

Color Abtractor



Version 1.8

Introduction

Welcome to Little CMS color abstractor. With this application you can create a special type of ICC profiles named **Abstract profiles**. Though we tend to use three different profile types - those for scanners, monitors and printers, the ICC has actually created a total of **7 different profile types**. Each has its own capabilities and situations for best use. **Abstract profiles** are the fifth type, very powerful but unfortunately seldom used and understood.

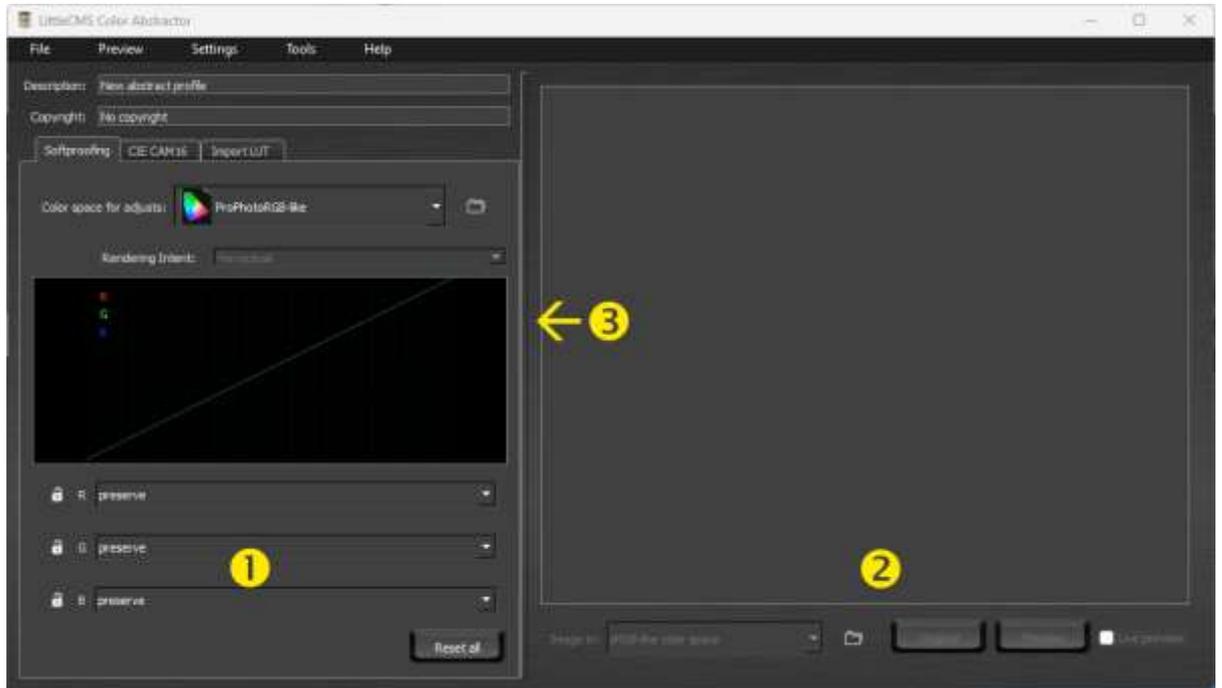
Let's see what ICC says about abstract profiles:

“Abstract profiles allow you to perform custom image effects, such as applying a particular ‘look’ to a series of images. Such a profile allows you to define CIELAB (or CIEXYZ) values as both input and output. Thus you can algorithmically define color changes of whatever type you like and produce the LUT that achieves that. A small number of color management applications support the creation and or use of abstract profiles.”

If device links convert from device to device, then abstract profiles are the opposite; they convert from Lab to Lab. Where the device link's domain is device-space edits, abstracts are all about Lab-space edits. Contrast bumps, increasing saturation, and gray or sepia effects are just a few examples of simple color edits that can be captured within an abstract profile. That means, you are doing color manipulation in a **device-independent space**. To make it simple, the changes you do look the same, no matter your images are in sRGB or AdobeRGB1998 or whatever CMYK color space.

Color Abtractor user interface.

