CLOUD COMPUTING

FACE MASK DETECTION WEB APP

By

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1.Introduction

A private website has been developed using the flask application in an Amazon EC2 instance to check if user uploaded images have people wearing masks. Only admin *admin* can manage the people (accounts) who can access the website. In this report we will first go through the how the program is structured and some standard procedures to open the EC2 instance remotely from a PC and launch the website. Then there is an explanation about how to use the website and the API endpoints are given.

2.Structure of the Program

All the program files are in Face_mask_web_app ('A1' in the file structure) folder on the desktop. The directory structure is shown below:

```
A1/
├─A1.py
├─wsgi.py
├─wsgi.txt
├─app/
│  ├─delete.py
│  ├─userpage.py
│  ├─api_upload.py
│  ├─pass_rec.py
│  ├─templates/
│  │  ├─delete.html
│  │  ├─pass_rec.html
│  │  ├─new_user.html
│  │  ├─pass_change.html
│  │  ├─api_register.html
│  │  ├─Result.html
│  │  ├─login.html
│  │  ├─user.html
│  │  ├─history.html
│  │  ├─history1.html
│  │  ├─api_upload.html
│  │  └─pass_ver.html
│  ├─LICENSE
│  ├─history.py
│  ├─config.py
│  ├─__init__.py
│  ├─MainModel.py
│  ├─pytorch_infer.py
│  ├─register.py
│  ├─routes.py
│  └─api_register.py
├─MainModel.py
└─start.txt
```

The app folder inside A1 has python files for individual pages and the image processing program. There is a templates folder inside the app folder which has the HTML files for all the pages. The python file A1.py imports all other .py files and runs the program. There is also a file named start.sh on the desktop which is used to launch the instance.

3.Database Schema

We used MYSQL Workbench to create a new database *new_schema*. We have two tables in our database *new_schema*:

- new_table (Stores the user Id, Salt and hashed password)
- history (Stores the username, uploaded image location, processed image location, count of face detected, count of faces with mask)
- Both tables are linked by the username column
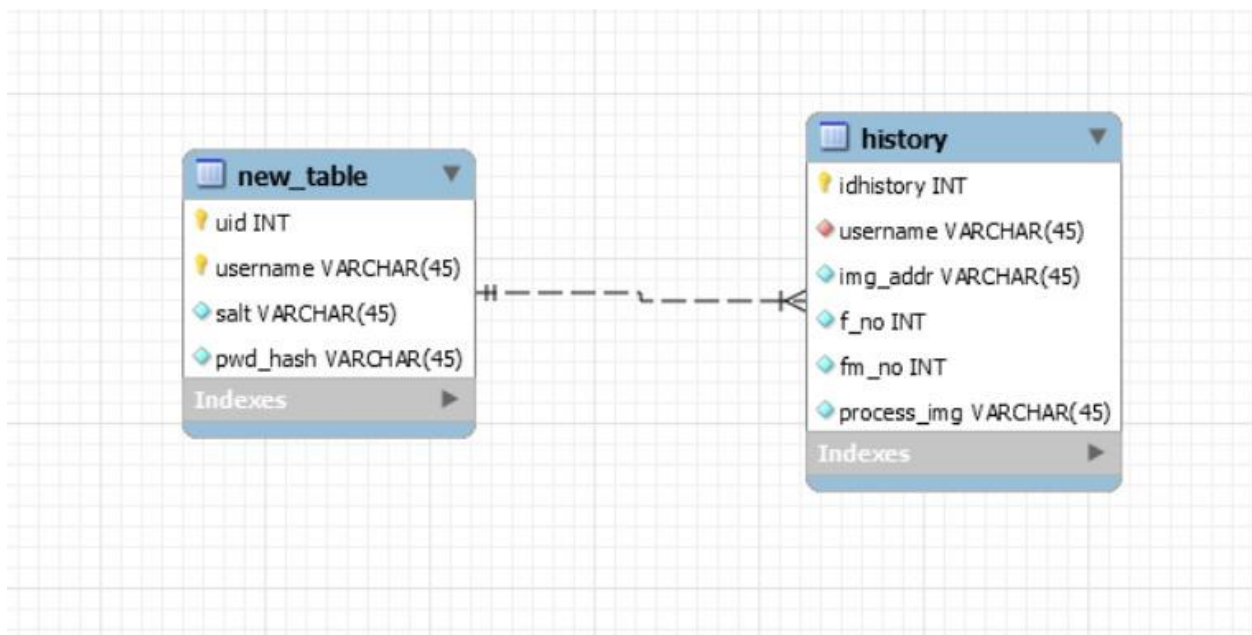
4.Launching the Web Application

4.1 Running the EC2 Instance

1. This account was created using AWS educate link provided to our class, so the TAs and professor will have access to the account.
2. Once you log in to the account, go to services and click on EC2.
3. Now select *Instance* on the left side of the page to view all available instances.

