User Manual

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Caribou Cams

Sponsor: Kathleen Orndahl

Mentor: Mahsa Keshavarz

Members: Samantha Muellner, Shuyue Qiao, Keenan Swanson, and Dongyang Yu

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1 Introduction

Our team is pleased that you have decided to choose our product to fulfill your business needs. Our product has two parts: a CNN, or Convolutional Neural Network, which is a powerful AI machine that can determine the video quality of caribou videos; and an easy-to-use website that allows volunteers to simply and efficiently further analyze caribou videos. The purpose of this user manual is to help you, the client, successfully install, administer, and maintain the product in your actual business context going forward. Our aim is to make sure that you are able to profit from our product for many years to come.

2 Installation

As part of final delivery, the system should have been installed on a platform of your choice. Over time, however, you may want to move to a new platform or re-install the product. This section will describe how to successfully install each individual part of our product.

2.1 CNN Installation

2.1.1 To install the CNN the first thing to do is install git.

A. For linux Fedora systems this can be done by the following command into the terminal:

sudo dnf install git-all

B. For Debian Linux systems use the following command into the terminal:

sudo apt install git-all

C. For macOS type the following command into the terminal:

git --version

D. For windows systems you should download from the following link:

https://git-scm.com/download/win

2.1.2 The next step is cloning the repository.

A. Go to our repository

https://github.com/Sam-the-Unwise/Caribou-Classification-AI

B. Click the green “clone or download” button and copy the link

C. On your machine, open your file explorer and choose a location you want the application to be

D. In the desired location of your file explorer now right click on an empty area within the file explorer and open terminal for Linux/Mac systems or click git bash for Windows.

E. Next type the following command:

git clone https://github.com/Sam-the-Unwise/Caribou-Classification-AI.git

F. All the files should be located in your desired location, open it and until you see the following contents

data
src
CaribouModel.exe

Note that this system was developed for a windows operated machine and we are unable to predict how it will operate on a Linux or Mac

2.2 Website Installation

2.2.1 Follow step 2.1.1 to install git

2.2.2 Clone the repository on github

A. Go to our repository
   https://github.com/Dongyang-Yu/Caribou-Classification-Website
B. Click the green “clone or download” button and copy the link
C. On your machine, open your file explorer and choose a location you want the application to be
D. In the desired location of your file explorer now right click on an empty area within the file explorer and open terminal for Linux/Mac systems or click git bash for Windows.
E. Next type the following command:
   git clone
https://github.com/Dongyang-Yu/Caribou-Classification-Website.git
F. All the files should be located in your desired location

2.2.3 Set up the environment on local machine

A. You need to install the following required components and libraries in your local machine first:
   - Python
   - Pip
   - Django (Python web framework)
B. Install Python
   1. Since we use the Django version 3.0 framework, the python version you install should be at least 3.6 and we recommend using the latest version of Python 3. The download link is: https://www.python.org/downloads/
   2. When you have installed it, type *python --version* in terminal to check if it’s installed successfully.
C. Install Django
   Since pip is already installed if you are using Python 3 >= 3.4, we now install django with pip. Type the following command into the terminal:
   py -m pip install Django
D. Run the website
   Go to the folder that you unzipped, which is Caribou-Classification-Website. Type following command in the terminal
   python manage.py runserver
   Then, type the following link in your browser:
   http://localhost:8000/

3 Configuration and Daily Operation

In the previous section, our team described how to successfully install and log into the separate sections of our product. In this section, we will detail you, the client, further on the tasks that need to be done in order to get the product successfully deployed and operational.

3.1 CNN Configuration and Daily Operation

**NOTE: This system was developed for a windows operated machine and we are unable to predict how it will operate on a Linux or Mac

To run the AI, navigate to the directory where the github was cloned. Within the folder there should be a CaribouModel.exe. Run the .exe and wait for it to open. It may take some time.

3.1.1 Setup for Further Training

The first thing to do if to further train the AI is to go to the setup tab. In the setup tab the latest version of the Excel Sheet should be there. If it isn't, replace that file and delete the older version.

After the new excel sheet has been updated, now all the files collected from that have been classified by clicking the upload videos button.

The next step is to press the "Parse Excel Sheet" button. This will go through the excel sheet and check if the video is in that sheet.

