

SpotID guide



SpotID is meant to act as a leopard individual identification tool from camera trap images. From a directory full of leopard camera trap images, SpotID will automatically sift through them, identify where the leopard is located, crop it out, remove the background, and then apply its innovative Deep Learning algorithm to try to understand which photos of leopards are most similar, hence guiding the user to identifying individual leopards in the capture-recapture method.

Opening the software

With the latest release, there is 0 code needed to run this model. One simply needs to download the corresponding release from [here](#), either Mac or Windows. Once downloaded and unzipped, you can simply open the spotID folder, and double click on the spotID executable. After a few seconds, your browser will open a window with the spotID interface. If this doesn't happen (not seen in local executions), simply type `http://127.0.0.1:5000`. The interface looks like this:

The screenshot shows a web-based application interface. At the top is a decorative image of a leopard's head. Below it are two main sections. The first section, titled "Open Existing Embeddings", contains a text input field labeled "Path to existing embeddings folder" and a green "Open Embeddings" button. The second section, titled "Run Model from Scratch", contains two text input fields: "Path for embeddings output" and "Path to uncropped images", followed by a green "Run Model" button.

Running the model

Now, if it is your first time running the model, you need to go with “Run Model from Scratch”. You need to set a path where your embeddings (the vector representations of the leopard images, how the model manages to tell you if two images are of the same leopard is due to this). This is important, as you’ll reuse this if you don’t start from scratch (see above).

Mac example path: /Users/dcolomer/Downloads/embeddings_test

Windows example path: C:\Users\dcolomer\Downloads\embeddings_test

You need to do the same for “Path to uncropped images”. This is the directory where the leopard camera trap images are stored. I must say that this does not mean that all of the leopard images are directly under the directory, they **can** be in subdirectories! The model will look inside all of the directories. I recommend you don’t have any other images in the directory though.

If you don’t know the full path to your images, simply go to the directory, right click, click on “inspect properties” or something similar, and you can copy paste the full path.

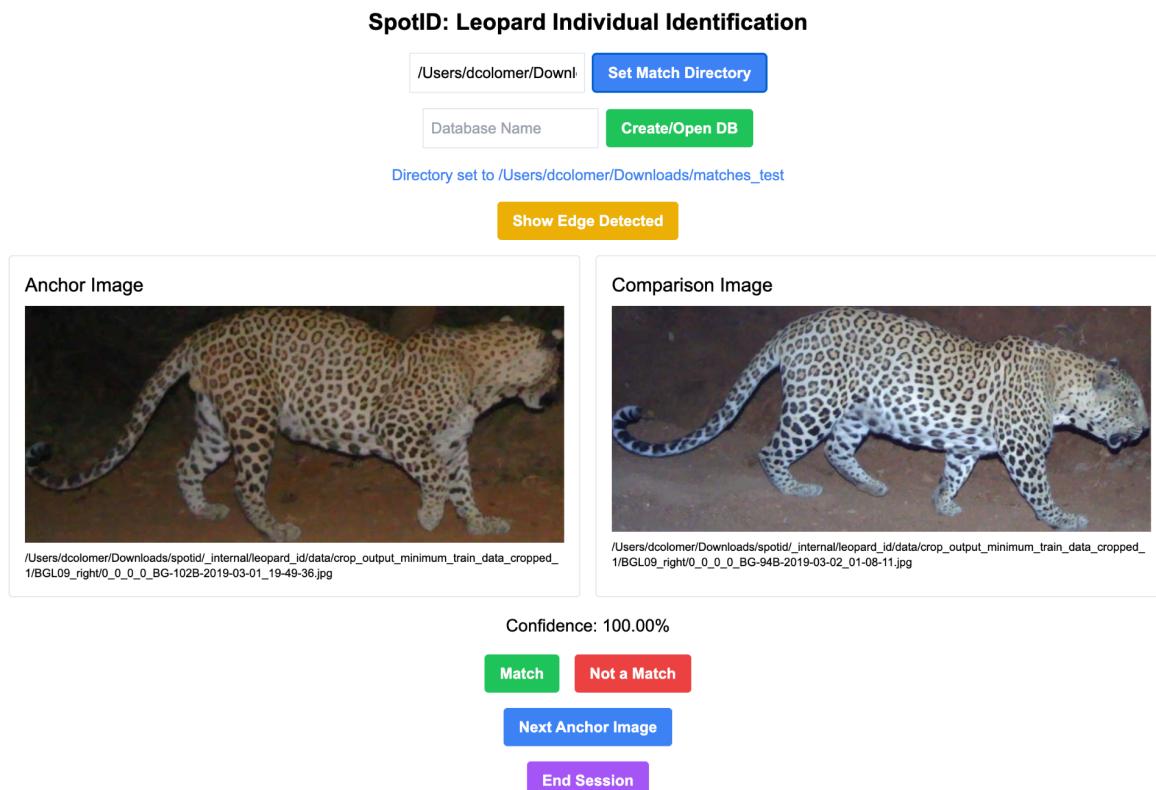
Once you click on “**Run Model**” it will start doing all of the process above. It takes a while (3 preprocessing steps and an AI model to run...). You can check the progress in the terminal that opens:

```
Cropping complete!!
INFO:root:Input directory: /Users/dcolomer/Downloads/spotid/_internal/leopard_id
./data/crop_output_minimum_train_data_cropped_1
Input directory: /Users/dcolomer/Downloads/spotid/_internal/leopard_id./data/crop_output_minimum_train_data_cropped_1
Input directory: /Users/dcolomer/Downloads/spotid/_internal/leopard_id./data/crop_output_minimum_train_data_cropped_1
Processing image BHA32_Right/0_0_0_0_118A-2013-12-05_17-12-07.jpg...
Processing image BHA32_Right/0_0_0_0_111A-2013-12-06_20-18-11.jpg...
Processing image BHA32_Right/0_0_0_0_109B-2013-12-09_19-47-01.jpg...
Processing image BHA32_Right/0_0_0_0_9A-2013-12-06_19-58-55.jpg...
Processing image BHA32_Right/0_0_0_0_11B-2013-12-11_01-32-40.jpg...
Processing image BHA32_Right/0_0_0_0_97A-2013-12-06_22-08-06.jpg...
Processing image BHA32_Right/0_0_0_0_118A-2013-12-05_17-12-08.jpg...
Processing image BHA32_Right/0_0_0_0_9B-2013-12-06_18-11-25.jpg...
Processing image BGL09_right/0_0_0_0_BG-122A-2019-03-05_03-41-48.jpg...
Processing image BGL09_right/0_0_0_0_BG-126A-2019-03-08_17-48-23.jpg...
Processing image BGL09_right/0_0_0_0_BG-129A-2019-03-10_20-28-01.jpg...
Processing image BGL09_right/0_0_0_0_BG-117A-2019-03-08_18-37-33.jpg...
Processing image BGL09_right/0_0_0_0_BG-120B-2019-03-07_00-10-25.jpg...
Processing image BGL09_right/0_0_0_0_BG-121A-2019-02-25_07-52-13.jpg...
Processing image BGL09_right/0_0_0_0_BG-129B-2019-03-10_19-17-50.jpg...
Processing image BGL09_right/0_0_0_0_BG-127B-2019-03-01_02-34-35.jpg...
```