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4. There will be only one instance available in the account

5. Now click on the *Instance ID*, then go to *Action* and select *Start Instance*

Once the Instance has started, we will be able to get the "Public IPv4 address" of the instance which is needed to access the instance from our PC.

4.2 Launching the Application

To launch the application from a remote PC we need the IP address of the EC2 instance (can be obtained after running the EC2 instance) and we need the key (.pem file) which has been attached with the submission. The following steps explain how to access the EC2 instance using putty and start the web application.

1. Install Putty and Puttygen in your PC.

2. Open Puttygen and load the key (.pem file) into it using Load option

3. Next click on "Generate" and then click on save private key (.ppk file)

4. Putty accepts the key in ppk format.

5. Open Putty, enter the hostname *ubuntu@<Instance IP Address>*

6. Click on Auth under Category->connection->SSH, Here browse and add the .ppk file

7. Next go to tunnels under Category->connection->SSH, Now enter the following details
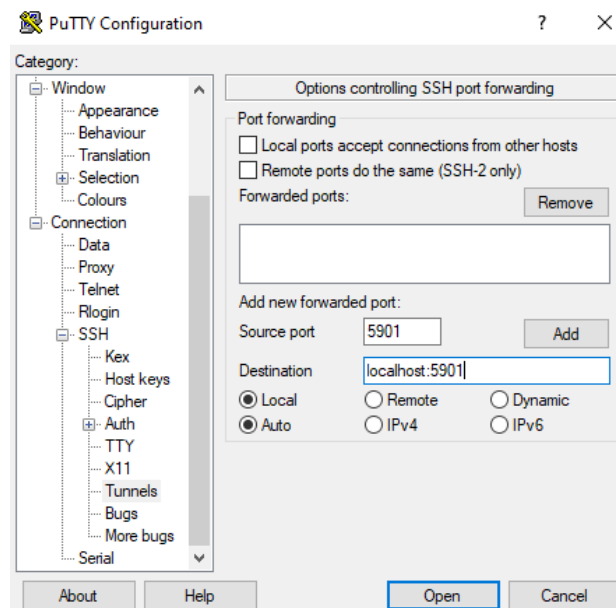

8. Now click on *Add* to add the tunnel and then click on *Open*

9. Now a terminal window will open giving us access to our Ec2 instance and we also have created a tunnel to access the instance using VNC viewer if needed.

10. In the terminal run the following command to start the web application

    - `cd ~/Desktop`
    - `./start.sh`

11. Now open the web browser in your PC and type the following Ip to access our web application
    <Instance public IP address:5000>

4.3 Accessing the Instance using VNC viewer

To access the instance using VNC viewer complete the steps 1 to 8 mentioned in the previous section and then do the following:

- Open VNC viewer and enter the connection address as *localhost:5901* then click Connect.