Organizing the videos into their rightful categories before splitting them into images is essential, so make sure to press "Organize videos".

Finally the last step of setup is to select the number of frames you want to create for and then select "Split Videos to Frames". Having more frames is better for classifying but we recommend using the frame rate, 30.

3.1.2 Training a new model

NOTE: We want to make sure that our initial model won't be overwritten, so we disabled the train button if the model name is the same as our default one.

To train the AI the first parameter to pick is the amount for the “train batch size”. This number is how many images are looked at for each epoch. Do the same for “validation batch size”

Next is picking the amount of epochs to run. Running more epochs increases the chance of getting a more accurate model. The higher the number the longer it takes to run, roughly about a day or two for 200 epochs.

Finally choose what you want the model name to be and select “Train” located at the top. Once this is finished the best model accuracy will be saved and be accessible for testing unknown pictures.

3.1.3 Predicting Unknown Videos:

First thing is to add all the unknown videos by dragging and dropping your files into the location brought up by selecting, “Upload to Folder”.

Once the videos have been added, the next step is selecting the model to make predictions on the unknown videos.

After the model has been selected, select the number of frames to split each video. Once again, higher frames will allow for better predictions.

Lastly, to make predictions, press “Test”. Once this is finished executing, the predictions made will be shown in the box below that states, “Working status”.

OPTIONAL
The results can be exported by first naming the file of the excel sheet, then pressing the button, “Export Results”.

If no model and weights have been generated yet, run the *trainingCNN.py* by typing “python3 trainingCNN.py”

This will take time

Once the models and weights have been generated, use the *testingCNN.py*

3.2 Website Configuration and Daily Operation

You would need an account to login to the system and get access to the data. This application has two types of the user account with different levels of access to the system. The normal user account (volunteers) will only have access to the videos and the form. The administrator user account (clients) can view all analysis data and users information, and also has access to the administration panel, where you can add/delete users, or change normal user accounts to the administrator user account and edit volunteers' analysis data.

3.2.1 Normal user account (volunteers)

There are two ways to create a normal user account: through the Registration Panel, or created by an administrator user account.

Before signing up for an account, you need to read the training tutorial (Figure 3.2.1-1) and after that, you need to take a test (Figure 3.2.1-2) and it will give you feedback(Figure 3.2.1-3).

