DTU Compute
Department of Applied Mathematics and Computer Science

Atomic Stretch: *Optimally bounded real-time stretching and beyond!*

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Motivation

Resizing video footage to a desired aspect ratio, also known as re-targeting, is a task exercised constantly by photographers, vid-eoeditors, and the like. Footage from different sensors with ratios 4:3, 16:9 or 21:9 (from anamorphic lenses) has to be matched with different output devices, where the most common ratios are 16:9 (widescreen) and 21:9 (cinamascope). If web pages and billboards are included, any ratio can be encountered. Many cameras simply achieve 16:9 by cropping a 4:3 sensor, thus discarting data that might otherwise have been used.

Approach

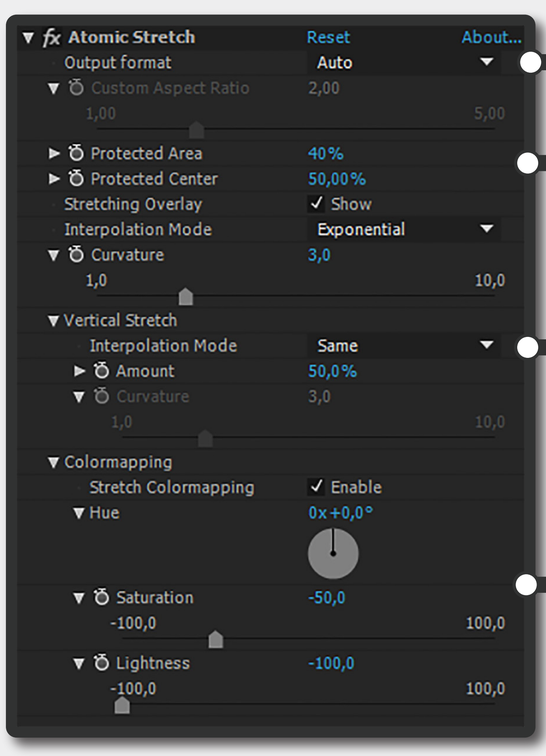
While advanced retargeting methods do exist, practical tools for video editing are scarce. We here present an automatic yet customizable real-time tool, which minimizes vertical compression effects, allows a protected region of interest supporting tracking, and attention redirection using desaturation and darkening. The stretching is within optimal bounds and the addition of vertical stretch towards the edges minimizes the resulting vertical compression effect. The figures to the right of the poster shows the application of our tool on a 16:9 frame (depicted above) stretched to 21:9. The tool is named Atomic Stretch and acts as a plugin to the industry standard video editing tools, Adobe After Effects and Premiere. The plugin will provide more wiggle-room in choice of camera, optics and editing.

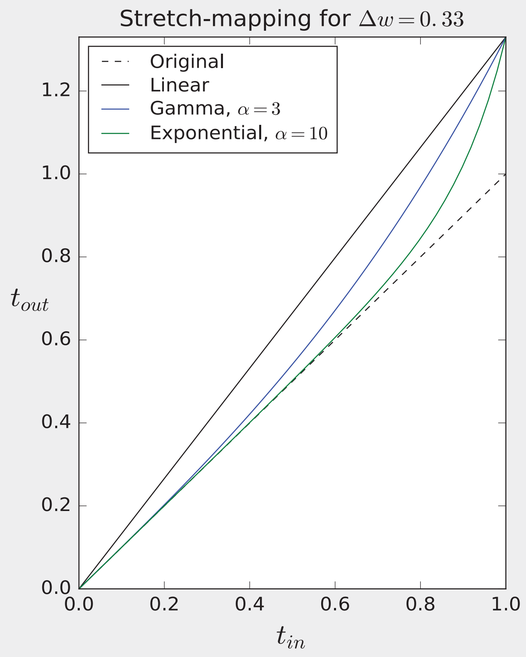
Get the plugin

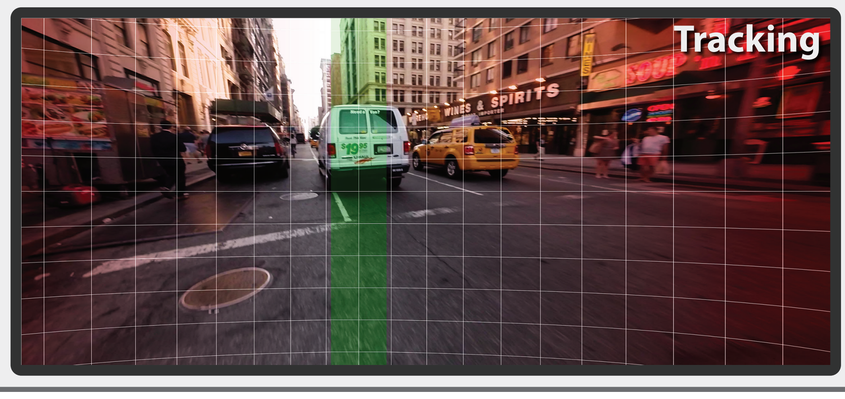
Interested in using our plugin? Our plugin is supported by both Adobe Premiere and Adobe After Effects and is available for both Mac and PC users. Download the plugin for free at:

www.**AtomicImageLabs**.com

Ae Pr







Method

We wish to stretch a given frame from the protected area (on each side) to the frame edge. Let $t_{in} \in [0, 1]$ denote the normalized x-coordinate in the original frame part, and let $t_{out} \in [0, 1 + \Delta w]$ be the normalized x-coordinate in the stretched part, where Δw is the fractional width increase. The stretching operation can now be defined as follows:

$$t_{out} = g(t_{in}) = t_{in} + \Delta w \cdot f(t_{in}) \quad \text{for} \quad f(t_{in}) \in [0, 1]$$

Where $f(t_{in})$ controls the added stretch. In addition to naive linear stretch ($f(t_{in}) = t_{in}$), we allow two different smooth stretch-functions, Gamma and Exponential:

$$f_{\texttt{Gamma}}(t_{in}) = t_{in}^{\alpha} \quad \text{and} \quad f_{\texttt{Exp}}(t_{in}) = \frac{\mathrm{e}^{\alpha \cdot t_{in}} - 1}{\mathrm{e}^{\alpha} - 1}$$

Features

Automatic mode: The plugin automatically retargets your footage to your project dimensions, allowing a one-click solution.

Protected region: The user may define a region in the footage that should not be affected by any stretching. This allows full preservation of targets of interest.

Tracking: The plugin is easily interfaced with the built-in AE feature-tracker, allowing protection of moving targets.

Vertical stretch: To counter barrrelling effects, a vertical stretch can be applied to the retargetting, producing perceptually pleasing results.

Colormapping: To drive the attention towards a target of interest, hue-, saturation-, and lightness-colormappings can be added to the footage, following the stretch-profile.