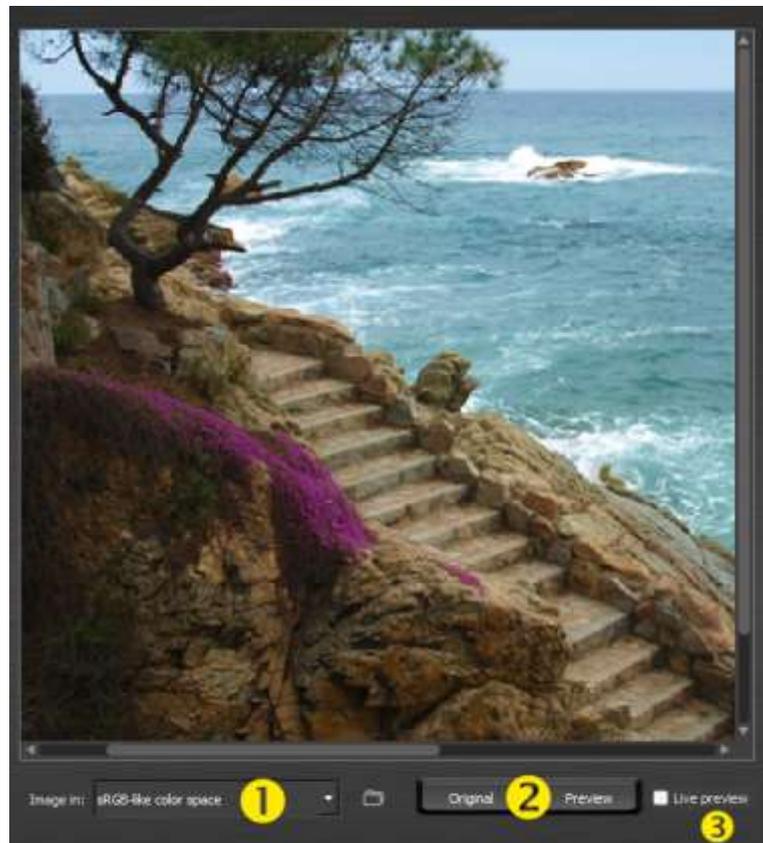
After opening the application, you can see a window like this. Mac and Windows look almost identical. On Mac, menus look slightly different just because Mac conventions.



The left part of the window (1) holds the profile generators. The right part (2), an image preview that allows you to see how your abstract profile affects images. You can resize right-left areas by dragging the middle separator (3).

Image preview

The best way to see how your abstract profile works, is by using an image of yours as example. You can use whatever image you wish as long as the format is supported. PNG, TIFF BMP and JPEG are supported since version 1.1, check the *open image* dialog to see the complete list.



Load any of your images as the preview by:

- Using the main menu: “Preview- Load preview image”
- Right click, (control click on Mac) – Load preview image
- Copy & paste image data over the previewer
- Drag & drop an image file over the previewer

Only RGB images can be used as preview. As some of those load methods does not allow to use embedded ICC profiles, the original color space of your image has to be explicitly stated in the combo box (1). This is equivalent to “assign profile” in Adobe Photoshop. You can compare the image as-is vs. the result of applying the abstract profile by pressing the buttons on (2). Also, you can use the context menu or the main menu to do such comparison. Control-A, Control-S are hot-keys for comparison. Checking (3) allows to see the changes in real time, but you need a fast computer to do so.

Navigating on preview image

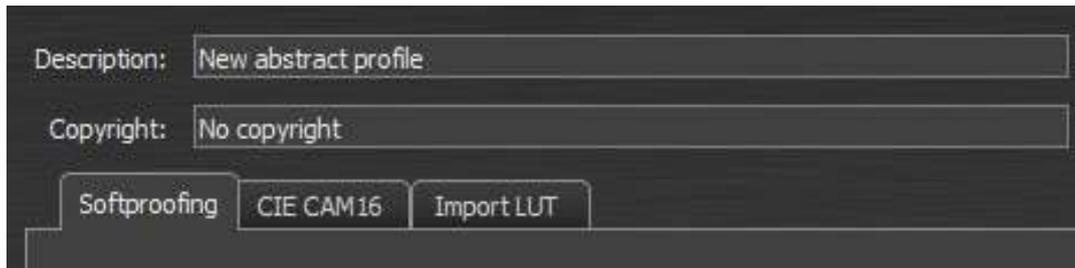
You can zoom and pan your test image by using the mouse and keys.

- To zoom the image, use the mouse wheel or press keys + and -
- To pan the image, click and drag
- You can right click or control-click on Mac to access context menu.

NOTE: The preview image is visualized colorimetrically. To set your monitor profile, see the “Preferences” section below.

Profile generators

The left part of the main window holds the abstract profile generators. In the upper part, you can set or modify the information others will see about your abstract profile. You are free to put whatever you wish here. Usually, a short description of the effect the profile will do. Currently, only English localization is allowed.



Below the information fields, you can see three tabs. Those tabs select the **generator** you are using. For simplicity's sake, only one generator can be used per abstract profile, although programs like the Color Translator allows to chain several effects by chaining abstract profiles. **The actual selected tab is the generator you are using.** Settings on another tab are kept, but ignored.

On version 1.8 of the Color Abstractor, there are three generators: A soft proof generator, a CIECAM 16 generator and a .CUBE importer.

