



iStabilize v. 2.2

Video Stabilizer for MacOS

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Introduction

iStabilize is a stand-alone software video stabilizer for MacOS. It stabilizes movies by removing unwanted shaky motion and smoothing the image path. iStabilize can separately smooth motion with respect to translation, rotation, and scaling (zooming) of a movie.

Stabilizing a movie is a two-step process. In the first step iStabilize evaluates motion within the movie. This can be rather time-consuming but needs to be executed only once. Based on these data, you can stabilize the movie in one or multiple segments, or as a whole. For any segment, iStabilize computes the optimum image path considering several parameters you specify. This is accomplished just in time, and you can see immediately the result and play the stabilized segment in preview mode. Now, you can interactively adjust the stabilization settings, until the result meets your expectations. In a final step you can render the stabilized movie, compress, and write it into a new movie file.

Requirements

iStabilize runs on Apple computers with MacOS X (10.4+). QuickTime 6.0 is required, version 6.5+ being recommended.

iStabilize supports Apple computers with PowerPC and Intel processors natively. Multiple processors are beneficial.

Quick Start

For a quick start, please follow these instructions: First, open the movie you would like to stabilize and specify a temporal portion of the movie, where stabilization shall be applied. Now, choose “Track Motion” from the “Stabilizer” menu, in order to analyze the movie. If you are asked to save the movie at another place, do so by preferably choosing the option “Allow dependencies” and choose “Track Motion” again.

After tracking has completed, you can select a temporal portion and begin a new edit session (“Stabilizer” menu), where you can interactively adjust the stabilizer settings and preview the stabilized movie.

When you are ready with these adjustments, you can make the stabilization permanent by creating a control track. This is simply accomplished by finishing the edit session. Just press the “Enter” key or choose “Finish Session” from the “Stabilizer” menu.

Finally, you can export the stabilized movie. Then, the movie is being re-compressed, and the stabilization is consolidated.

Licensing

iStabilize requires a license to be fully enabled; otherwise it runs in demo mode and is functionally restricted. In demo mode, stabilized movies are rendered with a watermark. However, you can save motion data and control tracks and other modifications with your movie and also view and play a stabilized movie in iStabilize.

To obtain a license, please go to <http://www.pixlock.com/purchase.html>.

Handling Movies

iStabilize is basically a movie player with common capabilities for viewing, playing, editing, and converting movies to other formats. The player related functions are quite similar to those in QT player. Those functions, which are more specific or important to stabilizing movies, are explained in the following.

Supported Formats

iStabilize handles QuickTime movies and the DV, AVI, and MPEG4 video formats. Standard definition DV formats (DV-PAL, DV-NTSC) are supported as well as HD DV formats (720p, 1080i, 1080p...), provided the respective QuickTime codecs are installed.

As of version 2.1, iStabilize fully supports interlaced video. With interlaced video, fields are separately motion tracked and stabilized. For most video formats, iStabilize automatically recognizes the interlaced mode, i.e. whether the movie is interlaced or progressive scan. For the non-recognized formats you can (and should) explicitly specify the interlaced mode. For this purpose you can open a dialog sheet (Movie->Format...). The popup menu "Field Order" indicates the interlaced mode and the field order in the case of interlaced video. Below, there is a control, where you can specify the field delay. This setting is only necessary for interlaced video. If you do not know the format of your video, you can request iStabilize to estimate these properties by stroking "Auto Detect". Unlike the initial estimation of the format when you open a movie, this method analyzes parts of the movie's content. Note, that it is important to specify the correct settings here, before you begin with motion tracking of your movie, otherwise stabilization may not work properly.

iStabilize adds several tracks to your movie. As only QuickTime movies support these tracks, you are asked to save your original movie as QuickTime movie, unless your original movie was already in QuickTime format, before you can start with stabilization. However, you can render your stabilized movie into any of the formats mentioned above.

Movies can be saved either as self-containing or dependent. A self-containing movie contains all data in a single file, which may be rather large and take considerable time to save, while a dependent movie is normally very small but depends on other files, which need to be available when accessing the movie.

