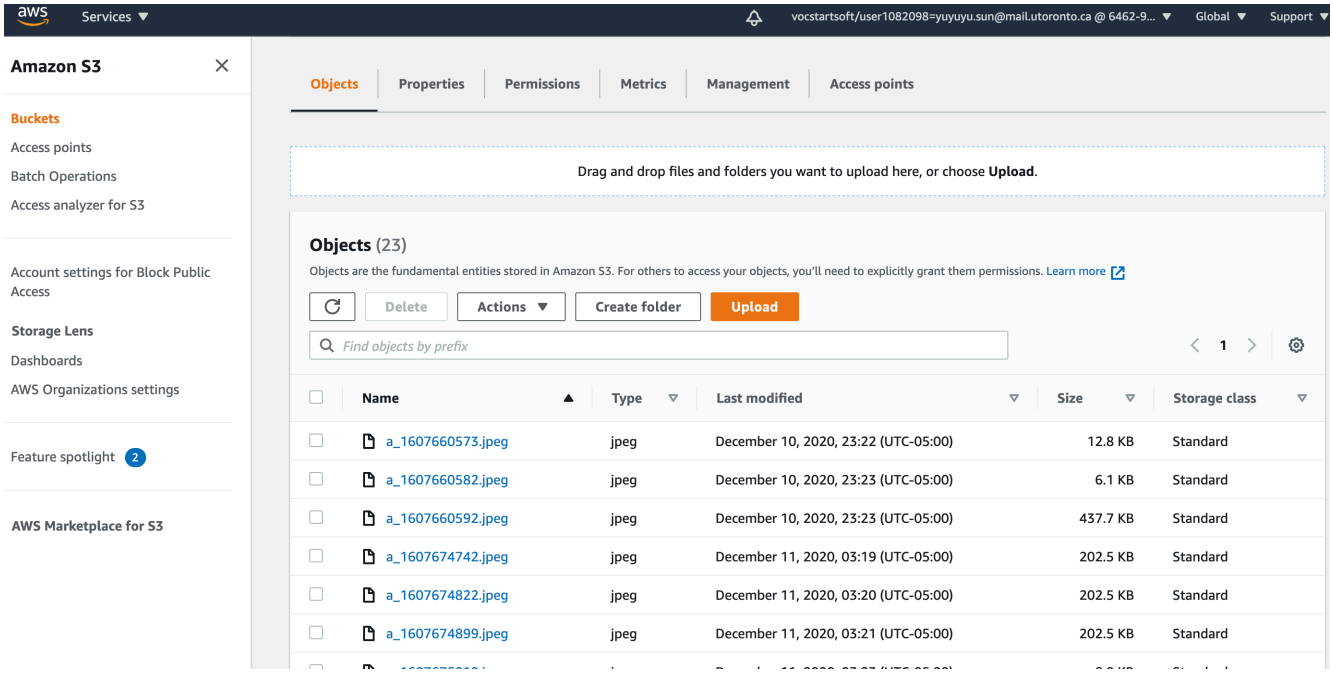
encrypt.py does the hashing for password

pytorch_infer.py does the image detection for uploaded pictures by calling AWS Rekcognition