The **Soft Proof generator** is useful to emulate devices and/or color spaces. The **CIECAM 16 generator** is useful to create special effects and to model viewing conditions. With the **.CUBE import and export** you can use this tool in conjunction with other programs for photo and video editing,.

Soft Proof generator

Soft proofing lets you to simulate how an image will appear on another device, such as a printer, by using only a computer monitor. This can be a helpful tool for making more predictable prints — and is perhaps one of the most useful applications of color management. However, it also requires a trained eye, in addition to knowing how to correct an image if it doesn't appear as intended.



On (1) you can select the color space to soft proof. Clicking in the white folder button (right to the color space for adjusts combo) allows you to select the folder where you store your ICC profiles. The default depends on the operating system. A number or predefined profiles are always available. Supported color spaces for profiles are Gray, RGB and CMYK. On depending on color space the number of available channel modifiers (2) changes. You have one modifier for Gray, 3 modifiers for RGB and 4 modifiers for CMYK. In the lower part of (1) you can select a rendering intent with the added choice of black point compensation. This is the intent you are emulating. For example, you may want to emulate and adjust a SWOP press operating in the relative colorimetric intent plus black point compensation.

Channel modifiers

Once you have selected the color space where you want to modify the images, you will get in (2) a number of per-channel modifiers. Again, you get one modifier per channel, so in gray color spaces you have one modifier, 3 modifiers for RGB and 4 modifiers for CMYK.



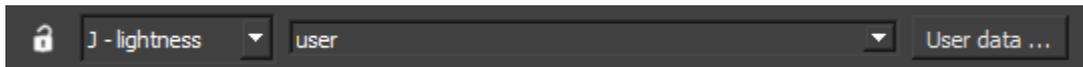
For all modifiers, clicking on (2) allows you to select the type of applied curve. Each curve has different parameters (3). On **gamma** type, for example, you have exponent and offset. For sigmoidal, you have sigmoid strength and offset. Clicking on the **lock icon** (1) protects the channel, so it cannot be changed by mistake. Reset has no effect on locked modifiers. The value can be edited directly by enter the number, incremented/decremented by using the up/down arrows or set by using the slider. All three methods are linked, so if you change the value, the slider is updated as well. Right-clicking (control-click on Mac) brings the context menu with a **reset** command. Use **reset** to set the modifier to no-operation, gamma to 1.0 no offset, for example. Locked channel modifiers cannot be reset. At the bottom there is a button that resets all unlocked channels.

You can see the graphical representation of the curves above modifiers area. This graphic can be zoomed and panned by using the mouse wheel and by clicking and dragging it.

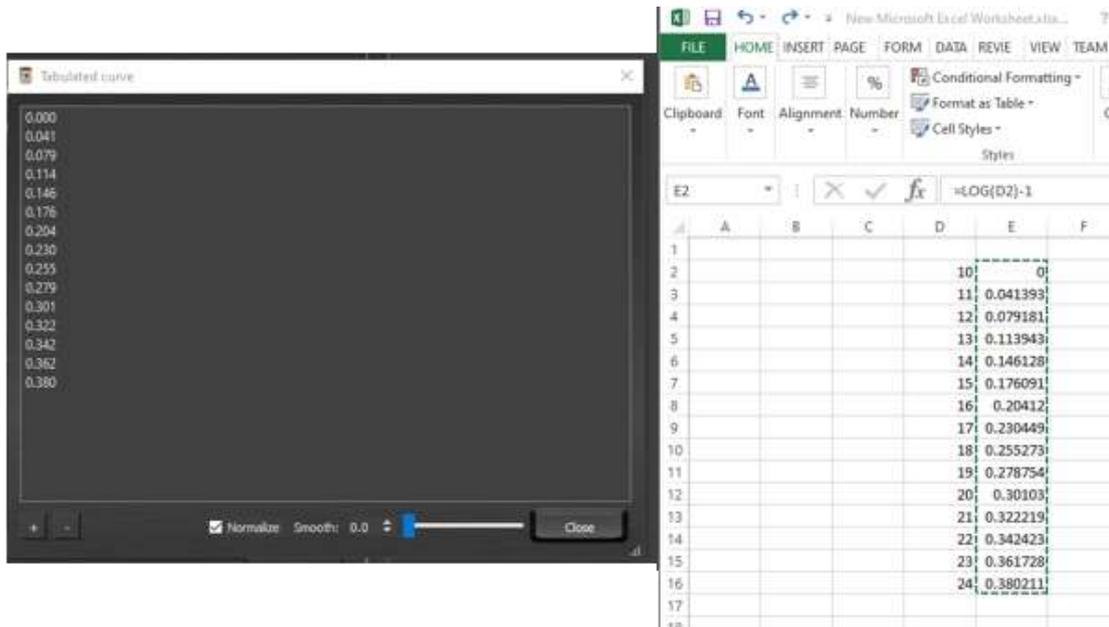


Some modifiers allow to change the **channel correlate**. This happens when using the **CIECAM16 generator**. For example, selecting **J-lightness** or **Q-Brightness** in luma channel allows you to modify the corresponding attribute. Please note the meaning of channel may drastically change when using a different correlate, so same numbers will yield different effects on different correlates.

