HotSpotter User Guide

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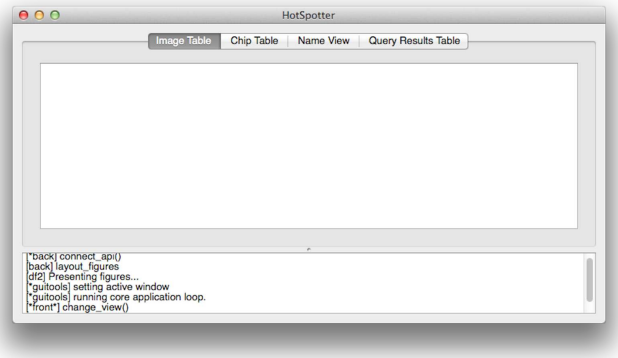
1 Usage

This document presumes that you have downloaded and installed the Windows or Mac version of the HotSpotter software, and describes the basic steps of running the program to identify individual animals. The instructions are primarily focused on the mac version of the software, but adaptation to the windows version is easy. Just know that the control key (`Ctrl`) on windows is equivalent to the command key (`Cmd` = ⌘) on Mac. This guide will use the mac notation.

1.1 Opening the Program

When HotSpotter is first run, the program prompts the user to open a database or create a new one. In each succeeding run, it will start by opening the previous database.
To Open or Create a new Database:

`File` → `Open Database [(⌘+O)]`

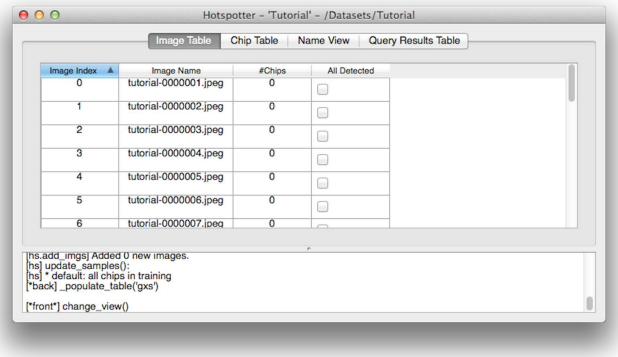


HotSpotter can also read StripeSpotter databases by opening the StripeSpotter database's `data` directory.

1.2 Importing images

In order to add one or more images to the database, run

`File` → `Import Images [⌘+I]`



HotSpotter will copy all selected images into its images directory. You may also import images by directory from the menu. These are automatically added to the database and may be seen under "Image Table'

1.3 Defining Chips with ROIs and Orientation

Before identifying an animal in an image — or, equivalently, finding other images that show the same animal —- a region of interest (ROI) an orientation must be assigned. (The sub-image extracted from an ROI is called a "chip".) The ROIs must be specified first and this can be done either manually or automatically. The automatic version is not very sophisticated: it simply assigns each image to be its own ROI. This is accomplished by

`Convenience → Convert All Images to Chips`

This option should be used in the relatively rare case that the animal occupies almost the entire image. The more common case is to specify the ROIs manually. Multiple ROIs are allowed for each image. Each ROI should include most of the body of the animal — anything that might be a distinguishing feature — so users should err on the side of making the ROI too large rather than too small.
In order to specify an ROI, the Image Table should be highlighted and then the image should be selected. Then, "ROI mode" must be entered:

`Actions → Add Chip [A]`

An ROI is selected by clicking two image points in the Image View to specify opposite corners of the bounding box.

