



GET MEDIEVAL ON YOUR PICTURES!

# USER MANUAL



## cf/x mosaic v2.0

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## Welcome to cf/x mosaic

We thank you for choosing cf/x mosaic, and hope that you enjoy working with it. This document will give you an overview of cf/x mosaic's most important features and how to use them.

## About cf/x mosaic

The classic mosaic is an image assembled from small pieces of colored stone, glass, ceramic or other materials (called 'tessera' in mosaikspeek). Creating a mosaic is an art that has been around for millennia in almost any culture. The ancient Persians loved them, as did the Romans, and the Greeks. Mosaics never have lost their appeal, and in modern times new sub-forms of mosaics have emerged.

cf/x mosaic is a specialized application that helps you creating high-quality mosaics and makes it fun. Pop in a picture, change crop, hit Go. It's that easy. Twiddle with some settings, hit Go again. It's that fun. The greatest advantage of mosaic is that it invites you to experiment. It can create 'classic' mosaics (images assembled from regular tiles) as easily as it creates modernistic assemblages of rectangles and lines. Even better, it creates great-looking, original, high resolution artwork even from low-resolution source images.

Here's a short-list of what is great about mosaic:

- Creates enormous, high-quality (more than 100x100 inch at 300dpi) original artwork from even small image sources
- It's Fast (capital 'F'). Less than 3 seconds for a 4'900 tile mosaic, 10 seconds for a mosaic with 40'000 tiles, 20 seconds at 'insane' quality)
- Supply your own color palette
- Allows transparent tiles & background
- Creates many different kinds of mosaics
- Easy presets for instant good results
- Fully customizable mosaics
- Intuitive interface that invites you to experiment
- Fully integrated crop and aspect ratio management – no need to pre-crop an image
- Supports differently sized tiles
- Choose from multiple tile shapes
- Supports 'messy' assembly that gives the mosaic a more organic look
- Export to most common image formats
- Integration with iPhoto, Aperture, Preview, Mail
- Direct upload to social web sites

## Changes from Version 1.x

If you have upgraded from version 1.x, here's a short summary of the major improvements that the free upgrade to 2.0 has in store for you:

- Supply a color palette for tiles
- Completely re-designed interface
- Rotate master image by +/-20 degrees for easy aligning
- New stunning presets
- Significantly larger maximum output size (100 x 100 inch at 300 dpi = 2.5 x 2.5 meters at 300 dpi)
- Custom output size
- New tile shapes
- Use transparency for background / tiles
- Greatly improved results view
- Fully 64 bit

## About This Document

This part of the documentation teaches you how to use cf/x mosaic and best use the tools it provides to quickly create great mosaics. Although you'll find that you can easily use mosaic without reading this manual, we strongly recommend you read it if you want to get the most out of the application.

## Document Conventions

Throughout this document you will find call-outs that contain important information. Please look for the following:



An exclamation mark denotes a paragraph that contains important information that you should remember when working with cf/x mosaic.



A paragraph with the ellipsis symbol next to it holds some interesting information that may help you understand how a feature works, or how it interacts with other features.



# Installation And Registration

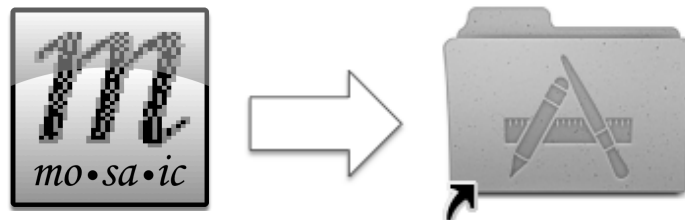
## ***System Requirements***

In order to run cf/x mosaic you need at least the following:

- An Intel-based Macintosh with 64 bit processor (Core 2 Duo or later)
- 1 GB of memory (4 GB recommended)
- OSX 10.5 or above
- A monitor with at least 1200x768x32 resolution (dual monitor setup recommended)
- Internet connection for automatic update notification and registration

## ***Installing cf/x mosaic***

Simply drag the cf/x mosaic icon to your 'Applications' folder.



If you purchased mosaic from the Apple Store, the app is already installed, and registered to you. You do not have to install it yourself.

## ***Registering cf/x mosaic***



If you purchased cf/x mosaic from the Apple Store, it is already registered to you.

When you install and start up cf/x mosaic for the first time, it will switch into 'DEMO' mode. In Demo mode the application functions exactly as when licensed - except that any mosaic you export will have a 'DEMO' watermark. Once you purchase a license (i.e. 'registering' it), cf/x mosaic will switch into production mode, and no longer apply the watermark to subsequent exports. Mosaic documents (.mosaic) saved in DEMO mode can be used without any restrictions in production mode.

A license can be purchased on-line within seconds with the 'Purchase License' command from the 'Special' menu. Once you have successfully purchased a license on-

line, cf/x mosaic immediately switches into production mode. Purchasing a license on-line requires that your Mac be connected to the Internet. Licenses can also be purchased off-line from cf/x.

You can also enter a license key manually from the 'Enter License' command. Again, cf/x mosaic will switch into production mode.

### ***Internet Update Notification***

cf/x mosaic can check to see if a newer version is available for download. This feature is activated manually. cf/x mosaic then connects to the Internet, and retrieves current version information from cf/x. No information about you or your Mac is transferred to cf/x during this process.



If you purchased mosaic from the Apple Store, the Store will notify you of any updates. Due to Apple Store restrictions, mosaic does not check for updates and does not provide a 'check for update' menu item.

## Introduction

Mosaics have been popular literally for millennia. There is something almost magical about a mural where you can easily touch the small, ordinary parts, then take a step back, and see how these parts become something much bigger. The art of creating mosaics is ancient. In Mesopotamia (the land between the Euphrat and Tigris rivers, located in today's Turkey and Iraq) mosaics were found that date back to 3000 BC and earlier.

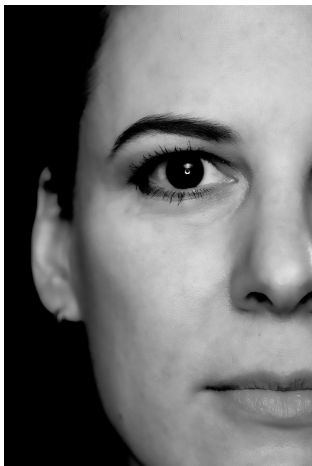
cf/x mosaic takes away the tedium of assembling a complex mosaic, but leaves all the joy of experiment and beauty. It supports classic mosaics (this time assembled from pixels instead of stone), and adds some interesting varieties. cf/x mosaic works by intelligently breaking down a Master ('source') image into little components, and then assembling them into a mosaic.

### ***Before we begin***

Although cf/x mosaic can create a beautiful mosaic from any image, your results will be much better when you observe the following simple rules:

#### **1. Use 'simple' images: High-Contrast, Low Complexity**

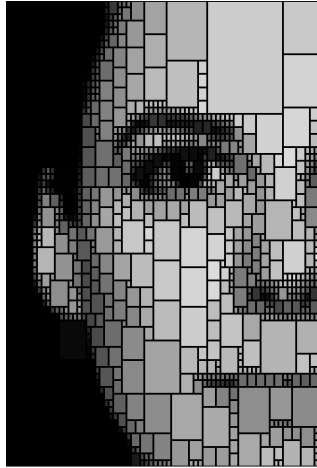
Not all images are equally well suited as Mosaics. Due to the way mosaics are constructed, high-contrasts, low-complexity ('detail') images work much better (they are much more recognizable and have greater impact) than low-contrast or busy images.