User curves



A special case is the *user* type of curve, which can be specified as tabulated or point set. By using those types, you can specify whatever type of curve you want. Pressing the “Data...” button launches the *tabulated curve* or the *point list* dialogs.



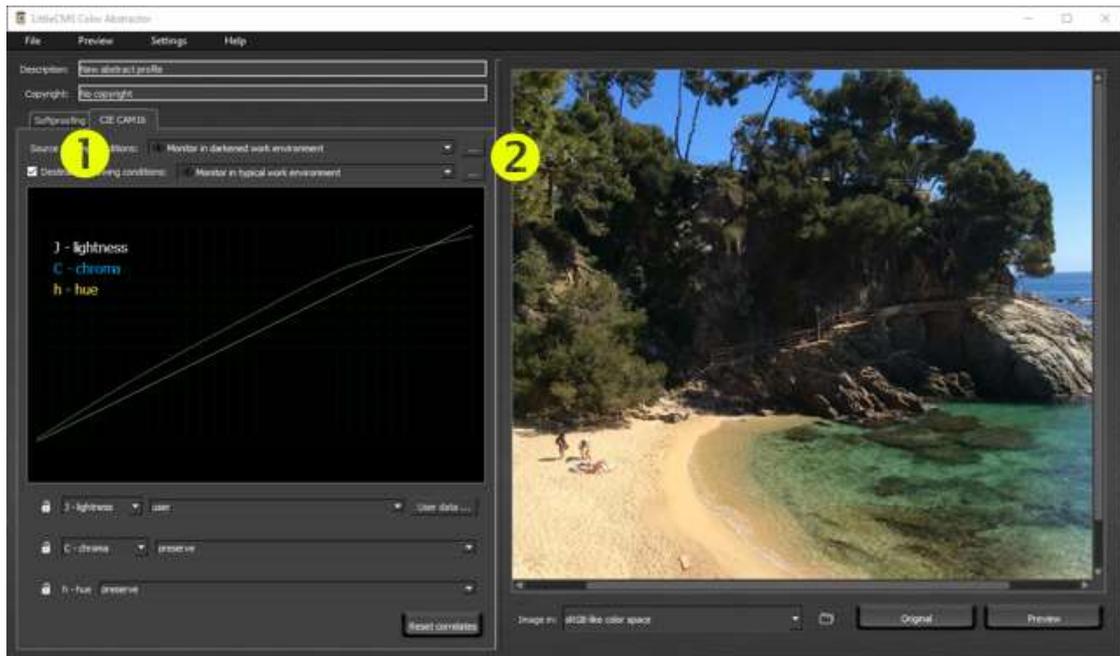
This dialog supports copy and paste from sources like Microsoft Excel. You need to provide a number of points that conforms your curve. The “**Normalize**” check box forces your values to be scaled in the [0 .. 1.0] range. You can reduce noise in your data by using the “*smooth*” feature. On more aggressive the smoothing, more “*flat*” the resulting curve will be. User curves needs not necessarily to be monotonic, though it is recommended to be so.



CIE CAM 16 generator

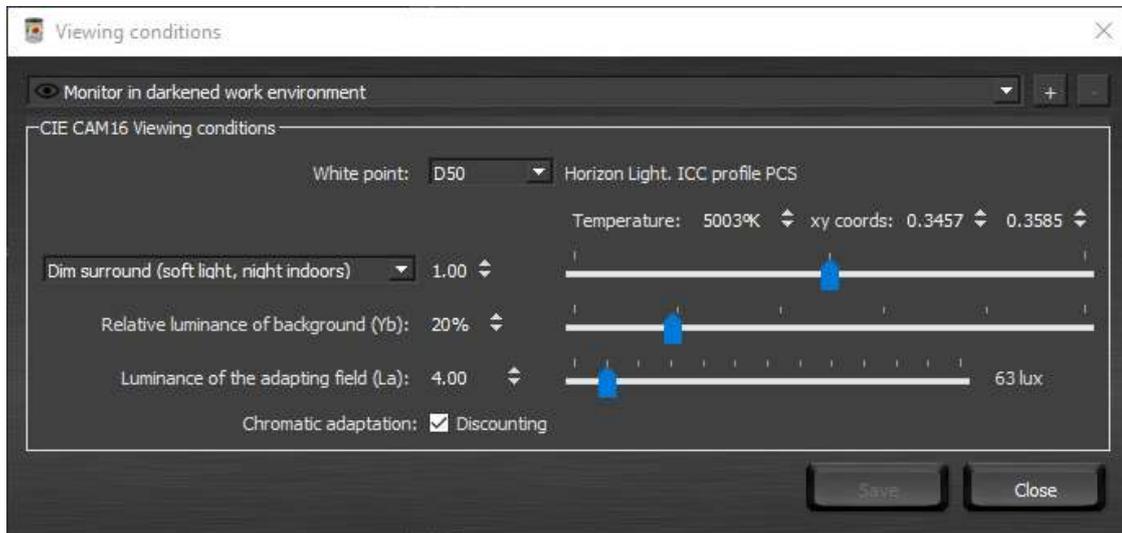
CIECAM16 is an advanced appearance model being actually investigated by the CIE. This model is a fixed and slightly simplified spin-off of the [CIECAM02](#) model which does a comparable job matching experimental data. See the committee webpage here:

<http://cie.co.at/technicalcommittees/new-colour-appearance-model-colour-management-systems-ciecam16>



This generator allows a lot of special effects, like adding more Chroma, converting to gray, emulating dark room etc. Feel free to experiment. It supports CIECAM16 correlates and **Viewing Conditions modelling**. By default, the viewing conditions are set to the standard ICC profile connection space (**PCS**). To model a change in the viewing conditions, check the **“Destination viewing conditions”** checkbox and select viewing conditions for source and destination. You can use the predefined set of viewing conditions, or define your own. To define a new viewing condition preset press the **“...”** button.

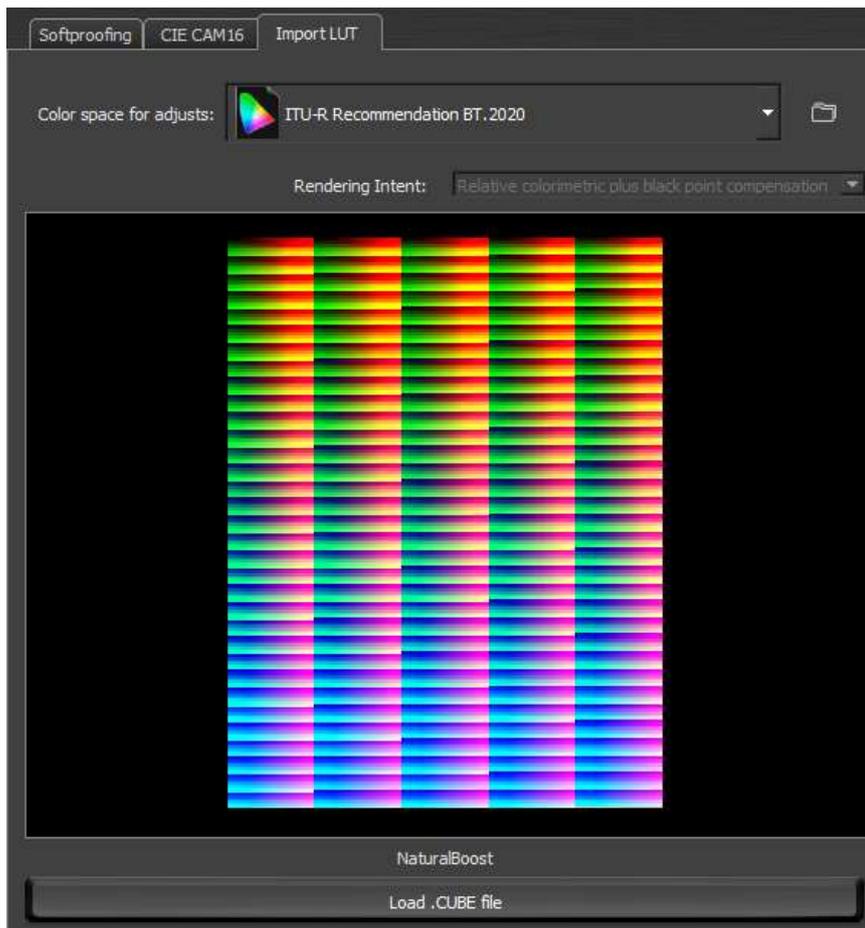
Using the viewing conditions dialog



You can use the predefined set of viewing conditions, or define your own preset. Pressing the [+] button allows you to clone the selected preset. Once you have modified the parameters as you wish you can save it. User viewing conditions definition is saved into the profile and you can edit it latter as well. The [-] button deletes custom-made presets. Built-in presets cannot be deleted.