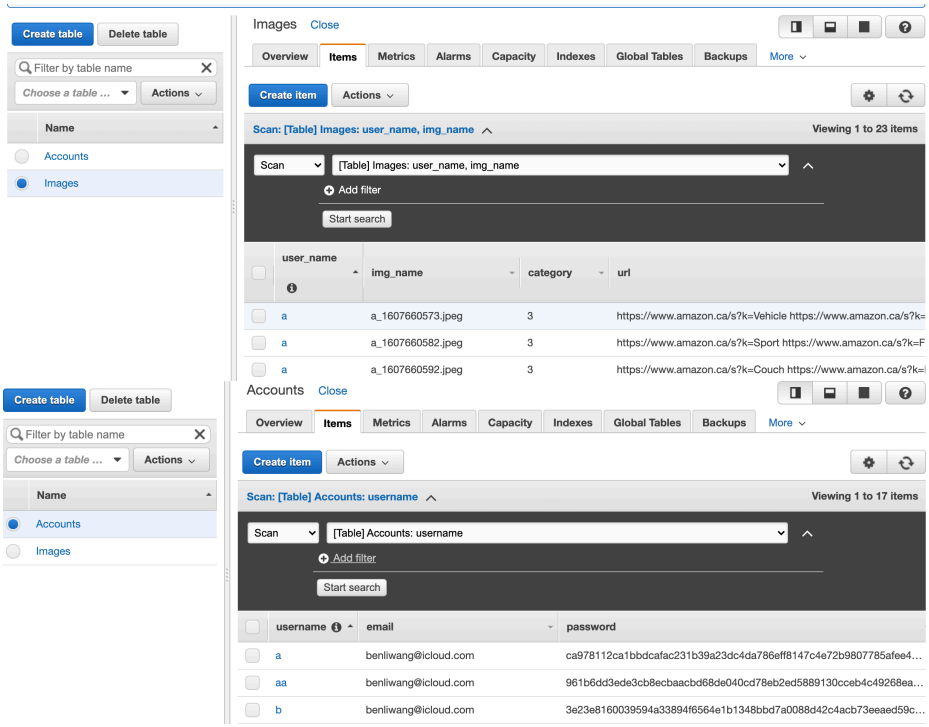
s3_helper.py upload, download and delete data from S3

Background Process

send_mail: send the database email to administrator
dynamoDB_monitor: return the database information
analyze_data: format the data from dynamoDB and help generate email message
Call while loop and loop every 60 sec to monitor the dynamoDB information.



S3 screenshot



Accounts table and Images table from DynamoDB

Cost Model

Assumption: each average user login to the website 2 times a day, save 50 images (avg size 0.5M per image) for 6 months, click the shopping links 3 times for every login, delete 10 history images for 6 months. Each lambda request only needs 512 MB memory, time 6ms.

Calculation example for 10 users:

Number of login requests:$10 \times 2 \times 3 \times 6 \times 30 = 10800$
Number of access data request: $10 \times 60 = 600$
Approximate request count ≈ 12500
Lambda & API Gateway cost = $\$0.0000000083 \times 12500 \times 6 = \$0.0006225$

S3 usage: $10 \times 50 \times 0.5 / 1024 = 0.24414$G
S3 & DynamoDB cost: $0.24414 \times 0.023 = \$0.00002246$

number AWS Rekognition image: $10 \times 50 = 500$
AWS Rekognition cost = $\$0.001 \times 500 = \$0.5$

Total cost $\approx \$0.501$

Calculation example for 1000 users:

Number of login requests:$1000 \times 2 \times 3 \times 6 \times 30 = 1080000$
Number of access data request: $1000 \times 60 = 600$
Approximate request count ≈ 1250000
Lambda & API Gateway cost = $\$0.0000000083 \times 1250000 \times 6 = \$0.06225$

S3 usage: $1000 \times 50 \times 0.5 / 1024 = 24.414$G
S3 & DynamoDB cost: $24.414 \times 0.023 = \$0.002246$

number AWS Rekognition image: $1000 \times 50 = 50000$
AWS Rekognition cost = $\$0.001 \times 50000 = \$50$

Total cost $\approx \$50.1$

Calculation example for 1000,000 users:

Number of login requests:$10000000 \times 2 \times 3 \times 6 \times 30 = 1080000000$
Number of access data request: $10000000 \times 60 = 600000000$
Approximate request count ≈ 1250000000
Lambda & API Gateway cost = $\$0.0000000083 \times 1250000000 \times 6 = \$62.25$

S3 usage: $1000000 \times 50 \times 0.5 / 1024 = 24414$G
S3 & DynamoDB cost: $24414 \times 0.023 = \$2.246$

number AWS Rekognition image: $1000000 \times 50 = 50000000$
AWS Rekognition cost = $\$0.001 \times 50000000 = \$50000$

Total cost $\approx \$50100$