In the case of an annotation mistake, an ROI can be reselected using

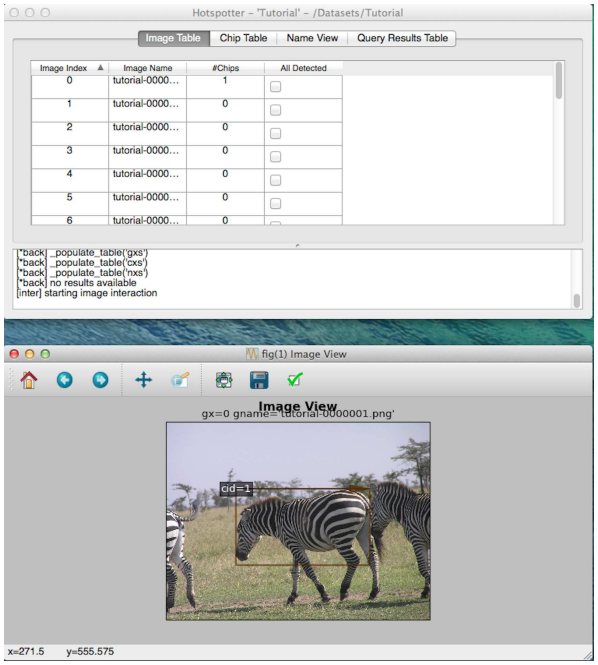
`Actions → Reselect ROI [R]`

or removed entirely using

`Actions → Delete Chip`

The default orientation is horizontal, and this is set internally by HotSpotter. This is usually sufficient when taking "normal" — e.g. side-view — pictures of standing animals, such as zebras or giraffes. On the other hand, for overhead pictures of animals like frogs, specification of the orientation is **crucial for accurate recognition**. The orientation is best determined by drawing an axis within the ROI of the animal in a way that can be repeated for each animal. For frog images this is the spine.
In order to specify an orientation other than the default (horizontal) orientation, the user must enter orientation mode:

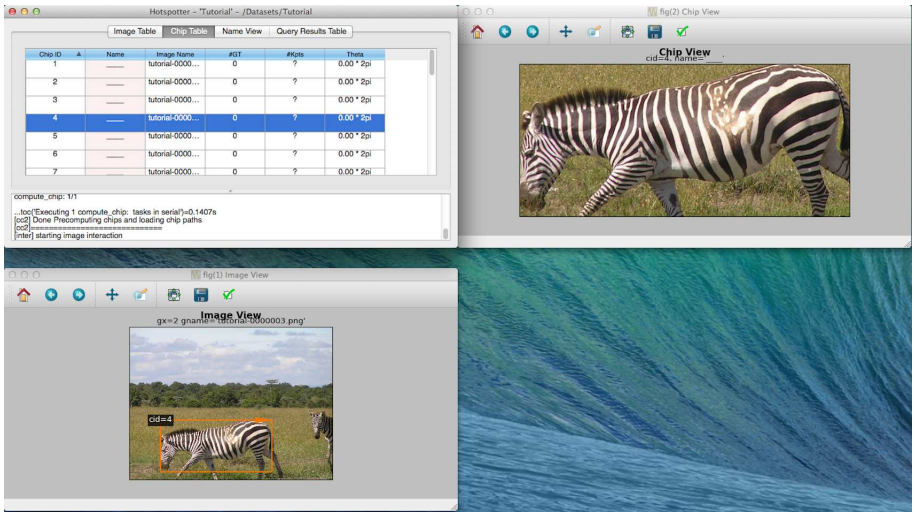
`Actions → Reselect Orientation [O]`



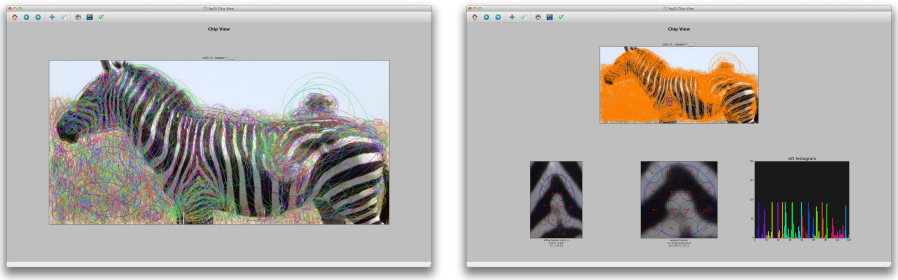
Clicking two points on the Image View defines the orientation axis. Note that the angle does not have to be selected perfectly each time. Pretty close will suffice.