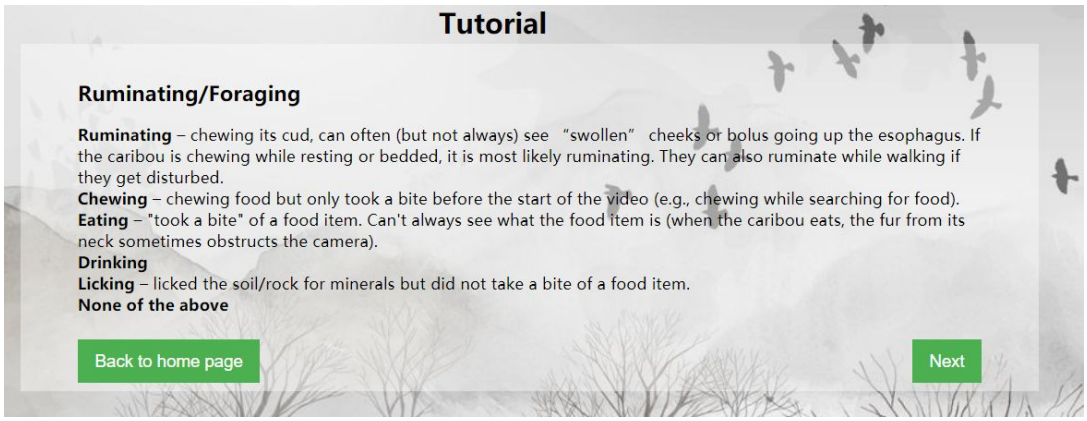

Figure 3.2.1-1 Tutorial page

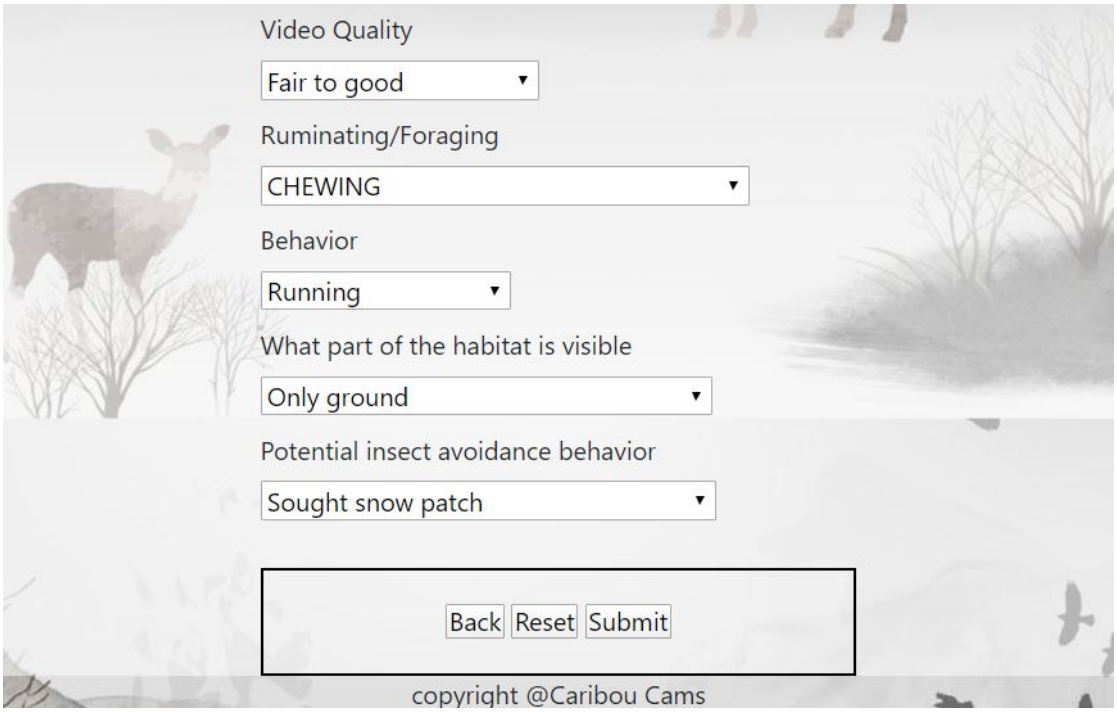

Figure 3.2.1-2 Testing page

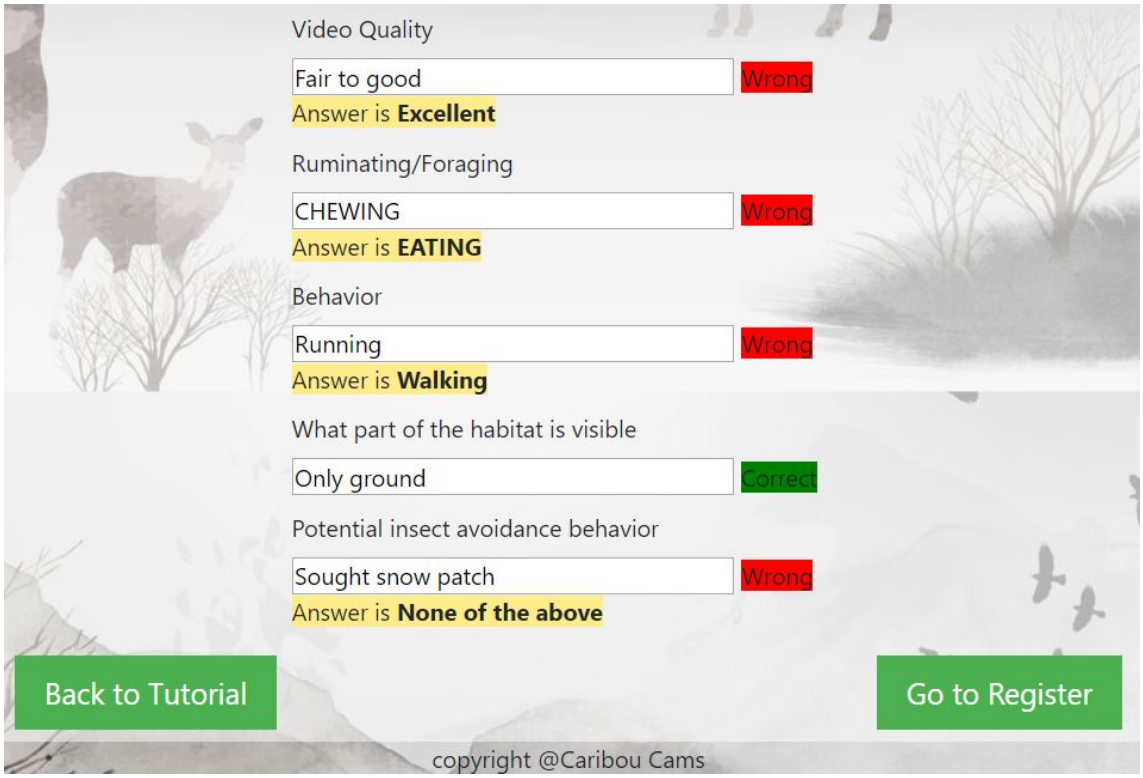

Figure 3.2.1-3 Testing feedback

- Click on the **Go to Register** on the bottom right corner. This will let the browser jumpto the sign up panel.
- Enter the valid information such as username, email address and password,and click on the **Sign Up** button to finish creating a new normal user account.
    - Notice that the system didn't allow duplicate usernames in the database.
    - Passwords need to fulfill the following requirements: At least 8 digits, can't be entirely numeric.

3.2.2 Administrator user account (Clients)

We have already created an administrator user account. Below is the credential of this account:

- Username: admin
- Password: admin
- ❖ **Notice**: Except for the access to the administrator panel, there is no difference between an administrator or normal user account

Once you login using administrator account, an **'Administration'** button appears in the navigation bar (Figure 3.2.2-1) at the top right.

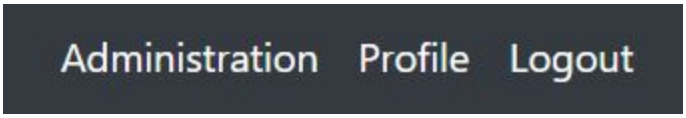

Figure 3.2.2-1 Navigation

When you login to the administration panel, you will see a dashboard (Figure 3.2.2-2), where you can manage groups, users, or view analysis data.

Figure 3.2.2-2 Administration Dashboard

3.2.2.1 Groups

Groups is an easy way to manage a certain group of users. You can classify the users into groups, and give access permissions accordingly.

To create a group, click on the **+Add** button below the **AUTHENTICATION AND AUTHORIZATION** header. This will jump to another page (Figure 3.2.2-3), where you can name the group you create, and select the access permissions you want to add to these groups. For example, you can set one group of users only to view the data,and the other group of people have permission to delete data.