- Once you enter the password (ECE1779pass), you should be able to view the following screen.
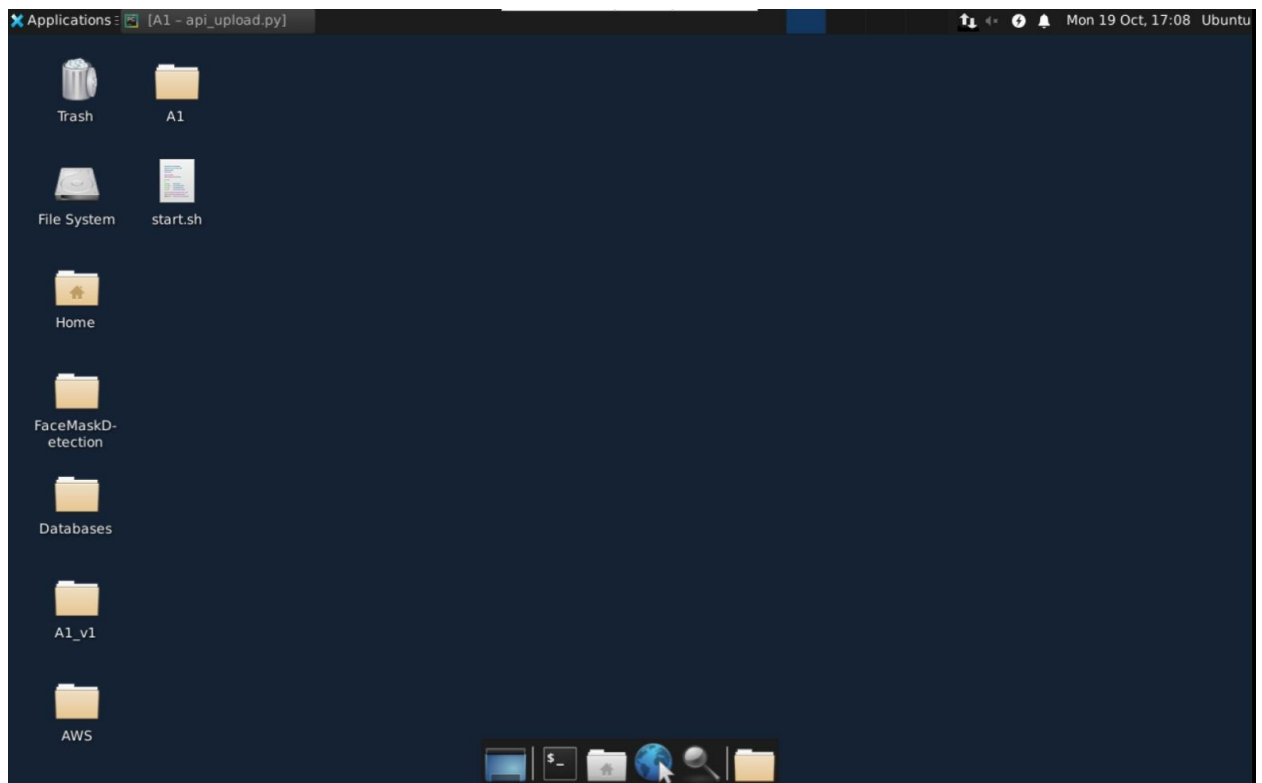
All programs are stored in the A1 folder on the desktop.

5. Using the Application

5.1 Logging In

First step to using the application is to log in. After you open the website, you will come across a login page.

Login

Username: |Enter username

Password: Enter password

Login

Forget Password?

Login with your username and password to access the homepage where you can access all your functions such as uploading a photo, logging out, or checking past uploads.

5.2 Uploading a Photo

From this page you can upload a photo from either your own computer or provide a link from the web. Click Submit to process that photo and run the mask detection algorithm on it.

5.3 Mask Detection Page

After uploading the photo and submitting it, you should see on the next page the processed photo, as well as the number of faces detected and the number of faces with masks.

Processed Image

Total number of faces: 4
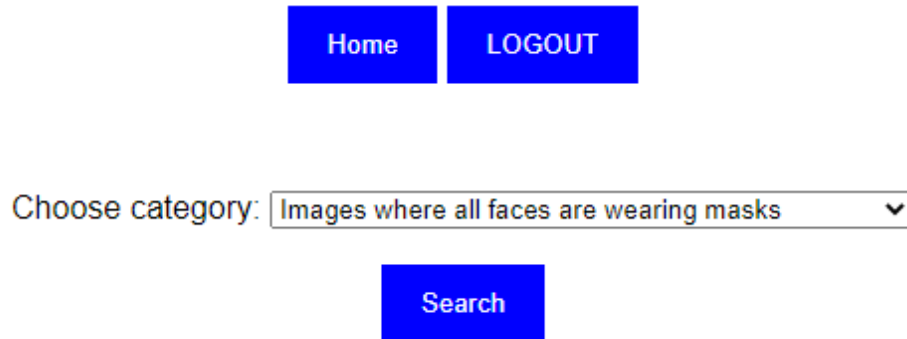
Number of faces with mask: 1

Processed Image

You should also see green boxes around the faces with a mask and red boxes around faces without a mask. From this page you can go back to the homepage to upload more photos or log out if you are done using the application.

5.4 Checking Upload History

From the homepage, you can also check all the photos you have uploaded by category. Click *Gallery* and you should be taken to another page.