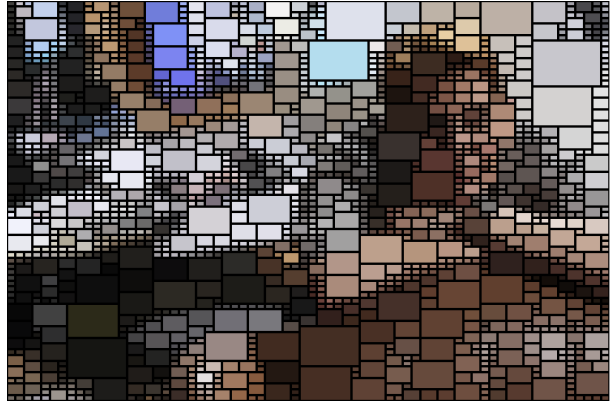
**Example 1: Monochrome, high contrast, even background**



**Example 2: complex detail, little contrast, cluttered background**

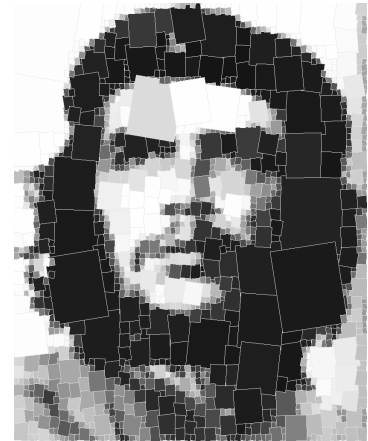
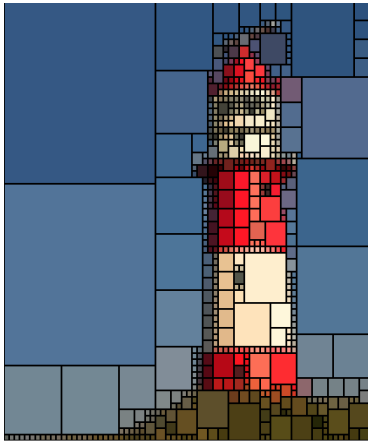


**Result can easily be recognized**



**Cluttered result, model can not easily be recognized.**

As you can see above, a face in front a simple (one-color) background works much better than, say, a group of people in front of a tree line. Use mosaic's built-in crop feature to focus on the best parts of the image.



**Figure 1 : some mosaic examples using the 'modernism' (left), Abstract (center) and Artful Greyscale (right) presets**

## 2. Use Presets

Since cf/x mosaic is highly customizable, finding the perfect settings for any particular image can be a daunting (although fun) task. If you need to start from scratch, this task can be even longer. We have provided you with a number of presets that you can take as convenient starting point for your own creations. The presets produce good results for almost all Master Images. Slight adjustments from you can then turn a good result in a great mosaic.

## Using cf/x mosaic

So let's begin. This chapter walks you through the few simple steps required to create a mosaic. We'll also add features one-by-one so you understand what that particular feature does, and how to best use it.

## Create your first mosaic

Start up mosaic, and let's have a look around:

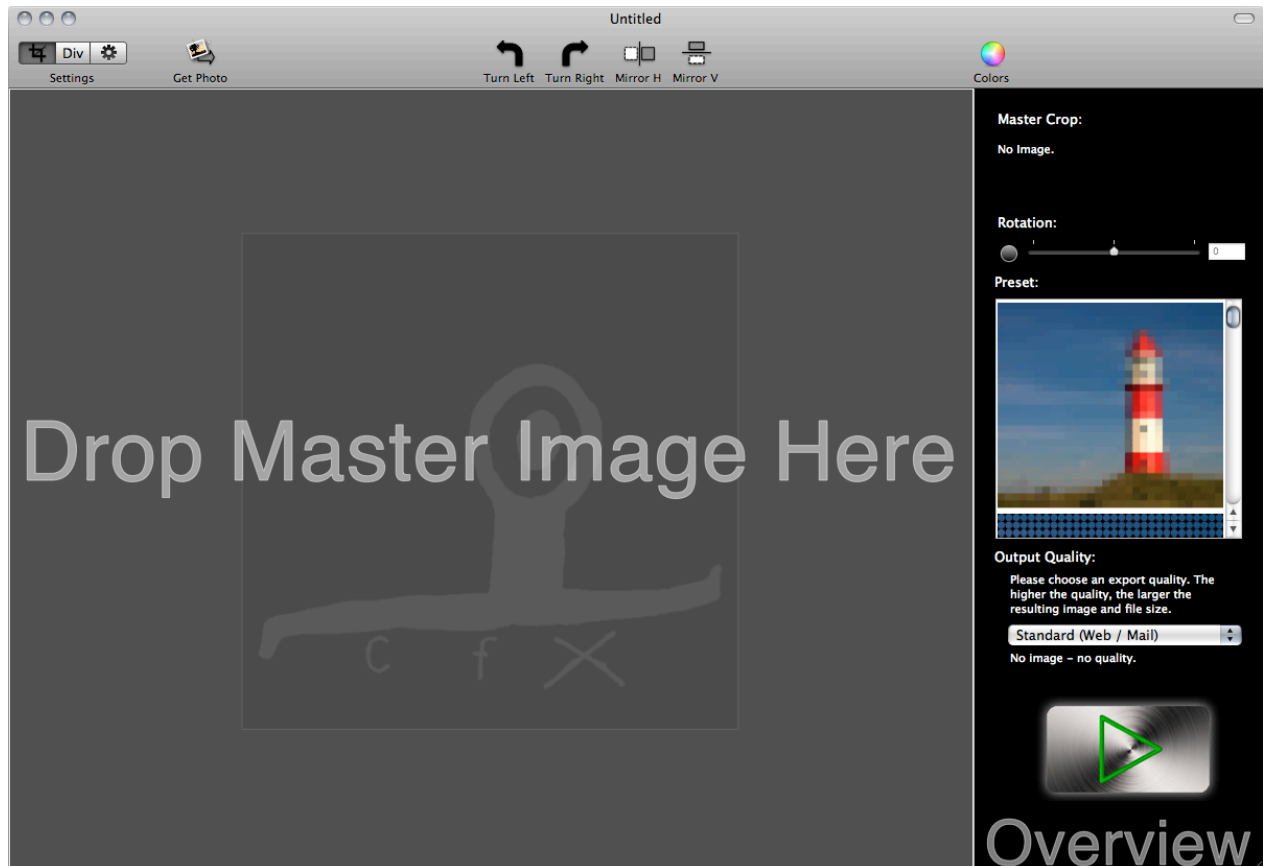


Figure 2 : cf/x mosaic's main window

For mosaic beginners, this window already shows everything you need. With just a simple drag and two clicks, you can generate great mosaics directly from here. Mosaic does allow you to tweak many settings, but only if you want to. It comes with more than 30 jaw-dropping presets, each of which you can curtail to your heart's content.

### ***Setting a master image***

The first thing to do is of course choosing an image from which to create the mosaic. There are many ways to do so: drag and drop an image from the Finder, iPhoto or

Aperture, use 'Import Image' from the 'File' menu, or click on the 'Get Photo' tool in the tool bar.

## Choosing a Master Image via the Media Browser

Although mosaic is designed with ease of use in mind, you can choose to tough image import out using OSX's built-in media browser. Using the media browser gives you access to special media groups such as 'Events', 'Albums', 'Faces' etc. that you may have defined in iPhoto or Aperture.

To use the Media Browser, simply choose 'Open Image' (⌘I) from the 'File' menu or click on the 'Get Photo' tool. Mosaic opens a new dialog. To access all your media, locate the left sidebar (the one that lists all your devices), and scroll down until you reach the 'MEDIA' group (near the bottom). Next to the 'MEDIA' label you'll find a triangle. If the triangle is pointing to the right, click on it to disclose the contents of the media group.

From the media group you have instant access to all your events, photos, faces, albums etc. that you have defined in iPhoto.



**Figure 3 : Using the OSX Media Browser to access iPhoto's Events**

Note that mosaic supports drag and drop from the media browser, so you can either double-click on the item you want to use, hit the 'choose' button, or drag it directly onto the main window.

## Setting up Master Crop

In the example below we dropped a nice b&w image of our model, shot against a light background into the box. Note how the image has a bright inside, with outer parts darkened. That bright box is the 'crop box', and defines the area that is used for the mosaic. You can change the area that is used by dragging the eight blue 'handles' that appear along the edges of the box.