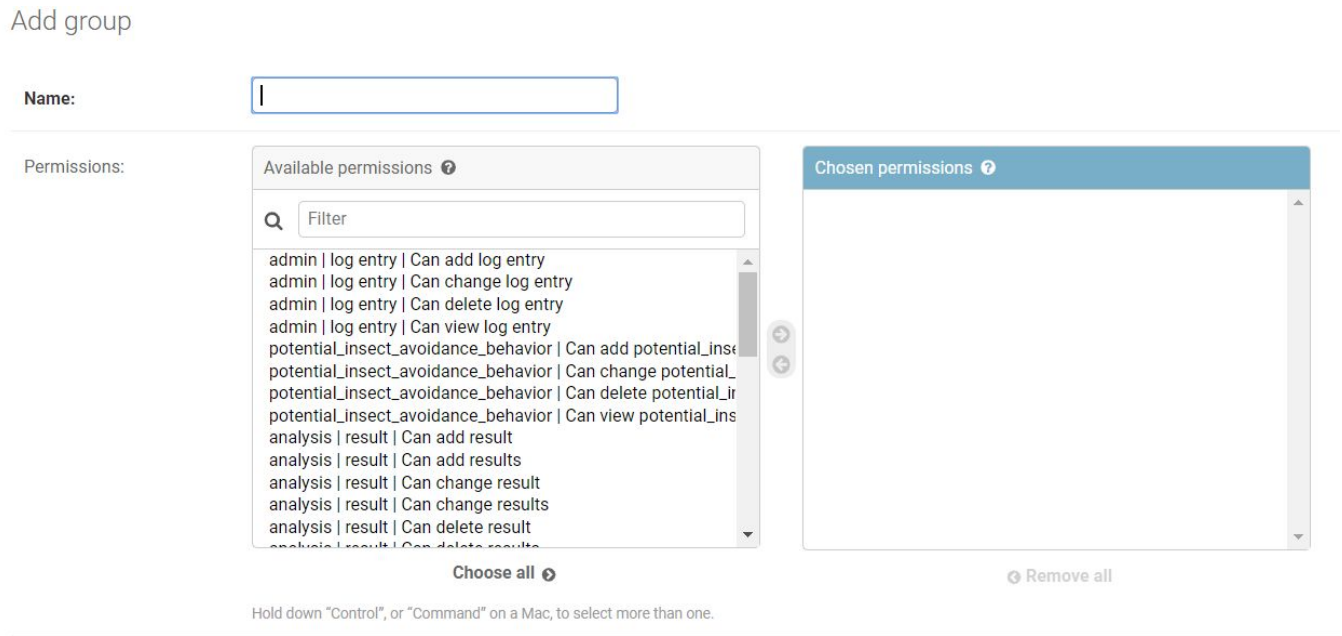

Figure 3.2.2-3 Add Group

3.2.2.2 Users

- Add account

Administrator can create a user account by clicking on the **+Add** button (Figure 3.2.2-4).

In the following page (Figure 3.2.2-5), enter the necessary information including: name and password

Figure 3.2.2-4 Add User

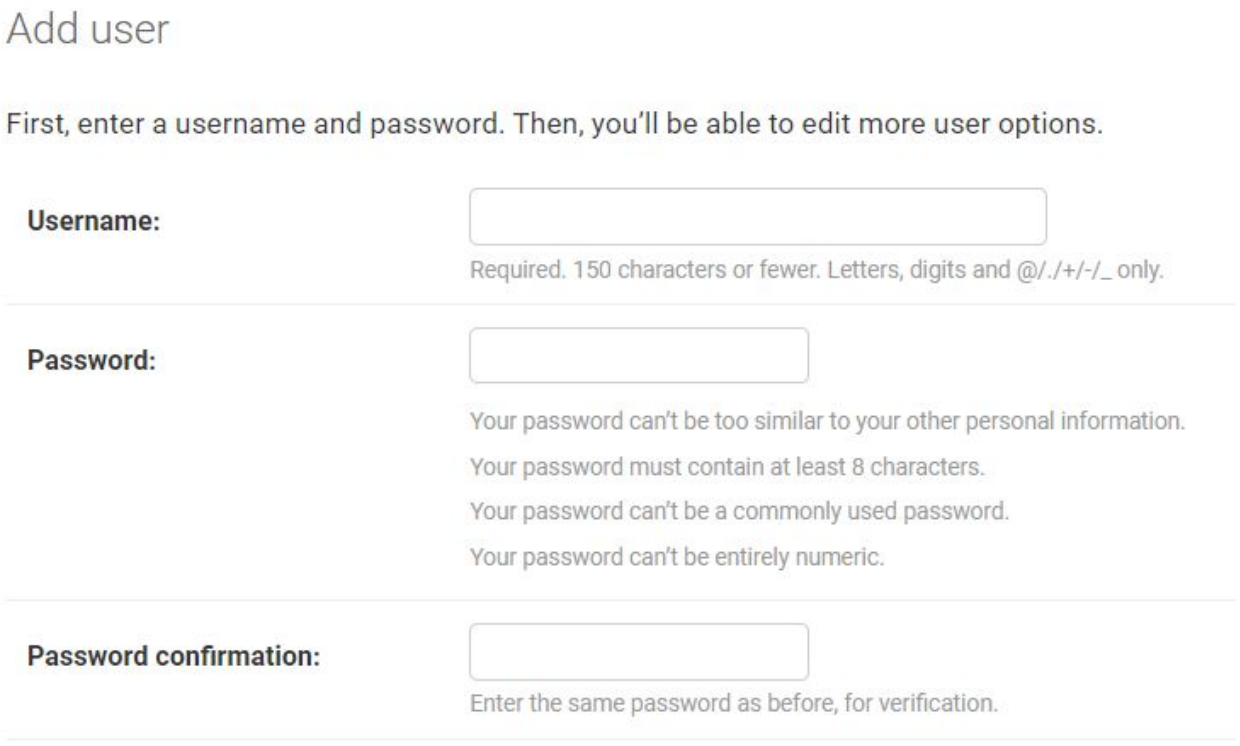

Figure 3.2.2-5 User adding page

- **Change account**

Click on the **Users** link, and select the specific user for more operations (Figure 3.2.2-6).