Viewer Size

When a movie is opened, it is shown at its native size, provided it fits on the screen. You can change the viewer / movie size by resizing the movie window to the desired size. To return to the movie's native size, just click into the zoom button of the window's title bar. When resizing a movie, its native aspect ratio is always preserved.

If you need more accurate control over the movie size, you can specify the desired values for width or height in the related dialog window accessible from the “Movie” menu. Note, that the viewer size does not affect any procedure involved in stabilizing movies.

Navigating in Time

In the movie window there are several controls, which allow for easy and precise navigation in the movie’s time domain – see figure below.



Controller at the bottom of a movie window. In the timeline a motion data track (blue) and a control track (green) are indicated.

The timeline represents the movie’s whole time range, where the slider’s position indicates the current movie time. In order to change the movie time, you can click into the slider and drag the slider to the desired time, or you can click directly into the timeline to change the movie time accordingly. When pressing the “Shift” key during dragging the slider, you can change the “In” / “Out” points to that time. For frame-accurate navigation, you can use the cursor keys to move through the movie time. Pressing the “Left” navigation key, lets the movie step back by one frame, while the “Right” key does the same in forward direction. You can increase the step interval to one second by pressing the “Control” key, while navigating with the cursor keys. The navigation keys “Up” and “Down” let you jump to the “In” and “Out” point, respectively. Alternatively, the character keys “i” and “o” with “Shift” take you to these points.

When the “Option” key is pressed, strokes of the navigation keys let you jump between interesting points in time. These are the beginning / end of the movie, the “In” / “Out” points, and track edit points. Again, you can additionally press the “Shift” key, in order to modify the “In” and “Out” point, while stepping through the movie time. Pressing the “Home” or “End” keys instructs the movie to go to the beginning or the end, respectively.

Below the timeline, there is a row with buttons, which also give you control over the movie temporally. The very left button lets you start playing or pause the movie. Alternatively, you can play or pause the movie by pressing the space bar or double-clicking into the movie view. Note, that some playing properties can be adjusted in the window’s toolbar – see below for details.

The next two buttons provide stepping through the movie – just in the same way as with the navigation key described above. The right-most button in that group presents a popup menu, which lets you directly go to some interesting points in time. You can obtain the same navigation menu by clicking into the movie view and the “Control” key being pressed (right mouse button).

In the center, the movie time editor shows the current movie time in “hh:mm:ss:-ff” format, where “ff” denotes the frame number. When you click therein or press the “Tab” / “Enter” key, the editor becomes the target of subsequent keystrokes, which is indicated by a focus border. Click “Enter” or “Tab”, and the movie goes to the desired time, or click “Esc.” to cancel editing and leave the movie time unchanged.

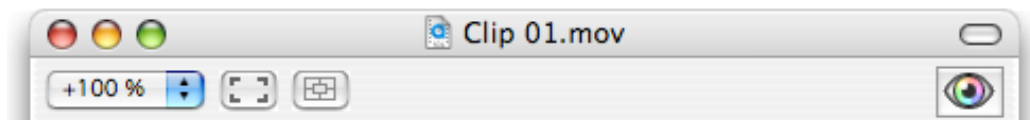
The button group on the right hand to the editor lets you set the “In” / “Out” points to the current movie time. Alternatively, the character keys “i” and “o” let you update the “In” and “Out” points to the current time.

In scrub mode you can play a movie at arbitrary speed forward and backward. Just click into the movie view and drag to the right (forward) or to the left (backward). The current play rate is indicated in the related control in the toolbar. Note, that this does not work inside the spatial selection for the motion tracker (blue box). You may need to hide it for scrub mode.

Similarly, you can play back and forth using the keys “j” and “l”. Each stroke accelerates the movie playback in the respective direction beginning at the lowest speed. Hit “k” and the movie stops/starts playing.

Playing / Display Options

There are several settings, which affect display and playback of a movie. In the toolbar of a movie window you find controls for changing the related properties, see the figure below.



A movie window’s toolbar with controls for adjusting playing speed, some playing / display options, and the spatial selection for the motion tracker. The right-most button lets you switch to preview mode.

