

scoreMovieLunges

Scoring lunges in a movie after it has been processed by Cadabra.

Introduction

The Mac application *scoreMovieLunges.app* was written in AppleScript by Clement Kent in September 2014. It solves a very specific problem: how to check which of a pair of flies (one wing-clipped, one not) is lunging at any given point in time.

It relies on a file of times when events (lunges by default) have been detected. This information can be supplied in two ways:

- For aggression movies the program Cadabra produces a file named something like Tables/Lunges_dates_08071425SL1bp01.txt, where 08071425SL1b_p01.avi is the movie file. This text file gives the times in seconds when Cadabra has detected lunges. Although Cadabra attempts to assign the lunges to flies "1" and "2", this is not reliable. So, we know after Cadabra runs when it found lunges but not which fly made them. *scoreMovieLunges* will convert a Cadabra .txt file into its own .LNG format.
- If you have times determined by some other method, create a .LNG file by writing time1,0 in the first line of the file, time2,0 in the second, and so on. Times should be in seconds with enough decimal places to accurately locate the event. So, the first line of the file might look like 1.352,0 meaning the first event happened on or around 1.352 seconds. *scoreMovieLunges* will read such an LNG file if one exists.

For some experiments the total number of lunges is enough. However for many experiments we wish to know how many of the lunges are produced by the Focal Fly (the non-wing-clipped fly) and how many are by the Wing-Clipped fly. The codes for these two flies in the application are simply "f" and "w". There is an additional code "u" for Unknown. At first every lunge is scored "u"; after you have seen a Cadabra-called lunge you can choose to leave the "u" score if:

- the time indicated doesn't really have a lunge (Cadabra makes a few mistakes of this kind), or
- you can't really tell which fly lunged (Cadabra sometimes calls boxing matches lunges)

After running through the movie looking at only the times where Cadabra thinks there are lunges, *scoreMovieLunges* will automatically write a comma-separated LNG file with information about who lunged when - see below.

It's really too bad Cadabra can't reliably tell wing-clipped and normal flies apart. When Cadabra, Qtrax, Ctrax, or some equivalent software gains the ability to do this, *scoreMovieLunges* will be obsolete. However, right now "ground-truthing" a Cadabra-processed movie means painstakingly looking through the whole move. Using *scoreMovieLunges* you only have to look at places where Cadabra found lunges. Scoring should take you about as many seconds as there are lunges once you are used to the software, so *scoreMovieLunges* simply speeds up the process of watching the movie.

What it won't do: *scoreMovieLunges* doesn't detect lunges. You need Cadabra or some other source of lunge times for that.

Based on ground-truthing experiments conducted by Pavan and Yong-Kyu, Cadabra misses perhaps 10-20% of the lunges a human observer sees. However, for many experiments, we only need to be able to compare Cadabra-found lunges during a training period to Cadabra-found lunges after some manipulation. *scoreMovieLunges* is good for this.

Installation

scoreMovieLunges only works on Macs with a fairly recent OS. At present the app needs to be compiled on the machine where it is to be run - this simply involves:

- save the script file ([source file here](#)) as *scoreMovieLunges.scpt* in the directory you want on the Mac
- double click on the script file. The AppleScript Editor should open.
- From the File menu, choose Export. A window opens.
- in the File Format box, choose Application, then click Save
- close the AppleScript Editor
- you should find a file called *scoreMovieLunges.app* in the same directory as the script file.
- You are done!

scoreMovieLunges uses one Mac application for displaying the movie files: Quicktime Player 7. This must be on your Mac. Check your Applications folder. If you don't have it it can be freely downloaded from Apple. You cannot use more recent versions of Quicktime Player because Apple neutered them. WARNING: in some future Mac OS release, they will stop supporting Quicktime Player 7. *scoreMovieLunges* will no longer work then.

Finally, *scoreMovieLunges* only works with movie files that Quicktime Player 7 can play. These include .avi, .mov, .mp4, and many others.

Using *scoreMovieLunges*

Input files:

- a movie file

- a .txt file produced by Cadabra from the movie (see Introduction).

These two files should be in the same directory. You need to have read and write access to this directory.

NOTE: you should not have the movie or txt files open in another program; this makes AppleScript go all weird and funny.

Output files:

- a .LNG file, with the same name as the input .txt file (except _p01 will be converted to p01 for consistency with the movie file), in the same directory.

The LNG file has one line for each lunge Cadabra detected. Each line is in format time,code. Time is the time in seconds (to 3 decimal places) when the lunge took place, and code is one of:

- 0 = unknown (see Intro)
- 1 = focal fly lunged
- 2 = wing-clipped fly lunged

Since it is in csv format, it is easy to load the LNG file into Excel, Matlab, R, or your favorite stats program.

NOTE: you should not have the LNG file open in another program; this makes AppleScript go all weird and funny. See Re-Use, below.

Starting the app:

Simply drag the .mov file on top of the *scoreMovieLunges.app* file. In a moment (be patient!) you should see three things happen in succession:

1. First, a "Notification" window opens temporarily in the top right of your screen. It only stays open for about 5 seconds, and displays the number of lunges to be scored, and if some scoring has already been done, how many were focal or wing clipped fly. You don't have to do anything about the Notification window - it goes away by itself.
2. Second, three options dialog boxes appear, allowing you to tell *scoreMovieLunges* how you would like the movie displayed and the scoring done. See Options, below.
3. Third, Quicktime Player 7 opens a window containing the movie. If this window doesn't appear in front, you should use Cmd-Tab to select it. Clicking on the window to select it puts AppleScript in a bad mood where it makes you click an OK button every time you enter a score. This is an extra step which you don't have to do if you go to the movie window using Cmd-Tab, for some unknown reason buried with Steve Jobs.
4. After step three, you should see the first movie section looping on your screen and a scoring dialog box. See below.