.CUBE import and export tool

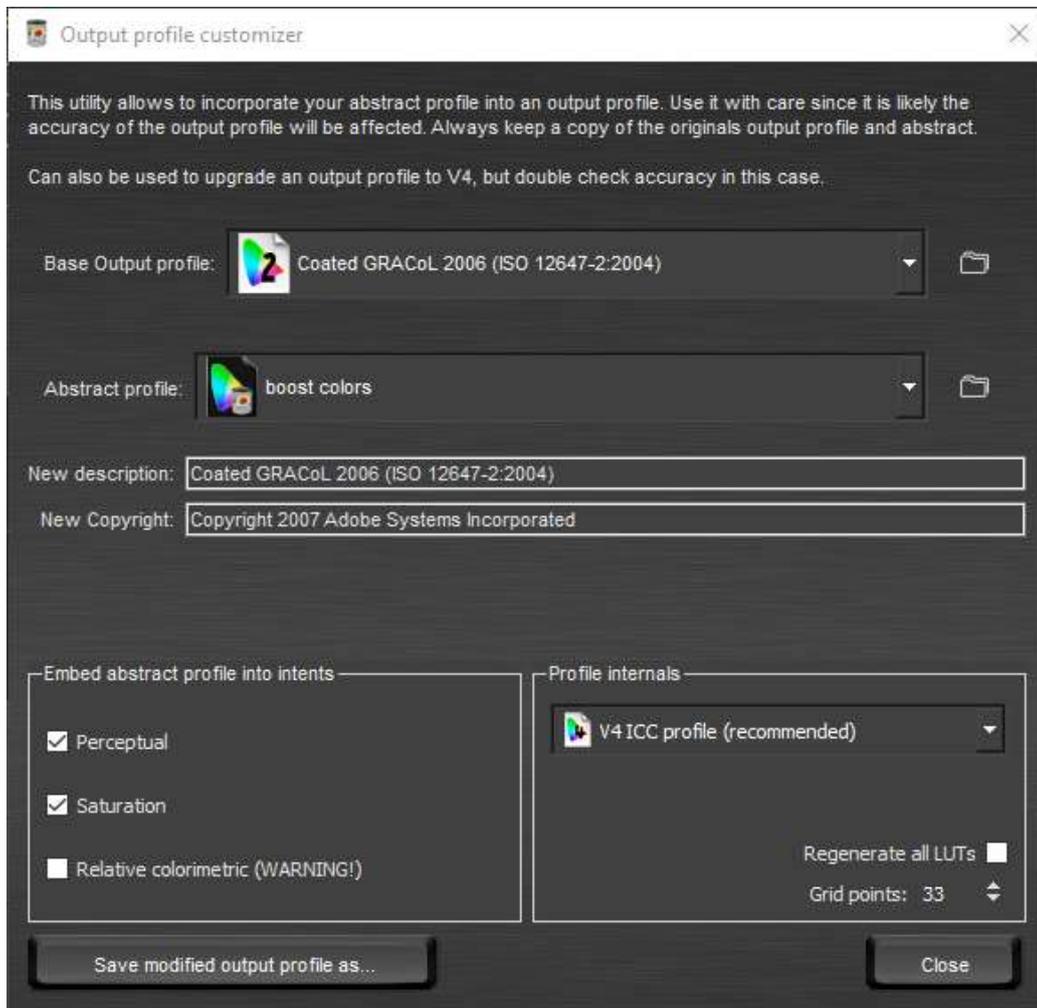
.CUBE files are RGB look-up tables used in several software. LittleCMS abstractor an import and export .CUBE files since release 1.8. Keep in mind those files are limited to RGB and are not colorimetric, so you have to specify which RGB space you want to use. Intent may affect too.



To export abstract profiles into .cube files operating at certain RGB space, select “Convert to .CUBE file” from the Tools menu. This utility can convert any abstract profile to a .CUBE, no matter the profile is not generated by the abstractor. Because that reason and the fact that you lose information, you have to save the abstract profile before converting it to a .CUBE

Embedding effect into output profile

You can use the color abstractor to incorporate the effect or adjustment you did into a yet-existing output profile. This makes the abstractor to a suitable tool to fine-tune or personalize color rendition on devices. To access the customizer utility, select “Tools” and “Embed to output profile” menu entry.