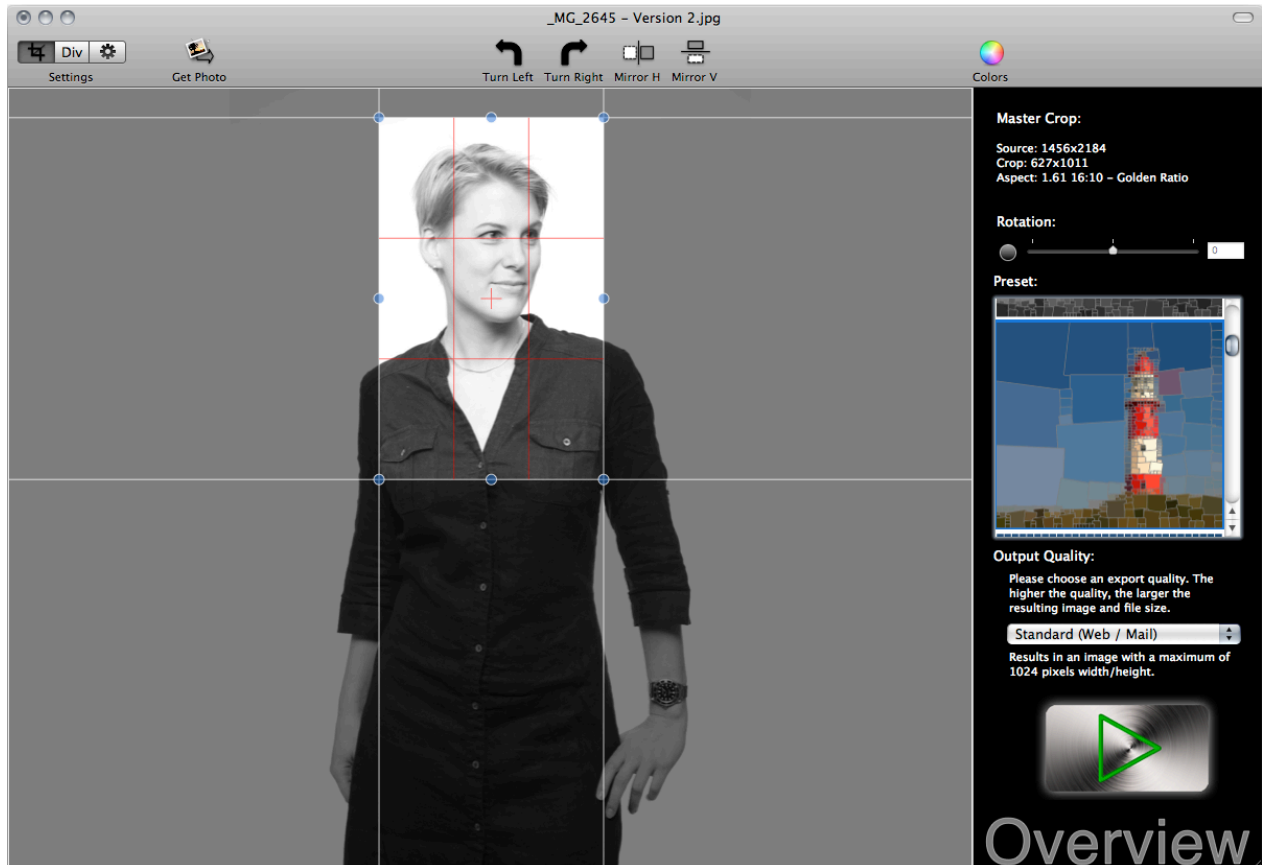


Figure 4 : Setting the Master image

While you change the crop box, mosaic constantly updates the Master Crop information that gives you information about the aspect ratio of the finished mosaic.

## Straightening the Image

Mosaic comes with built-in functionality to help you straighten out your master image. To straighten an image, click on the Button next to 'Rotation'. Use the yellow helper lines to align your image properly



## Using Presets

One of mosaic's greatest features is that it comes with a host of great presets that kick-start your artistic mojo. The presets are accessible on the right side. Each preset is represented by a small image that (hopefully) gives you an indication how that preset works. Each preset shows the same basic image: the Borkum Lighthouse.

You can scroll through the available presets and click on any preset that interests you.

To try out mosaic, simply choose a preset.



Choosing a preset always overrides all your current settings, and will also discard any colors you have added to the tile color DB

## Choosing a Quality

The last step before you start creating a mosaic is setting output quality. Mosaic has a number of useful presets here as well (Standard, Good, Better, etc.). For this tour, simply pick 'Good', but note that mosaic can generate truly gargantuan output (30'000 pixels per side, enough to create a 100 inch (2.5 m) square at 300 dpi<sup>1</sup>).

The output quality you should choose largely depends on what you intend to do with it later:

Quality	MP	Use For
Standard	1	Mail, Web
Good	4	On-screen presentations, HD footage
Better	15	5 x 7 inch prints (300 dpi)
Perfect	35	10 x 13 inch prints/photo books (300 dpi)
Insane	75	16 x 20 inch posters (300 dpi)
You gotta be kidding!	130	Recreating Pompeii in 1:1 scale
Now that's HUGE	900	Your personal attempt at the Guinness Book Of World Records?

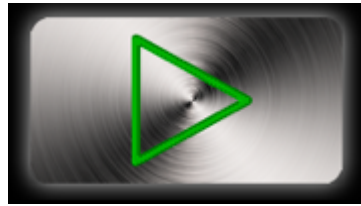
Figure 5 : Quality vs Usage

<sup>1</sup> Note to professional designers: please contact [ursin@cfxsoftware.com](mailto:ursin@cfxsoftware.com) if you require versions that create larger output for a quote on a bespoke version of mosaic.



### ***Creating a Mosaic.***

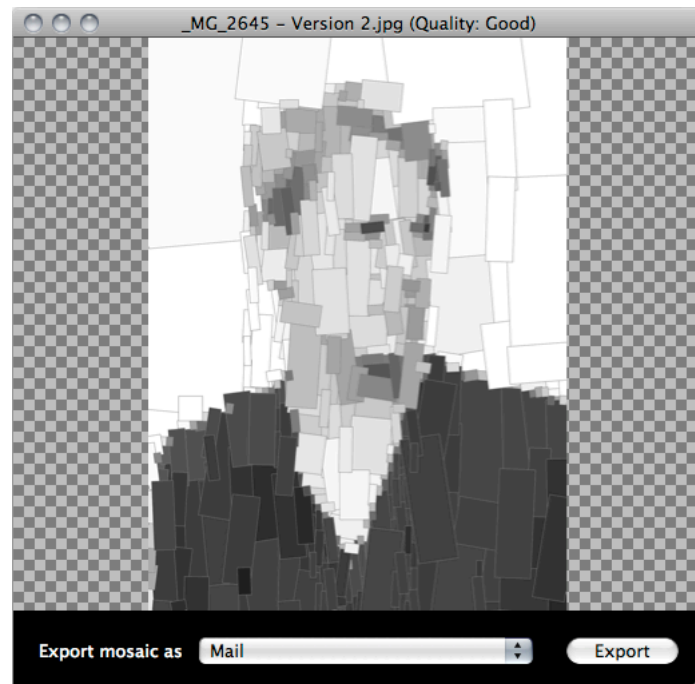
All that remains to do now is hit the 'Go' button. It looks very much like this:



A few seconds later a new window opens that shows you new mosaic...

### **Exporting your Artwork**

Every time you complete a mosaic, it appears in it's own export window.



**Figure 6 : Mosaic export window**

Note that the actual image may be a **lot** bigger, depending on your chosen quality.

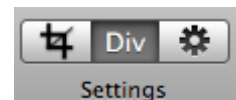
From the export window you can save or share the finished mosaic. Use the 'Export mosaic as' pop-up to choose the destination, and then click on 'Export'.

## Fine-Tuning your mosaic

While the first section of the manual focused on getting you started with mosaics, this part shows you an important, but non-essential aspect that you need when image fidelity or tile aspect are an issue (e.g. you want square tiles).

## Using Divisions

Mosaic has three main interaction screens. 'Overview', the first one, you are already familiar with. The second screen, 'Divisions' controls overall mosaic fidelity, and (somewhat more important for some mosaics), each tile's aspect ratio.