The popup menu on the left hand gives you control over the playback speed. The next control provides a popup menu, which lets you switch several options. First, you can instruct iStabilize to play within the movie’s selection only, i.e. the interval between the “In” and “Out” point. Then, you can tell the movie to play in a loop. Finally, you can choose to indicate the “TV safe”, “Title safe”, and “Safe” regions. These overlays can help to adjust the stabilizer’s settings, see below for details.

The next button lets you control the spatial selection for the motion tracker. See “Tracking a Movie’s Motion” for details. The very right button lets you switch to preview mode. See “Preview Mode” below for details.

Viewing and Editing Tracks

QuickTime movies consist of tracks, typically a video and an audio track. iStabilize adds a few other tracks for holding motion data and controlling spatial properties. For convenient handling of these tracks, iStabilize provides viewing and editing capabilities for movie tracks.

To open the track table, choose “Track...” from the “Movie” menu. A track is represented by a row in that table and has a check box for en-/disabling, a type descriptor, and shows its start and stop time relative to the movie time.

Video tracks are denoted by “Video...” followed by a descriptor of the compressor type. Motion data is held in a track entitled “Motion”, and control tracks are denoted by the phrase “Control”.

The easiest way to switch on/off a track’s functionality is to en-/disable it. For permanently removing a track’s functionality, you can also delete a track. For that purpose, you select the track(s) to be deleted by clicking into a track (press “Shift” or “Cmd” for multiple tracks) and press the “Backspace” key or the “Delete” button.

Exporting

With iStabilize you can export movies to a wide range of other movie formats supported by QuickTime, such as DV, AVI, MPEG-4, or to a QuickTime format using various compressors.

For exporting a stabilized movie, one or more control tracks are required. See “Creating Control Tracks” for details.

In the export file select dialog box you can choose the movie format from the popup menu “Exporter” and adjust the related settings when pressing “Settings...”. These settings are remembered the next time you use this compressor. By pressing “Default”, you can reset the related settings to default. Check “Selection Only”, if you only want the temporal selection to be exported. For interlaced video you can advise iStabilize to render only one field by checking “Single Field”, otherwise both fields of each video frame will be rendered. This option can be useful, when the stabilized movie is shown on a progressive scan display, such as a computer monitor.

The movie being created, takes over the natural width and height of the movie to be exported. Some exporters allow specifying a custom movie size in their settings panel.

Once you have chosen the destination file and adjusted the compressor settings, the exporter starts his job in the background. The export activity and its progress are indicated in the exporter window. After the exporter has started, the related movie is no longer needed. You can close it, edit it, or further process it. The background exporter is particularly useful, because you can issue further export operations, while another one is still running. For better efficiency, only one export operation is active at a time, the others are waiting in a queue.

Stabilizing a Movie

Stabilizing a movie is divided into two steps. First, the movie is scanned frame by frame, while the motion within the movie is tracked, and the related motion data is recorded. See “Tracking a Movie’s Motion” below for details. Once, the motion data has been computed, you can stabilize one or more segments of the movie by attaching respective control tracks. In “Creating Control Tracks” you can read more about the stabilization process. With control tracks being installed, you can play the stabilized movie in preview mode or export it to another movie file.

Tracking a Movie’s Motion

Before a movie can be stabilized, its motion must be tracked. This is a complex computation and takes some time for a longer movie, but you need to perform this only once.

Tracking is only executed for the movie’s temporal selection, i.e. between the “In” and “Out” point. If there is no selection, motion is tracked over the whole movie’s duration. The range for tracking can be chosen generously, because you can later restrict the actual temporal range of stabilization more accurately.

By default, the whole spatial area of a movie is considered for motion analysis. However, there are conditions where a restriction of the tracking area is useful or necessary. This is e.g. true, when a movie has borders with constant color. In such a case you can enable spatial selection for motion tracking. The related command is “Use Spatial Selection” in the “Stabilizer” menu, or you can click into the corresponding button in the toolbar in order to switch this feature on and off. When switched on, a blue box appears, which initially covers the whole movie. Now, you can resize this box with the cursor in order to match the actual movie area. Unlike some other motion trackers, which track for a local feature, iStabilize’s motion tracker considers the whole scene and benefits from large areas with rich contrast. For this reason it is important that the selected area is as large as possible, to yield best results. The spatial selection is only considered during motion tracking and only when it is switched on. It does not affect the rendering of stabilized movie frames.