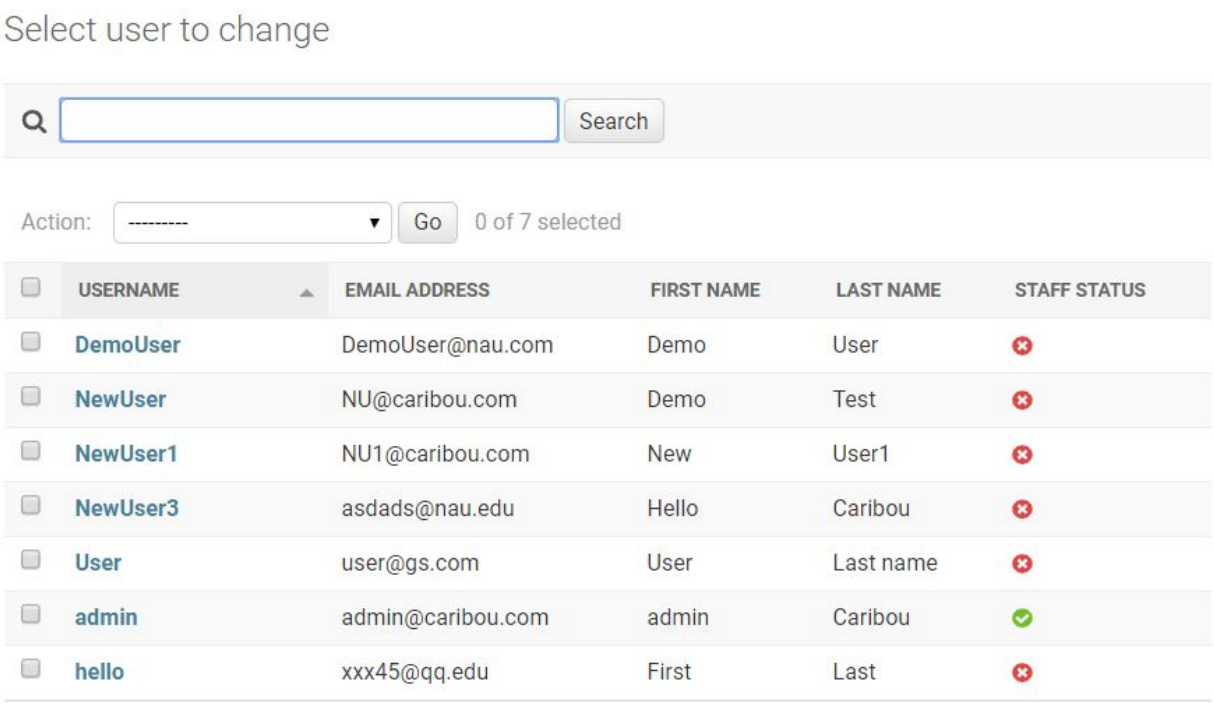

Figure 3.2.2-6 Change users

3.2.2.3 Result

Data saved in **Result** are the video analyses (Figure 3.2.2-7). Administrators can check those analyses. If some fields are analyzed wrong,they can edit them by clicking on it, and edit them (Figure 3.2.2-8).