To switch to the 'Divisions' screen, please choose the 'Div' tab on the 'Settings' control

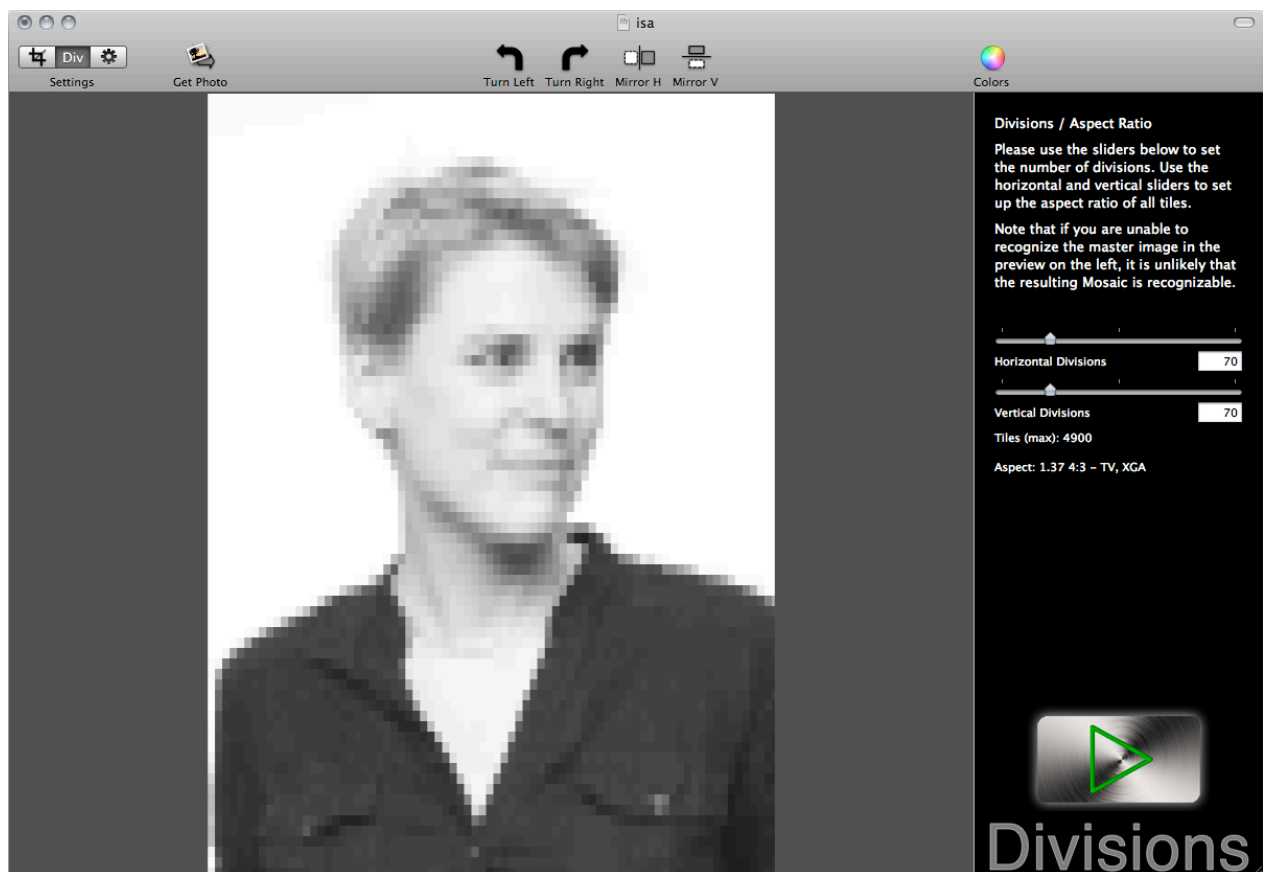
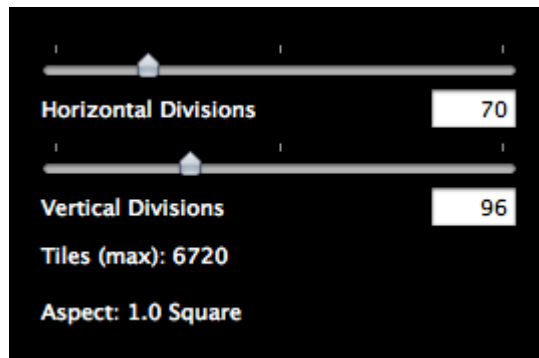


Figure 7 : Mosaic divisions control

The only controls here are two sliders that you use to tell mosaic how many times you want the master image to be subdivided. More subdivisions usually result in smaller tiles, and can make the resulting Mosaic more recognizable.

### ***Tile Aspect Control***

If the number of divisions is the same for horizontal and vertical, the tiles have the same aspect ratio as the crop. You can change this to enforce an aspect ratio for your tiles. If, for example, we wanted above image be constructed from square tiles (instead of oblong tiles that are all in portrait orientation), we'd move either slider (horizontal/vertical) and watch the 'Aspect' read-out until it changes to 1.0:



**Figure 8 : Using division sliders to enforce 1:1 aspect**

## Advanced Mosaic Concepts

This chapter finally delves deep into the many cool options that help you to create exactly the mosaic you want.

With the exception of output quality and divisions, everything in mosaic is controlled on the third screen, 'Settings'. The 'Presets' you saw on the first screen, are nothing more than automated scripts that change all settings on this screen to specific values.

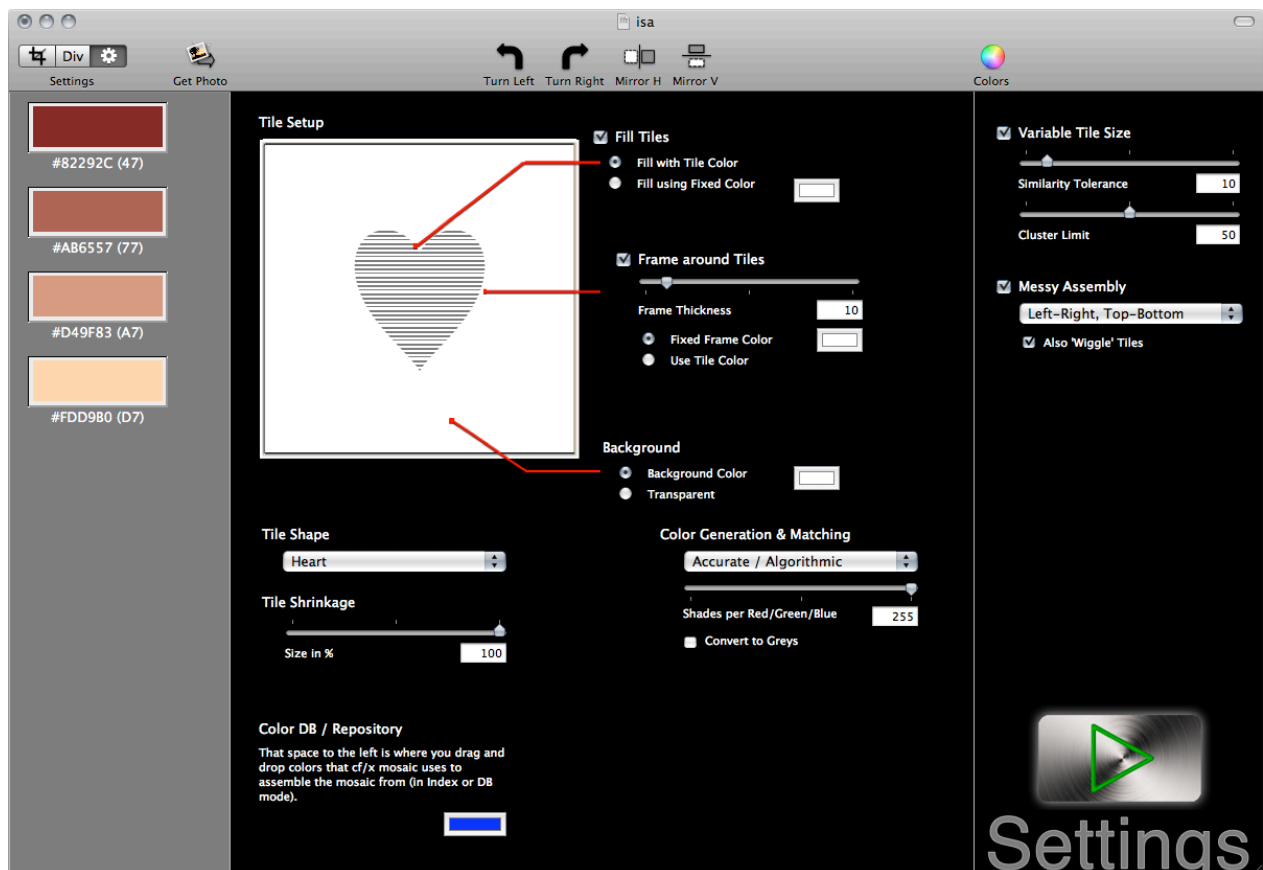


Figure 9 : mosaic's settings screen

Mosaic is far more powerful than the presets let on, and once you mastered (or gotten bored of) the presets, make sure you start trying your hand at tweaking presets. We at cf/x usually use a preset as a starting point, and then switch to the Settings screen and start tweaking until we find a particularly cool mosaic.

On this screen you can control:

- What **shape** a tile uses and it's **size**
- If and how a tile is to be **framed**
- How the tile's **color** is determined
- The **Color Palette** that is to be used for tiles

- How tiles are **assembled**
- The color and transparency of the **Background**
- If tiles have **universal** or **individual** size

We'll run through these one after another.