When the tracking process has completed, the data is written into a new movie track, denoted by “Motion” in the track list. The motion data can then be used for previewing the stabilization or can be saved with the movie for later use. There can be multiple motion data tracks in a movie, and they can be temporally overlapping or distinct.

In the track list you can en-/disable or delete motion data tracks as any other track. See “Viewing and Editing Tracks” for details. Enabled motion data tracks are indicated by bluish tinge in the time line of the movie controller.

Note, that modifications to video tracks may invalidate the information contained in a motion data track.

Creating Control Tracks

Control tracks keep information about how a movie's segment is stabilized during playback or exporting. A movie can contain multiple control tracks each with different properties regarding stabilization.

Control tracks are created in an editing session, where you specify the stabilization characteristics. First, you should define a movie segment by setting the "In" and "Out" points accordingly. Be sure there is an enabled motion data track covering this segment, otherwise you should create one, before you can continue. See "Tracking a Movie's Motion" for details about creating a motion data track.

Now, you can begin an edit session by choosing "New Edit Session..." from the "Stabilizer" menu. Motion data is read from a related track and a drawer provides several controls, which govern the process of stabilization. Also, iStabilize switches to preview mode, so you can interactively watch and play the movie, while you adjust the stabilizer's settings. You can also fine-adjust beginning and end of the stabilized segment by moving the "In" and "Out" points. The slider turning to red indicates video samples being stabilized in the course of an editing session.

When you have completed your adjustments for this segment, you can finish the edit session either by pressing the "Enter" key or choosing "Finish Edit Session" from the "Stabilizer" menu. Then, a control track is created to hold the stabilization properties, which you have specified. Alternatively, you can cancel an edit session by hitting the "Escape" key or choosing "Cancel Edit Session" from the menu.

Once you have created a control track, you can edit it later. Just move the slider in the timeline to the control track and choose "Edit Current Track..." from the Stabilizer menu. iStabilize will then load the parameters of that control track and initiate an edit session.

Adjusting the Stabilizer Settings

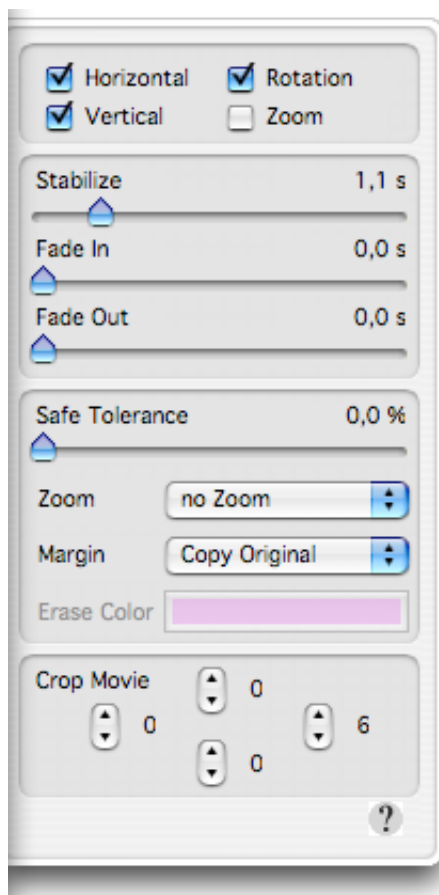
When creating or editing a control track (see "Creating Control Tracks"), a drawer window provides controls for adjusting the stabilization parameters. Have a look at the figure below. There are four sections in that window with functionally grouped controls in each.

In the first section you can specify some basic settings related to what kind of motion shall be compensated: horizontal or vertical translation, rotation, or zoom. You can choose any of them independently.