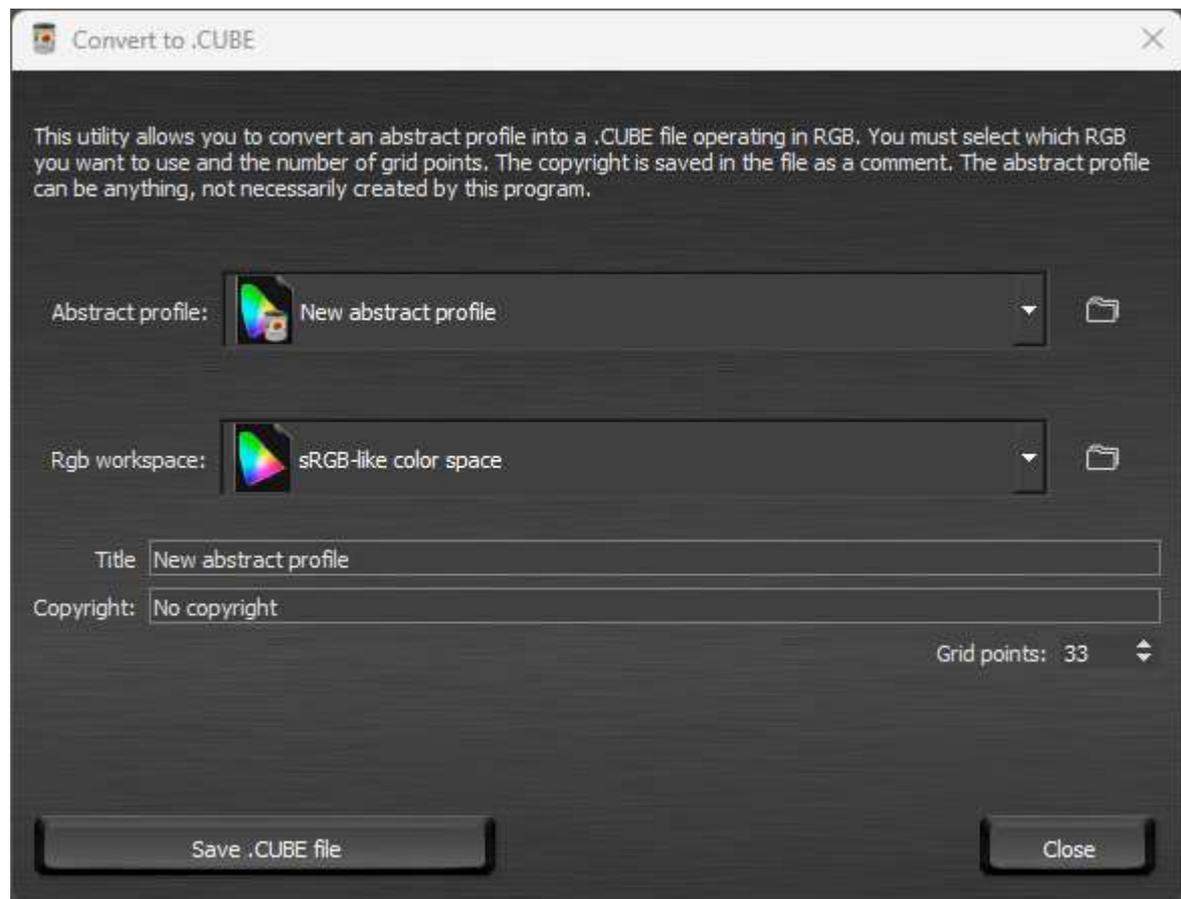


You can use all three intents if wish so, but we strongly recommend to leave relative colorimetric alone as it has a special meaning for some applications and also the absolute colorimetric intent is built upon it. Perceptual and saturation are very good candidates to be used for effects. The demo version does not allow to save the modified profile. Once activated, it does. Output profiles may be RGB and CMYK independly of effect. Yes, you can adjust sRGB gamma and then put the effect on a CMYK profile.

WARNING: Never ever overwrite the original output profile, always operate on copies.

Exporting an abstract profile as .CUBE

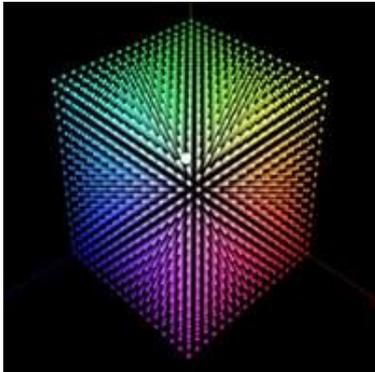
.CUBE files are operating in RGB, this utility converts from Lab to RGB and then exports to a .CUBE file. Process is lossy, so you have to save the profile before doing this conversion.



WARNING: Different RGB spaces may have severe impact on the color rendition. Using same space you have in the image preview would help to see differences.

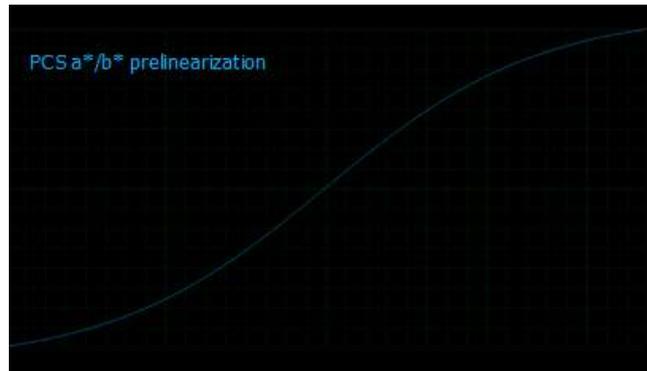
Abstract profile Internals

Internally, the abstractor stores the behavior of the profile by using a look up table (LUT). You can choose between V2 and V4 abstract ICC profiles. V4 is fairly superior to V2, so try to avoid V2 except in cases where backwards compatibility is needed.