### ***Controlling a tile's Shape and Shrinkage***

Who says that a mosaic has to be assembled from boringly square or oblong shapes? Not us. In mosaic, you can control the shape of a tile with the Tile Shape pop-up.

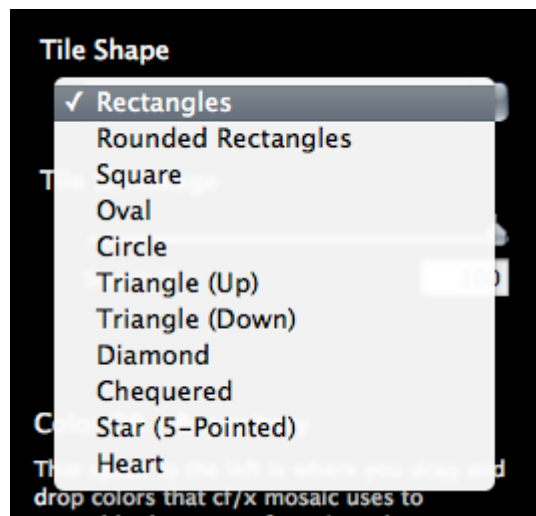


Figure 10 : mosaic's available tile shapes

Directly below the Shape control is a 'Shrinkage' slider. Use this slider to shrink the shape inside the tile's rectangle. If you shrink a shape inside the Tile, everything outside the shape reveals the background. At 100%, the shape fills as much of the tile as it can

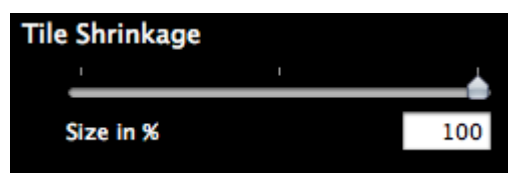


Figure 11 : Tile Shrinkage. 100% means no Shrinkage

## Mosaics and Color

One of the most powerful, fun, and interesting features of mosaic is how you can control color in your mosaics, and the fact that you can supply your own color palette for mosaics. Before we explain how you can actually use a color palette, let's briefly examine how you manage a color palette in mosaic:



The following discusses how mosaic handles color in general. See how you can apply that color to a frame or tile's surface later under 'Controlling a Tile's Frame' and 'Controlling a Tile's Color'

### *The color Palette*

On the left side of the 'Settings' screen is an empty grey area. This area is the 'repository' or 'color DB'.

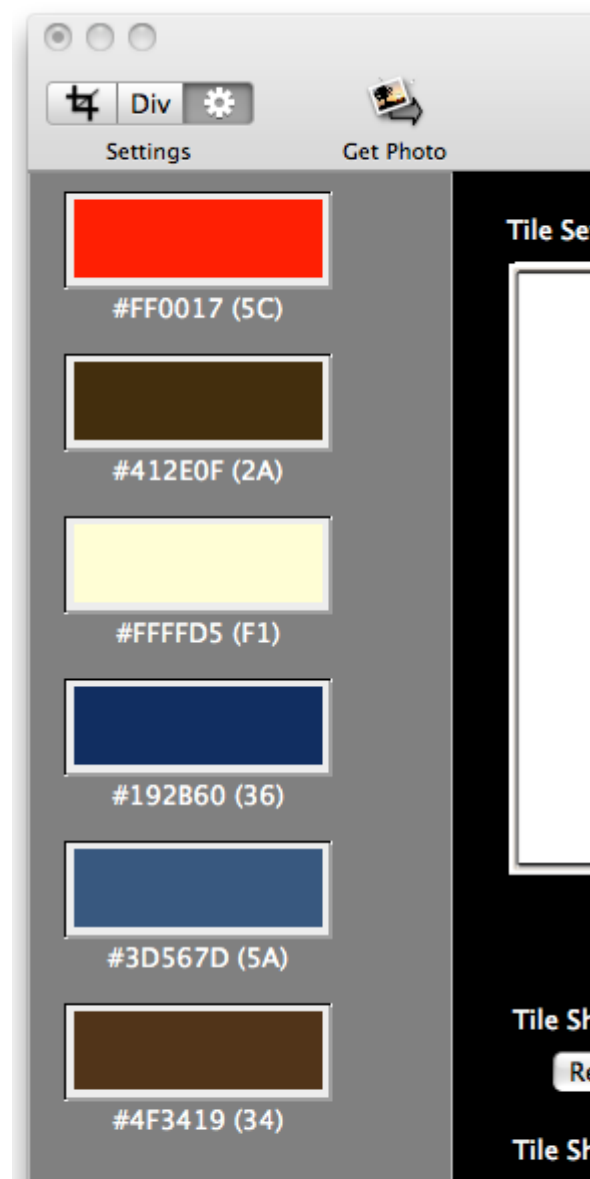
Some of mosaic's color generation schemes can access and use the color DB, and some ignore it. You control the color scheme that Mosaic uses through the 'Color Generation & Matching' controls (which we explain later).

It is important to realize that the order, in which colors appear in the color DB **can** be significant (for some schemes). In these cases (which we will point out), changing the order of colors in the DB results in a differently colored mosaic.

Managing the color palette is quite simple, and even fun. Colors in the DB can be re-arranged by clicking and dragging them, just like in many other editors.

To remove a color from the DB, simply select (click) it, and choose 'Delete' from the 'Edit' menu. The color disappears, and all later colors are moved up.

When you save a mosaic document, all colors in the DB get saved along with the other settings.



## Color Items

The items in your color DB provide some important information that may be useful to you:



Figure 12 : A color in the DB

Each color item in the DB is displayed as follows:

- a large rectangular area that is filled with the color
- a strange looking number that is preceded by the '#' sign. This is the hexadecimal representation of this color as web designers would use it.
- a similar strange number, enclosed in parentheses'()'. This is a hexadecimal representation of the color's brightness on a scale of 0...255 ('#00' to '#FF')

Use the brightness (number in parentheses) to determine if a color is darker or brighter than another (this can be helpful for some color schemes).

## Adding Colors to the DB

To add colors to the DB, simply drag a color from any color well (e.g. OSX's color palette) and drop it at the location where you want it:



Figure 13 : Inserting a new color into the DB

Note that you can add the same color more than once (this can be used for great effect with the indexed color scheme).

### ***Controlling Color Generation and Matching***

Color is what makes a mosaic distinct, and cf/x mosaic has more ways to control color than you can shake a pigment at. What makes cf/x mosaic unique is that you can provide your own color palette, and then let mosaic match the tiles to the palette, guaranteeing that only the colors in your palette are used. You tell mosaic how colors are generated with the 'Color Generation & Matching' pop-up, and it's secondary controls:

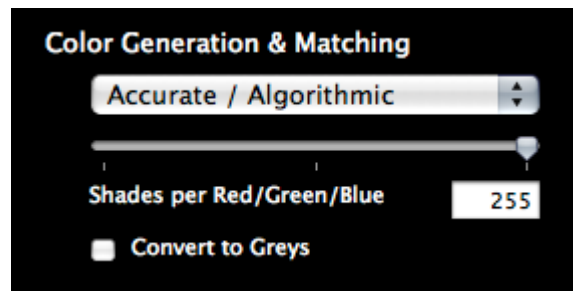


Figure 14 : Color Generation Controls

### ***A note on Color Usage when using the color DB***

If you choose a color generation scheme that involves the color DB, please remember the following important principles:

- There is no guarantee that each color in the DB is used (i.e. set a minimum number of uses for a color)
- There is no way to restrict the usage of a color or force mosaic to use all colors equally (i.e. set a maximum number of uses for a color).



## Accurate/Algorithmic

This is also sometimes referred to as 'natural' color. For each tile, mosaic calculates the average color of the part of the photo that this tile represents. This color is then used. This is the default.

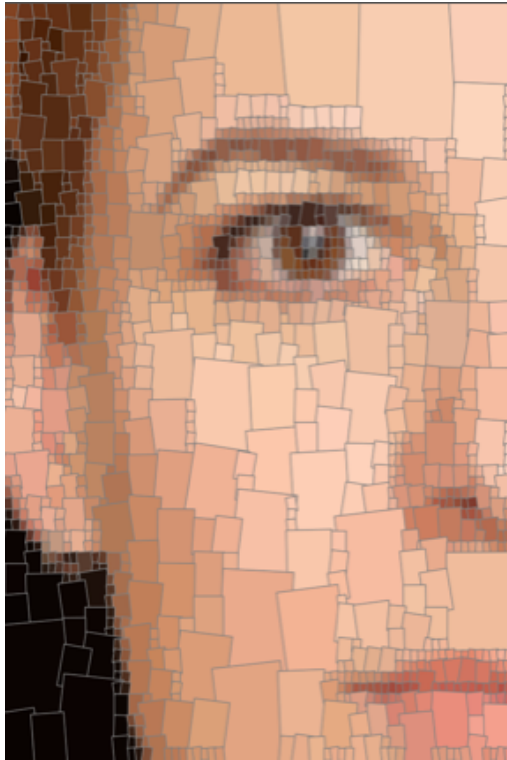


Figure 15 : Mathematically accurate tile coloring



All colors in the DB are ignored.