Scoring:

scoreMovieLunges automagically tells Quicktime Player 7 to display the movie from 0.5 seconds before the lunge to 0.5 seconds after, and then repeat.

At the same time a dialog box appears with the phrase "*lunger is f/w/u/s:*". A default answer is in the dialog box. When you first start scoring, the default answer is "u". If you are re-scoring the movie, the default answer is whatever score was previously assigned.

You type one of the following lower-case letters:

1. f = focal fly
2. w = wing-clipped fly
3. u = dunno, or not really a lunge
4. s = stop scoring
5. nothing at all, which means take the default answer

You press "return" on your keyboard to finish entering your score.

If you entered f,w, or u the code will be recorded and the app will move you forward to the next time where a lunge occurs and you keep scoring.

If you are at the end of the set of lunges, *scoreMovieLunges* automatically saves your scores in the LNG file, puts up a final notification window giving a summary of the scores, and exits.

If you entered s, a confirmation dialog asks you if really want to stop (*Exit?*). Click OK to stop, or No to continue scoring. If you stop the scoring using s, *scoreMovieLunges* will write any changes you made to the LNG file and exit.

Re-use:

scoreMovieLunges allows you to re-score a movie. This allows you to score for a while and then stop for lunch, and come back later and resume scoring. Or, you can look at scores somebody already recorded and change them if you want.

All you do is drop the movie onto *scoreMovieLunges.app* just as you would do when first starting scoring. *scoreMovieLunges* checks to see if a

.LNG file already exists in the movie directory. If it does, the app knows you are resuming or re-scoring the movie.

The key to re-use is the third option you set at the beginning (see Options, below). This scoring option specifies whether you want to see all lunges, or only those with the "u" unknown code. If you want to check a previous scoring, choose the "a" all option. If you want to resume scoring, choose the "u" option.

Options:

At the beginning of the scoring session, you are asked for your choice of three option settings:

1. **How fast to display the movie?**
 - a. prompt: display rate (q/h/n/d)
 - b. q = quarter speed
 - c. h = half speed
 - d. n = normal speed (for pro scorers)
 - e. d = double speed (per Yong-Kyu's request)
 - f. default: q
2. **How large to display the movie?**
 - a. prompt: double or full screen (d/f)
 - b. d = double the normal size
 - c. f = full screen
 - d. default: d
 - e. NOTE: in full-screen mode, the scoring dialog box sits above the movie, sometimes obscuring the action. In double mode, it never obscures the movie. This cannot be fixed; it is a built-in limitation of AppleScript. If you are running in full-screen mode, you CAN move the dialog box by dragging it, if it is in the way of seeing the flies.
3. **Score All lunges or only Unknowns?**
 - a. prompt: all lunges or unknowns only? (a/u)
 - b. a = all lunges from the beginning
 - c. u = only lunges marked as "unknown". On first scoring, this will be the same as "all".

Future Nice-To-Haves:

1. **Allow .avi and .mp4 files**
 - a. Requires: way to get access to Quicktime Player 10 from within Applescript
 - b. Difficulty: unknown
 - c. priority: undefined
 - d. DONE - Sep 16 2014. Qtime Player 7 allows avi. Only req't on movie file is that Qtime Player 7 can open it, and filename is of form fname.ext with no internal "." characters.
2. **Allow other file naming conventions.**
 - a. Requires: definition of alternative naming conventions
 - b. Difficulty: relatively easy
 - c. priority: undefined
3. ~~**Allow additional codes (boxing, etc).**~~
 - a. Requires: list of behaviors/codes
 - b. Difficulty: relatively easy
 - c. priority: replaced by 8, below.
4. ~~**Add time window option.**~~
 - a. Purpose: change the 0.5 seconds before and after a lunge to a user-specified amount, so pro users can score quicker.
 - b. Difficulty: relatively easy
 - c. priority: replaced by 8, below.
5. **Make into signed Apple applet.**
 - a. Purpose: make it easier to install on new computers (no re-compile required).
 - b. Requires: Apple Developers license (99\$) and Developer Key (free, but through Apple bureaucracy). Will only work on recent Mac Mavericks OS versions.
 - c. Difficulty: theoretically easy (according to Apple) but probably not.
 - d. priority: undefined
6. **Automate mov file conversion at end of Cadabra run.**
 - a. Purpose: tack a script onto the existing Cadabra pipeline to automagically (a) convert avi to mov, (b) copy mov and .txt files to known server directory. Makes starting scoring easier.
 - b. Requires: Unix scriptable avi to mov converter
 - c. Difficulty: theoretically easy
 - d. priority: undefined
7. **Plot lunge history after scoring.**
 - a. Purpose: small app to import LNG file into Matlab or R and create a graphical report of:
 - i. numbers of lunges versus time (table)
 - ii. cumulative lunges versus time (line plot)
 - iii. save as PDF
 - b. Difficulty: relatively easy

- c. priority: undefined
- 8. **Use Preferences to set options**
 - a. Purpose: allow individual users to run with default option combinations chosen by them (see 3,4 above).
 - b. Difficulty: moderate, using pList properties
 - c. priority: undefined

Updates and Changes:

1. Sept. 16 2014, CK.
 - a. Revised movie file name parsing to allow and valid file to be used, so log as it is of form fname.ext
 - b. Revised checking of answer from user to:
 - i. be sure it is single character only
 - ii. make sure it is in allowed list (which is a prelude to a Codes property)
 - c. Attempt to make Qtime movie window the front window.