1.4 Chip Properties Display

Within these chips HotSpotter computes its hotspots — elliptical regions centered on points of interest that HotSpotter automatically detects. Intuitively, the hotspots are loosely analogous to a "fingerprint" for the chip. Chips with enough hotspot similarity are matched successfully by HotSpotter. A chip can be seen by clicking on the Chip Table and then selecting a chip.



The hotspots' points of interest and elliptical regions can be toggled on and off by clicking on the grey area around a chip in the Chip View. A specific hotspot can be viewed by clicking on a point of interest on the chip within the Chip View.

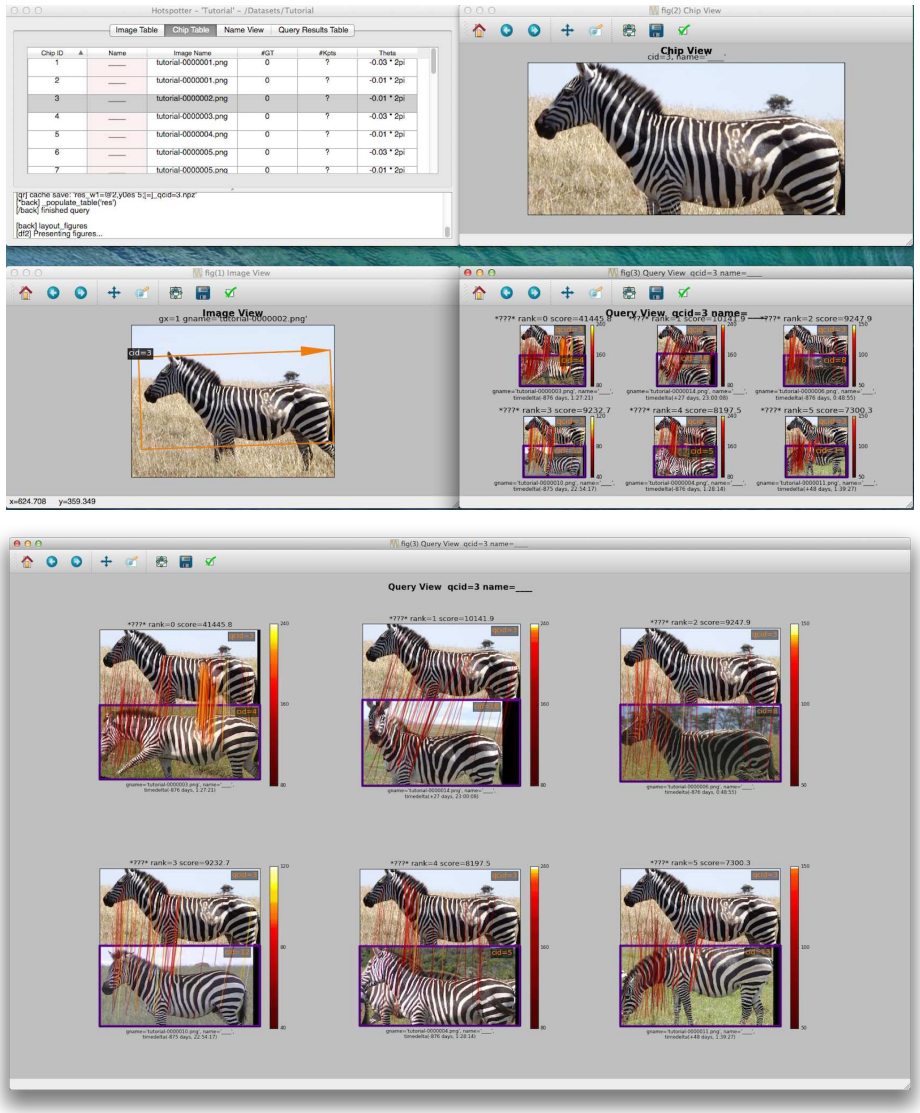


1.5 Running a Query

A Query can be run on the selected chip.

```
Actions → Query [Q]
```

This will quickly find similar chips in the database. The program will automatically rank the chips in order of similarity and will highlight the portions of the image that it identifies as being most similar.