## Brightness is index into DB

This scheme uses the color palette in the following way: For each tile, mosaic calculates the average brightness of the part of the photo that this tile represents. The brightness is used as an index into the color palette (the color repository on the left). Low brightness (dark colors) results in a low index. Fully dark colors (#00) always uses the very first color in the DB, fully bright always the last color in the DB.

!

The order in which colors appear in the color DB is relevant for this scheme. Duplicate colors are significant.

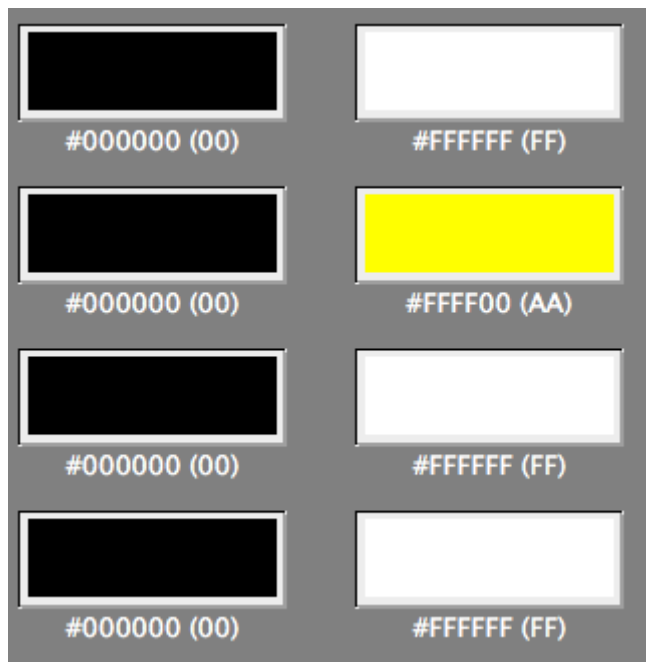


Figure 16 : Using the same color multiple times to create great effects with Indexed scheme

In above example we use the 'Indexed' color scheme to generate a truly great effect. We set up the color DB with alternating black and white colors, which causes strong contrast in the resulting mosaic. Instead of white, we use a yellow that causes a strong yellow (always surrounded by black) in the lower mid-tones of the result.

## Closest Match to Color

This is the 'true' color palette scheme. Only colors that are in the color DB are used. Tiles are matched to the color in the color DB, and the 'closest' color (as determined in the Red-Green-Blue color space) wins.

! The order of colors in the DB is irrelevant. Duplicate Colors are ignored.

You can greatly enhance the quality of the mosaic by using the 'color pickup tool' (looking glass) of the color manager to pick a number of prominent colors that appear in the original.

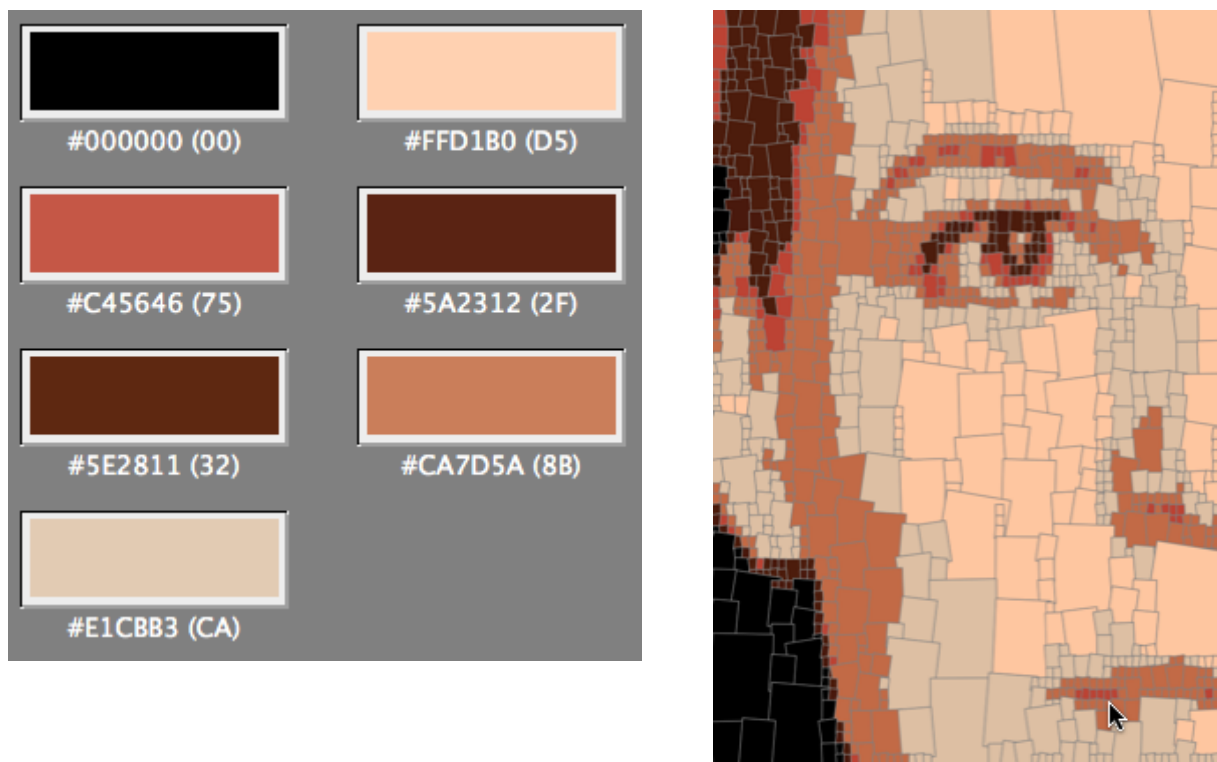


Figure 17 : We used the color pickup tool to create a mosaic that uses exactly 7 colors with closest color match scheme

## Closest Match to Brightness

This clever scheme uses the brightness (luminance) value (calculated using the HSL color space) of each tile to find the color with the most closely matching brightness. Since many colors have the same brightness, this color scheme is for special (contrast-enhancing) effects, and is also used routinely to create great false-color mosaics.

! The order of colors in the DB is irrelevant for color matching.  
If two colors have the same brightness, only the first color is used.