From the drop down, you can select the category of images you want to see. There are four categories: Images where every face was wearing a mask, images where no faces were detected, images where no faces are wearing a mask, and images where only some of the faces are wearing a mask. After you press *Select*, you will be taken to another page where you will see all your uploaded images for that category along with the processed image with the mask detection.

From here you can go back to select another category, go back to the homepage, or log out.

5.5 Admin Tools

If you log in with an admin account, you get a few extra tools that regular users do not have access too. This includes the ability to create and delete new user accounts. The username for admin is *admin* and the password is *Ece1779pass*.

| Create User | Remove User | Change Password | LOGOUT |

Hello admin,

Please provide the location of the image below if it is in your pc

| Choose File | No file chosen | Submit |

Please provide the webaddress of the image below if it is online

Website link:

| Image weblink | Submit |

| Gallery |

The admin can also upload photos like a regular user and use the application in much of the same way.

5.5.1 New User Creation

The admin can create new users to give regular access to the system. This is done by clicking the *Create User* button which takes you to the new user creation page.

NEW USER CREATION

Username:

Enter new username

Password:

Enter new username

Create User

There you can specify a username and password for the new user and click *Create User*. The password should have an uppercase letter, a lowercase letter and a digit in it.

5.5.2 Delete a User

The admin can also delete users from the system. This is done by clicking the *Remove User* button in the admin home page.
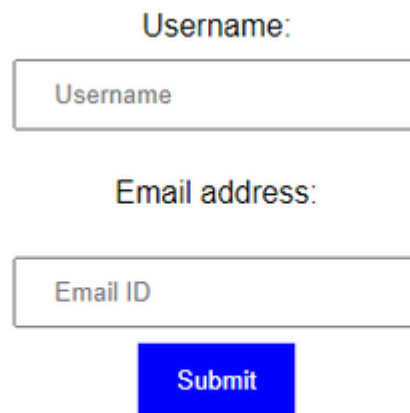
Home | LOGOUT

Delete User

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Delete User

From here, select the user you want to delete from the drop-down menu, and click *Delete User*. This will remove that user from the system, and they will no longer be able to log in with those credentials.
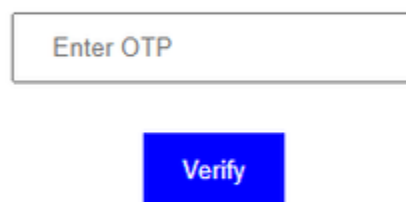
5.6 Password Recovery

Sometimes a user can forget their password. It happens to the best of us. In a situation such as this, there is the password recovery feature. This feature can be accessed from the login page. After clicking *Forget Password?* you will be taken to a new page.

Username:

```
Username
```

Email address:

```
Email ID
```

Submit

On this page, you can provide your username and email address. A One Time Password (OTP) will be emailed to you.

An OTP has been sent to your email

```
Enter OTP
```

Verify

Providing this OTP will let you reset your password and then you can log in as normal.

5.7 Change Password

Similarly, you can choose to change your password when you are logged in. Simply click *Change Password* in the user's home page and you'll be taken to the change password page.

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CHANGE PASSWORD

Password:

Enter password

Retype password:

Re-enter password

Change

*The password should contain:
- Minimum 8 characters
- Maximum 17 characters
- Atleast one uppercase letter
- Atleast one lowercase letter
- Atleast one digit

This will let you change the password according to the provided requirements and character limits.

5.8 API Endpoints

We have provided two API endpoints. One is to register new users and the other is to log in and upload an image.

USER REGISTRATION

Username:

Enter username

Password:

Enter password

Retype password:

Re-enter password

Register

*The password should contain:
- Minimum 8 characters
- Maximum 17 characters
- Atleast one uppercase letter
- Atleast one lowercase letter
- Atleast one digit

The user registration API page can be accessed with the extension */api/register*. Here a new user can be directly registered by anyone who can access the link.

DIRECT API UPLOAD

ENTER A VALID USERNAME AND PASSWORD
THEN CHOOSE AN IMAGE TO UPLOAD

Username:

Enter username

Password:

Enter password

Please provide the location of the image below if it is in your pc

Choose File No file chosen

.jpg/.png/.JPEG files only

．

Please provide the webaddress of the image below if it is online

Website link:

Image weblink

Upload

After registering a new user in /api/register we can go to /api/upload to upload the image with the newly created username and password. This image will be processed and displayed.