Once the user decides based on a query that two or more chips match, the actual recording of the match occurs only when the chips that match are all given the same name. This requires an understanding of the meaning of the names within HotSpotter, as described next.

2 Additional Tools and Tricks

Here is a brief discussion of are a few additional tricks and options for running HotSpotter:

- `Actions -> Select Next`: selects either the next image that does not already have an ROI or the next chip without an orientation.
- `Actions -> New Chip Property`: record metadata as a series of one or more attribute/value pairs for any user defined metadata. HotSpotter will automatically import existing metadata from StripeSpotter databases.
- `Options -> Edit Preferences`: change the behavior of HotSpotter. For now, these are not very well documented and should only be used with extreme care or collaboration with the HotSpotter team.

- `Help -> View Data Directory`: Opens the current database directory.
- `Help -> View Source Directory`: (primarily for developer usage) Opens the HotSpotter source directory.
- `Help -> View Internal Directory`: Opens the current database's `_hsdb` directory
- `Help -> Delete Computed Directory`: Removes all of HotSpotter's internal cache. It should be used if you suspect the database has been corrupted. This forces everything to be recomputed.
- `Help -> Delete Global Preferences`: This removes HotSpotter's external cache, which may have inconsistent file formats between versions. If HotSpotter has trouble loading try this first.

3 A Bit of Troubleshooting

In the event that HotSpotter behaves unexpectedly, the first thing to try is a restarting the program. If the error persists, the following will fix common errors:

- **Delete your preference directory.**
  HotSpotter keeps a small set of preference files in the user's home directory. These files remember the last database opened as well as other preferences. When updating to new versions these can sometimes cause problems. Deleting the `~/.hotspotter`[1] folder may fix some issues.
- **Re-Import the Images**
  If the images you've imported aren't showing up, you can always re-import the images in `user_database_dir/images` directory.
- **Delete the Computed Directory**
  If something looks corrupted or ROIs are being oddly drawn, the user should consider deleting the computed directory. Running the command `(Convenience → View Internal Directory)` will open `user_database_dir/_hsdb` directory. From here the `computed` directory may be deleted. This will cause the program to recompute all of its data. The user may have to restart HotSpotter.
- **Mac OSX 10.8 Gatekeeper**
  For Mac OSX 10.8 Mountain Lion users this app might not run. This error is due to a security feature within Mountain Lion called Gatekeeper. If the app fails to run, please do the following:
  1. Go to `System Preferences` — Click the Apple icon in the menu bar (top-left of the screen) and select `System Preferences` in the drop down menu.
  2. Go to `Security & Privacy` — It is located on the top row, entitled `Personal`.
  3. Go to the `General` tab.
  4. Authenticate — Click on the lock at the bottom-left corner of the screen and subsequently input your computer username and password.
  5. In the bottom half of the `General` tab, there will be the following selection:

```
Allow applications downloaded from:
( ) Mac App Store
(X) Mac App Store and identified developers
( ) Anywhere
```

[1] Note that ~ denotes the user's home folder

Select `Anywhere` and subsequently select `Allow From Anywhere` in the drop down warning.

6. Close the `System Preferences` window.
7. Install HotSpotter and run it.
8. To re-enable security after running HotSpotter once, repeat the above changes to your preferences, except click on `Mac App Store and identified developers`.

- **Email the Developer**
  If all else fails users should send an email to `hotspotter.ir@gmail.com`. Please include a detailed description of the error, the output of the `(Convenience → Write Logs)`, and what was being done when it happened.

4 Source Code

4.1 License

HotSpotter is currently distributed under the Apache License, Version 2.0.

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HotSpotter
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limitations under the License.
```

4.2 Download

Download the source code here: https://github.com/Erotemic/hotspotter

```
git clone git@github.com:Erotemic/hotspotter.git
```

Once the source code has been downloaded the program can be run by using the command:

```
./main.py
```

4.3 Contribute

HotSpotter is an open source project. If any tech-savvy users develop a cool feature or a bug-fix and would like to see it incorporated, send an email with the proposed patch to `hotspotter.ir@gmail.com` for code review.