In the preferences dialog you can select the number of nodes used. On V4 ICC profiles the node count can be different from a^*/b^* . L^* usually needs more nodes than a^*/b^* . 17 nodes for a^*/b^* would be enough in many cases. For L^* 25 nodes or more is suggested.

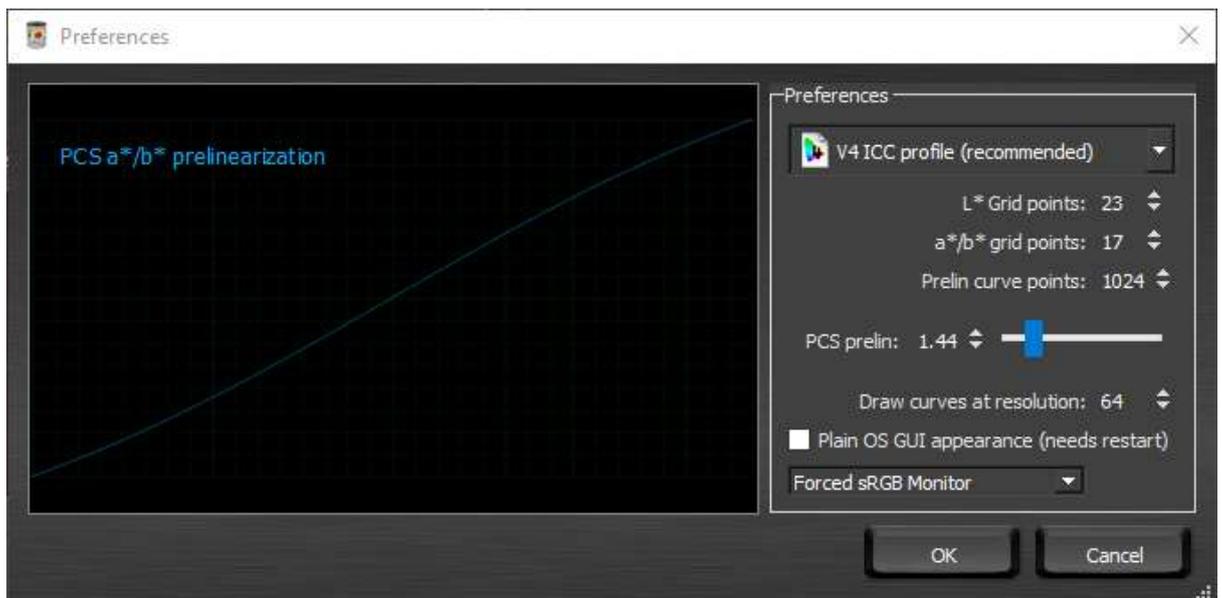
Since a^*/b^* represents chromatic components, and the LUT covers all near infinite CIE Lab gamut, it is likely the profile will waste nodes on the most extremely saturated colors. To optimize that, you can use an S-shaped sigmoidal curve. The effect of this curve is to assign more nodes to the central part, close to neutral grays and less nodes to the extremes. The strength of this curve is selectable.



Some of those curves are not directly encodable in the ICC format, the sigmoid for example. In this case the abstractor creates a sampled curve with a given number of points. You can select how many points you want to use in the **“Prelin curve points”** setting. 1024 points should be enough in most cases.

Preferences

Aside the settings discussed above, you can select the resolution when drawing curves, which is only a way to represent the curves and has nothing to do with the profile accuracy and finally the monitor profile. Since some computers may have wrong or faulty profiles, you can ignore the actual profile and force a sRGB one. This is only used for preview images.



Finally...

This is a short manual for a tool that has been created with simplicity in mind. But still, keep in mind this is only a tool. Sometimes finding the right curves and combinations requires a sort of art, play with the settings and find interesting combinations. Happy abstracting!

Regarding Qt5 LGPL

[LittleCMS Color Abstractor is using Qt under LGPL v3](#)

The Qt source code needed to build the DLL, so or dylib dynamic libraries used by this program is available upon request. Please contact us at sales@littlecms.com to get source code. Additionally you can get this code from the Qt Company <https://www.qt.io/> No modifications have been done on those libraries. Compiling Qt5Core Qt5Gui and Qt5Widgets and substituting those found in the installation directory allows you to use your LGPL v3 rights.