In the next section you can specify the temporal characteristics of stabilization. "Stabilize" defines the relaxation time for adopting the next frame's position. This parameter defines, how fast the stabilizer follows camera motion. For low values, only fast shaking is compensated, while slow camera motion is tolerated. Higher values instruct the stabilizer to compensate for slow shaking too. For most applications, it is recommended to apply the smallest value, which still yields good stabilization results, i.e. a smooth image path.

When processing only a temporal portion by means of stabilization, abrupt image transformations can occur at the beginning or the end of the stabilization interval. These unwanted effects can be eliminated by fading-in and/or fading-out the effect of stabilization. The parameters “Fade-In” and “Fade-Out” let you specify the respective duration for these transitions. A value of zero disables fading.

Stabilization works by spatially transforming frame by frame of a movie. As an unwanted side effect, margins occur, thus reducing the effective spatial resolution of a movie. Actually, stabilization and resolution are natural opponents, the higher the value for the stabilization time, the bigger are the margins. In most cases it is the challenge to find the best compromise. The parameters provided in the next section shall give you powerful help in this respect.



Drawer window for controlling the stabilizer’s characteristics.

In this context the idea of the “safe region” shall be introduced. The safe region is given as the largest rectangle within the movie space, which has no overlap with any margin in any frame throughout the specified temporal range. It is “safe” from any margin. The size of the safe region may be further reduced in order to match the aspect ratio of the movie. When checking “Show Safe Bounds” in the popup menu of the options button in the toolbar, you can see the safe region and how it is affected e.g. by the “Stabilize” parameter. The stronger the stabilization, the smaller the safe region – in general. Of course, it is one goal to maximize the size of the safe region. However, the construction of the safe region is quite rigid, as even a single strong jerk may diminish the safe region significantly. Therefore, in most cases it is wiser to allow a certain number of jerky frames without affecting (reducing) the safe region. The slider “Safe Tolerance” let’s you specify the percentage of most jerky frames, which shall be ignored, when computing the safe region.

Until now, the concept of the safe region is just a theoretical construction, but it has practical use when reducing the size of visible margins. Margins can be made smaller by zooming into the movie. For this purpose, the popup menu “Zoom” provides different options. For any zoom, the movie is spatially mapped from the safe region to the specified size. Thereby “TV safe” and “Title safe” mean areas reduced by 5 % and 10 %, respectively, on each side with respect to the original size. Both areas can be indicated when checking the related menu items of the options popup button in the toolbar. When “to Full Size” is selected, the movie is zoomed from the safe region to its original size.

For a given zoom setting (other than “no Zoom”), the actual magnification therefore depends on the size of the safe region. At zero “Safe Tolerance” the specified zoom rectangle will be free of any margin. For other values, you allow some margins to appear within that rectangle.

Next, there are three methods for treating residual margins. Firstly, you can fill the margins homogeneously with the “Erase Color” as specified by the control below. When using the third method “Copy Original”, the movie is drawn in its original size in the background. Finally, “Extrapolate” fills the margins by extrapolating from the center to the border of the respective video frame. In this way, margins can become quite inconspicuous as compared to the other methods.

The last group of controls allows for cropping the movie box on each side. Most cameras produce borders with modified colors (e. g. black or white), and this can be a problem, because extrapolation would reproduce wrong colors. Also the other margin treatment options may benefit from cropping the movie.

In order to find the optimum for these parameters, it is advisable to go from top to bottom through these parameters. First, you should commit to the compensation method(s). Then, you need to find the best relaxation time (“Stabilize”). Later, you may optimize the safe region by increasing “Safe Tolerance” and specify the zooming behavior. Finally, you can choose the appropriate method for filling margins and crop the movie for best margin filling.

Preview Mode

In preview mode you can watch and play a stabilized movie. As stabilization requires one or more control tracks, you can preview a stabilized movie only if there are control tracks present. See “Creating Control Tracks” for details.

You can switch on/off the preview by choosing “Preview” from the “Stabilizer” menu or by pressing the preview button in the toolbar.

If iStabilize finds a control track for the current video frame, the slider in the time line turns to green, and the current frame is displayed in a manner as specified by the control track.

While creating a new or editing an existing control track in an editing session, preview mode is always switched on.