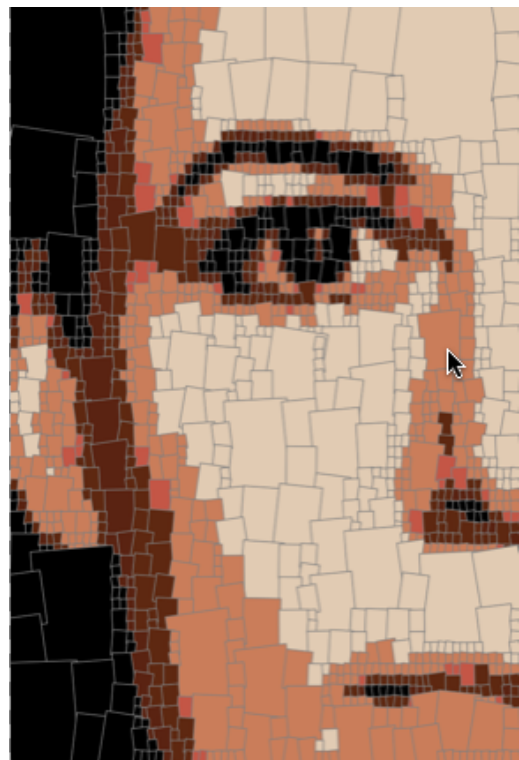
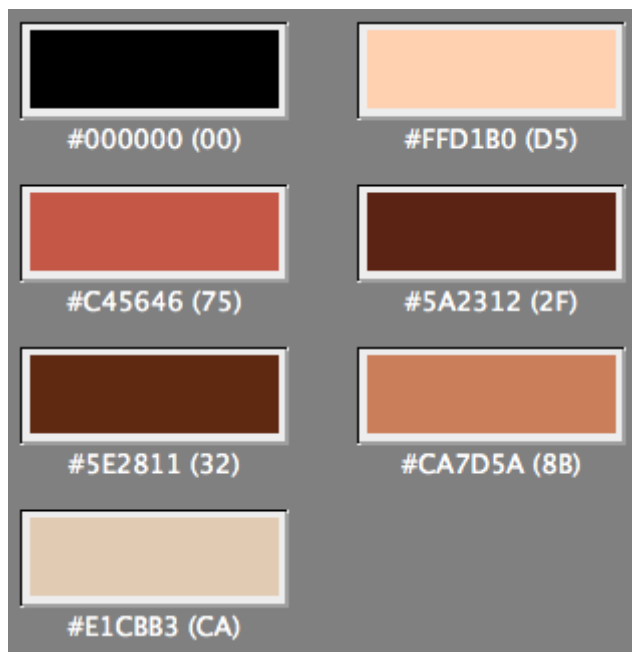
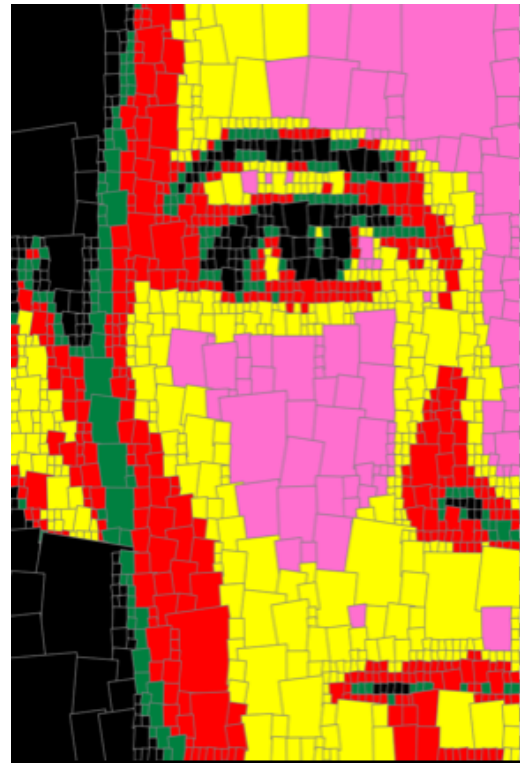
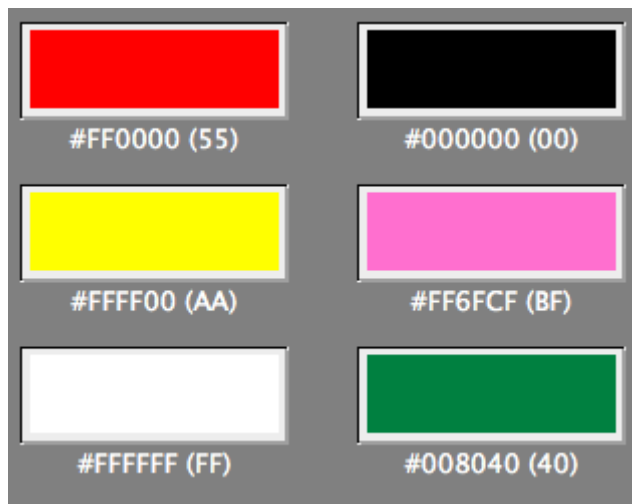


Figure 18 : A great variation on the color scheme: pick up colors from the original, then use a b&w version of the original and map colors to brightness



**Figure 19 : Using the 'closest brightness match' to create a false-color mosaic**

Remember that with an indexed DB, output color is complete independent from input color.

... We used this to good effect in the two examples above. The master image in both examples was a grayscale ("black & white") image!

## Controlling the Source Spectrum

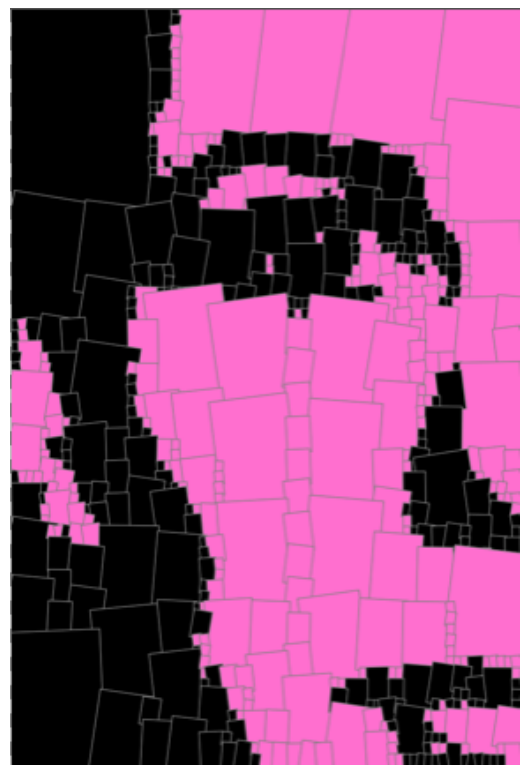
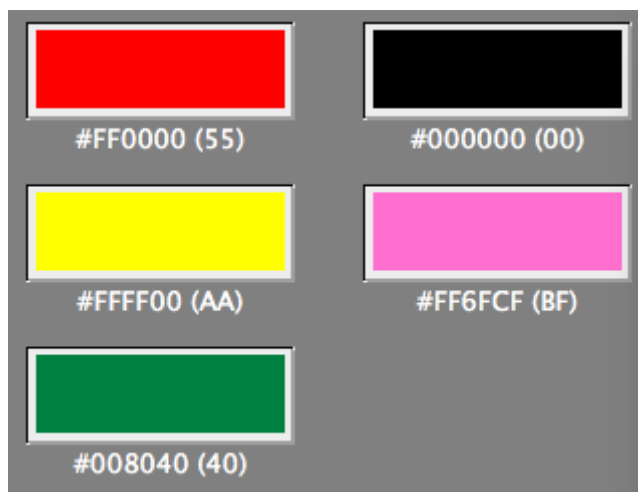
In mosaic's color space, each color component (red, green and blue) can have 256 discrete values, which gives a total of  $256^3 = 16'777'216$  different colors. You can (for all color generation schemes) limit the number of colors per component to a smaller number, in effect narrowing the color gamut.

You control the spectrum with the 'Shades per Red/Green/Blue' slider.



The reduction of available shades is applied BEFORE color matching. The *reduced* color is then matched to those in the color DB.

Limiting the number of shades per component can dramatically increase contrast. Used in conjunction with a color palette, the results can be very interesting. The color/brightness matching even works if the number of available colors exceeds the number of possible shades:



**Figure 20 : Closest Brightness with only 1 shade per component. Note how (because of the reduced number of shades) only black (lowest brightness, #00) and pink (highest brightness, #BF) are used**

## Tile Color Setup

In mosaic you can control three distinct color properties for each tile:

- the tile color itself
- the tile's frame
- the background (if the tile does not completely fill the tile's frame)

Mosaic sports a graphical interface that makes controlling these properties easy:

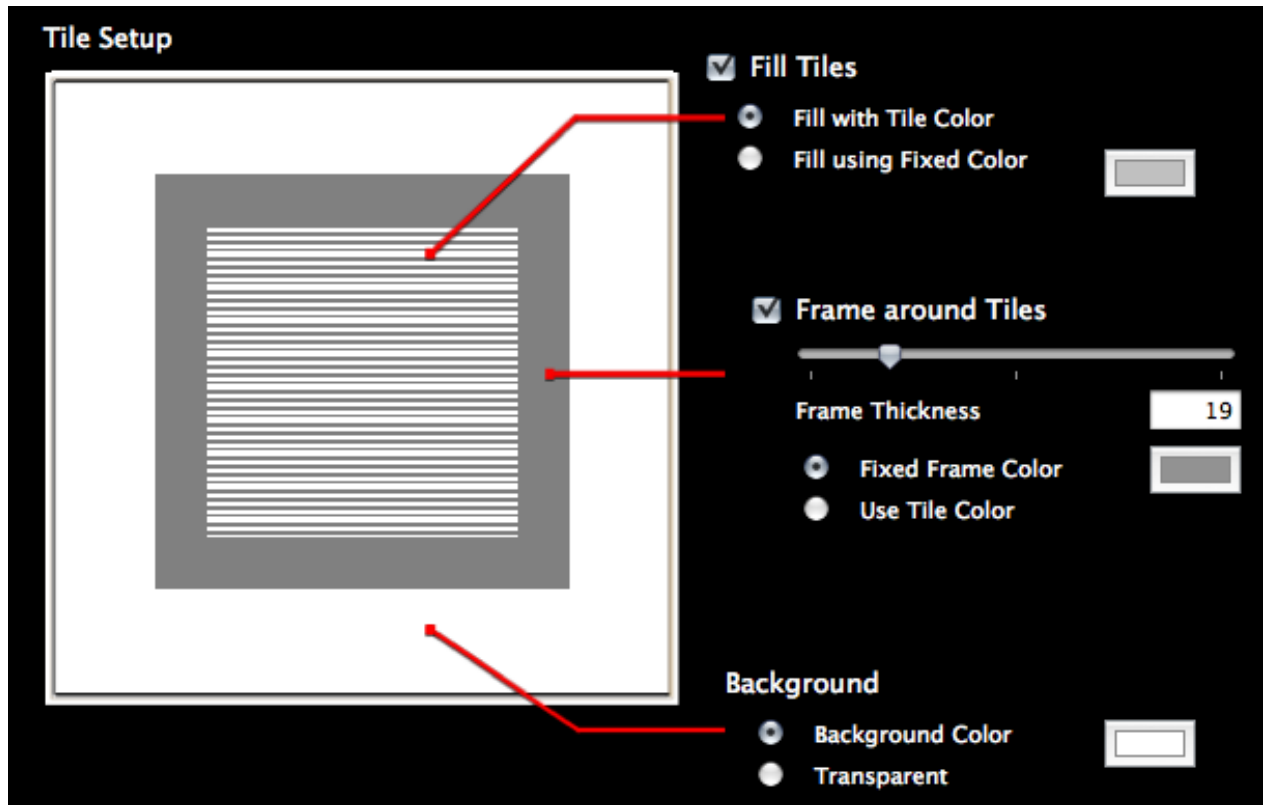


Figure 21 : Tile Setup interface

### ***Controlling a Tile's frame***

You can turn a tile's frame on or off. Frames grow inwards, leaving less space for the actual tile if enabled.

If you enable frames, all tiles have the same frame width, even if you have enabled variable tile size. You control frame width with the 'Frame Thickness' slider.

The color of each frame can be either a fixed color, or set to assume the calculated tile color (as defined with the 'Color Generation & Matching' controls).

### ***Controlling a Tile's color***

You can either fill a tile's shape or turn filling off. If you turn off tile filling, you may still tell mosaic to draw the frame (i.e. frame and fill are independent of each other). If you do not fill the tile, mosaic shows the background color instead. When used with transparent background, this can be used for great effects (especially with tile shapes that also do not completely fill the full tile's surface).

A tile's color can be set to a fixed color, or (more naturally) to the calculated color. In the latter case, the tile's shape is filled with the color as you set up in the 'Color Generation & Matching' section.

### ***Controlling the background color***

The background color is shown wherever no tiles or tile frames are drawn. It is entirely possible that the mosaic completely fills the whole canvas, and no background is visible.

You can set the background color to any color, or choose it to be completely transparent.



## Controlling a Tile's Size and Assembly

One of Mosaic's most advanced features is that it can use variably sized, messily assembled tiles. Most mosaics are created from uniformly sized tiles, which give each mosaic a stark, regular appearance.

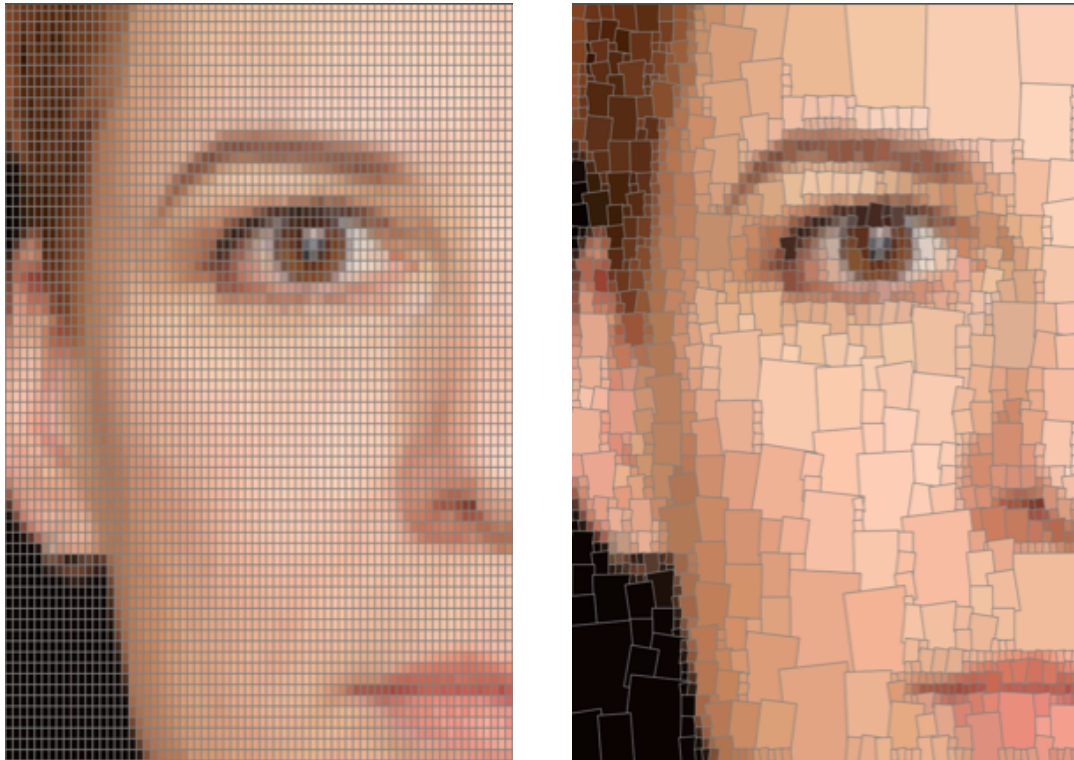
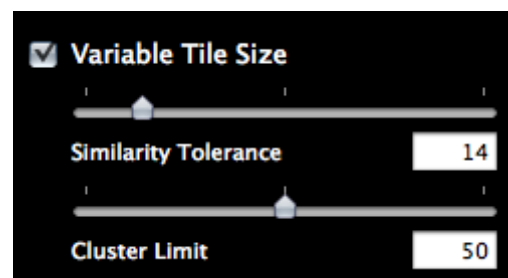


Figure 22 : Uniform tiles, normal assembly (left), and Variably sized tiles, assembled 'messily' (right)

### Controlling Tile Size

Mosaic can take multiple tiles of the same color, and create a new, larger tile from them. With the 'Variable Tile Size' controls, you can

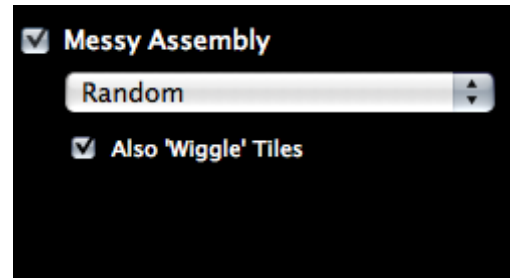
- Enable variable tile size
- Tell mosaic how similar two tiles must be to be regarded the same color (and therefore be potentially collared into a larger tile)
- Tell mosaic how large a single tile can grow



## ***Controlling Tile Assembly***

Computer-assembled mosaics often look stark, forbidding, and even soul-less. This is because the mosaic is a result of a precisely defined mathematical expression.

To counter-act this, mosaic can introduce an element of chance to make the result look more alive.



We call this 'Messy Assembly', and these are the elements that you can use to give the mosaic a more organic look:

- *Messy assembly*  
when you enable messy assembly, all tiles have a certain percentage so slightly grow, resulting in a more-or-less ill-fitting mosaic, that looks much more natural than a perfectly fitting grid of tiles
- *Assembly Order*  
For reasons currently unclear, the human eye excels at detecting how tiles are placed on a grid (when messy assembly is enabled). To greatly enhance the life-like assembly, choose 'Random' or an 'Ascending' or 'Descending' tile assembly order
- *Wiggle*  
The final element of chance is 'wiggle'. Each tile is slightly rotated to the left or right during assembly.

# Acknowledgements

## *Included Software Frameworks*

cf/x mosaic uses the following software packages

- **Sparkle**, Copyright © 2006 by Andy Matuschak

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## ***Imagery***

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