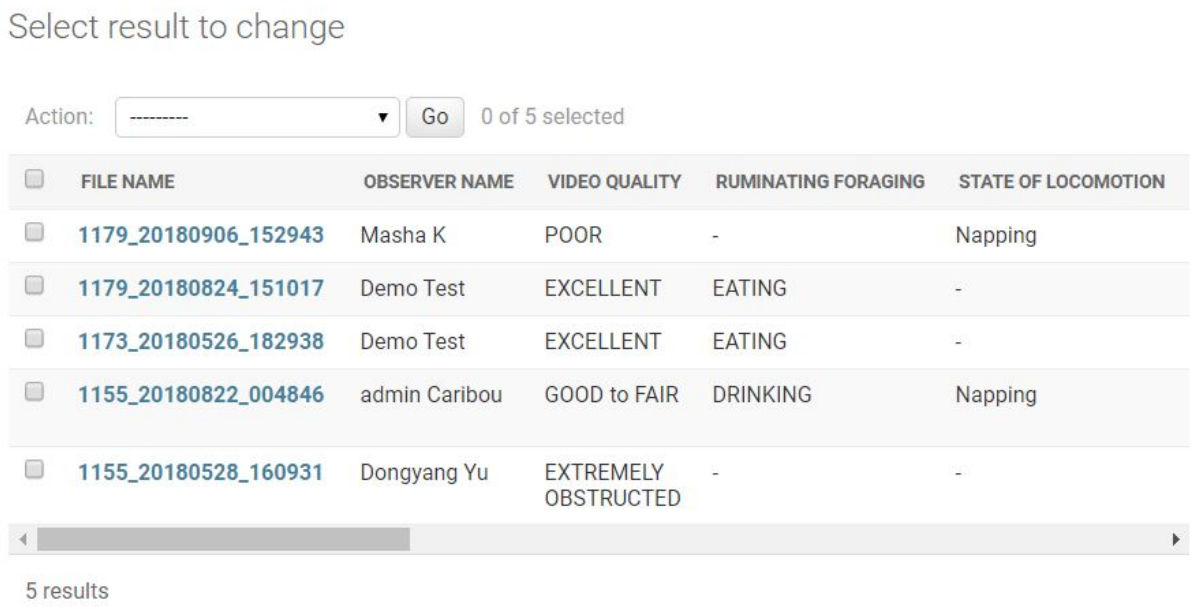

Figure 3.2.2-7 Results data

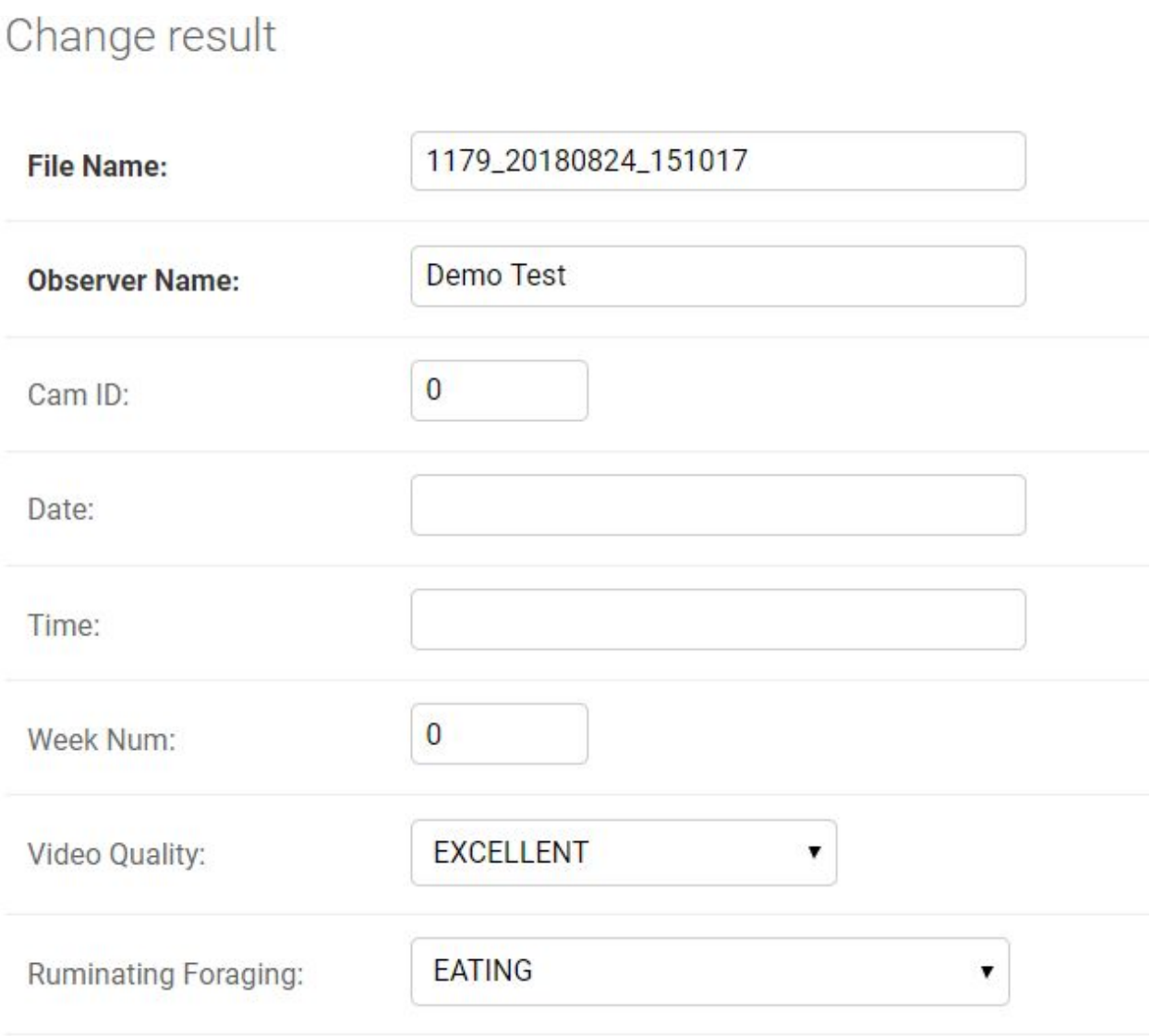

Figure 3.2.2-8 Change data

4 Maintenance

With the past two sections you should now be able to successfully install and run both parts of our product. In this section, we will discuss any specific types of maintenance and activities that should be administered to the product in order to maintain its long-term health.

4.1 CNN Maintenance

To maintain the application, the source files of the project are located in the src folder of the downloaded repository. To be able to update the code, the environments should be set up. We used anaconda, download at https://www.anaconda.com/products/individual.
After the download is complete open the anaconda prompt. Type the following the commands:

conda create -n tf tensorflow
conda activate tf

pip install tensorflow
pip install keras

This allows each file to be executed that contains machine learning algorithms. Each file can then be changed and updated for the future if needed.

4.2 Website Maintenance

4.2.1 Website security maintenance

In order to protect the security of the video on the website, we log in through the username and password, so that only authorized people can access the video.

4.2.2 Website content update

When the training videos on the website need to be updated, you can pour in new videos and new forms, or find our team members to update.

4.2.3 Database maintenance

For wrong data in the database, the database administrator can enter the database to make changes. The administrator of the database can also monitor the user's dynamics in real time.

5 Troubleshooting