Processing the images

We could have implemented an automatic clustering algorithm that groups the images of the similar leopards into one single leopard, but the possibility of having some false positives (different leopards grouped as one) and the consequences of that meant that we backtracked with that. We thus made a semi-automatic model.

Once the model has encoded all the images, you get shown, for each individual image, the 5 most similar images in order that were found in all of the images processed, with a similarity index:



The first thing that you need to do is set the match directory, again with a full path. This is where the organized images and the csv with the matched leopards will live. You need to do the same with the DB, which is the database of image matches (so that you can come back to it afterwards).

Once you do that, you can start matching. If you think the images are a match, click “match”, otherwise, “Not a match”. Use the “confidence” as a guide. It is rare for images to have close to 100% confidence without them being matches in our database.

Of course, as I said previously, you get shown the 5 closest images per leopard (without showing the images twice, so when the “Comparison image” above gets shown as an “Anchor image”, the photo that is currently as “Anchor image” will be skipped as comparison image to

avoid giving you extra effort). This means that, once you have matched all the images to a leopard, you'll start seeing false matches (normally with confidence <60%). If this is the case, simply click on "Next Anchor image".

Anchor Image



/Users/dcolomer/Downloads/spotid/_internal/leopard_id/data/crop_output_minimum_train_data_cropped_1/BGL09_right/0_0_0_BG-94B-2019-03-02_01-08-11.jpg

Comparison Image



/Users/dcolomer/Downloads/spotid/_internal/leopard_id/data/crop_output_minimum_train_data_cropped_1/BHA32_Right/0_0_0_9B-2013-12-06_18-11-25.jpg

Confidence: 55.52%

(Example of a false match due to the logic seen above)

Once you're happy with your work, click "End Session" and your data will get stored in the match directory as such:

> leopard_1	Today at 21:31	-- Folder
> leopard_2	Today at 21:31	-- Folder
> leopard_3	Today at 21:31	-- Folder
leopard_matches.csv	Today at 21:31	6 KB CSV Document