With programs, successful installation and maintenance should keep the program running smoothly. However, there is still a chance for problems to occur. This section will discuss how to handle such problems and what steps can be taken in the future to further avoid them.

5.1 CNN Troubleshooting

Accidentally deleting the code -- redownload from github
Accidentally deleting the saved model and/or weight -- unfortunately, you'll just have to rerun it
Accidentally saving training/validation data -- refill the folder with new videos, but make sure that each folder contains the same number of videos
Corrupted download

5.2 Website Troubleshooting

Accidentally deleting the code -- redownload from github
Forget password -- click the "forget password" button to go to the another page to reset the password
Webpage is not showing -- refresh page or check network connection
Picture is not shown -- refresh page or redownload the picture from github
Can't jump to another page - refresh page or login again

6 Conclusion

This User Manual has provided you, the client, with all the necessary information to use this product to its full ability. Thank you again for choosing our product in order to accomplish your goal. While we are all moving on to professional careers, we would be happy to answer short questions in the coming months to help you get the product deployed and operating optimally in your organization. Below we have attached our emails to our names, which you are welcome to contact us at any time with questions regarding the project.

Best wishes from your developers:

Samantha Muellner (Team Lead) - shm53@nau.edu
Shuyue Qiao (Architect) - sq66@nau.edu
Keenan Swanson (Customer Communicator) - kks259@nau.edu
Dongyang Yu (Recorder) - dy239@nau.edu