BEAUTIFY

Kronnect

Contents

Introduction

Thanks for purchasing!

Beautify is a full-screen image processing effect that improves the image quality in real time producing incredibly crisp and vivid scenes.

Beautify uses several intelligent algorithms in a single-pass resulting in a very fast image effect:

- Analyses local pixel contrast, enhancing visual features and producing sharp images.
- Reduces or completely removes banding in gradients, usually seen in sky boxes due to color quantization.
- Adjusts pixel saturation, boosting pixel color without over saturating the image.
- Factory presets or global effect slider, which takes care of all effect details in one step.

In addition to this unique image enhancement technology, Beautify provides state of the art filmic ACES tonemap operator and high quality extra effects which you can combine just enabling them in the inspector. These are high quality effects which are combined in the same render passes providing superior performance.

Beautify is very easy to use, just add the image effect to your camera, choose a preset and that's all.

It works with forward and deferred rendering paths as well as linear and gamma color spaces.

Two shader variants are included, one optimized for speed.

Demo Scenes

A few demo scenes are included to quickly play with the different presets. Just open and play with them to learn about Beautify possibilities.

Quick Start

1. Add the Beautify script to your main camera in your scene.

2. Choose one of the preset and that's all!

You can of course customize any of its parameters to match your game mood and requirements.

Beautify parameters

General Settings

- **Quality**: chooses the shader variant. The "Best performance" variant uses less texture fetches and includes some extra optimizations which results in a faster performance with less accuracy making it suitable for mobile devices (real performance depends on device GPU power and the number of enabled effects).

- **Preset**: quickly choose a factory combination of values for the parameters below.

- **Profile**: assign or create a Beautify profile. A profile is a custom file that stores current configuration. You can have multiple profile and assign them either in Editor or at runtime. Jump to "Using Profiles" for more details.

- **Compare Mode**: shows a side by side comparison of Beautify effect.

- **Force ARGB32**: this option only affects Android platform and should be used only as a workaround for an Unity bug with high precision render textures on Android GPU Mali T720. You may want to include this option in your game settings.

Image Enhancements Options

- **Sharpen**: sharpen intensity. A higher value will produce a dramatic result but can show some undesired artifacts with thin objects or whitish backgrounds. Use the following extra settings to control those artifacts:
    - **Min/Max depth**: allows you to choose the depth range where sharpen will be applied. Decrease max depth to remain skybox untouched. Increase min depth to cause an effect similar to depth of field.
    - **Max Depth**: will compute depth difference around pixels to detect edges. When the depth delta is greater than this value, sharpen will not occur. This will protect thin objects like standalone wires or lines.
    - **Luminance Relaxation**: sharpen is subtler on high contrasted areas. This parameter tunes this relaxation. Reduce this value to preserve thin edges or bright areas.

o **Clamp**: irrespective of sharpen intensity or above params, clamp controls the maximum effect applied over a single pixel.
o **Motion Sensibility**: reduces sharpen effect while camera moves/rotates. This option can reduce flickering and produce a cheap motion blur effect. Set this value to 0 to disable this option.

- **Dither**: dither function shifts pixel RGB values according to a pseudo-random pattern to reduce banding.
  o Min Depth: by default, dither is applied to entire image. Use this parameter to make dithering only occur beyond given depth (set this value near 0.99 to make it only affect sky).

Color Grading Options

- **Tonemapping**: default is Linear which means no tonemap operator is applied. Choose ACES (Academy Color Encoding System) to map HDR colors into LDR space. Use only with HDR enabled on your camera.

- **Vibrance**: controls the intensity of adaptative saturation. This algorithm considers current saturation of each pixel, so low saturated pixels receive more importance than high saturated pixels.

- **Tint**: multiplies scene pixels by a given color. Alpha controls the transparency of the tint effect.

- **Daltonize**: similar to vibrance but mostly accentuate primary red, green and blue colors to compensate protanomaly (red deficiency), deuteranomaly (green deficiency) and tritanomaly (blue deficiency). This effect does not shift color hue hence it won't help completely red, green or blue color blindness. The effect will vary depending on each subject so this effect should be enabled on user demand.

- **Contrast** & **Brightness**: these two paramters adds a final contrast + brightness adjustment to the image.

Lens & Lighting Effects

This section contains several optional visual effects related to lens or light. All of them are optional meaning that if disabled they won't make the shader slower. You can also combine many of them to create very nifty results!

- **Bloom**: produces fringes of light extending from the borders of bright areas, contributing to the illusion of an extremely bright light overwhelming the camera or eye capturing the scene. Use intensity and threshold (light sensibility) to adjust bloom effect. Layer mask option allows you to specify which objects are subject to bloom.

- **Anamorphic Flares**: also known as JJ Abrams flares, they add a sci-fi look to the scene. This effect is only available for Best Quality settings. It's similar to bloom but also can be assigned a tint color (use alpha to blend between original and tint color) and an orientation (horizontal or vertical).

- **Sun Flares**: beautiful, fast and procedural lens flares produced by the bright light of the Sun. There're lot of options to customize from sun disk size and intensity, corona rays, ray diffraction and ghosts.

- **Lens Dirt**: adds dust and dirt effect to your camera when looking to a light source. You can control the intensity and the brightness threshold (brightness sensibility). If you want to use different dirt textures, just assign your own texture into the Dirt Texture slot (several textures are provided in this asset inside the Textures folder).

- **Depth of Field with Bokeh**: depth of field is the distance between the nearest and the furthest objects giving a focused image. Enable this option to produce a photography effect where the target object remains focused while the the backgorund and foreground looks blurred.

  - **Autofocus / Focus target / Focus distance:** allows you to specify where is the focus plane. For autofocus it's recommended to reduce the focus speed as it will produce a more pleasant effect between changes.
  - **Focus speed**: the speed between current focus and a focus change. For example, if the target focus is moving a focus speed of 1 will update the focus instantly whereas a lower value will make the focus more progressive.

o **Focal Length and Aperture:** these two parameters are used to simulate the virtual camera. Focal Lenth is the distance between the lens and the image sensor. Aperture is referred to the effective apertura or diameter of the pupil through which the outside light enters.

o **Foreground Blur:** enable to allow foreground objects to be blurred. Use offset to adjust the foreground blur distance.

o **Downsampling**: reduces the screen buffer size to improve performance. Can produce some artifacts.

o **Sample count**: referes to the maximum samples that will be gathered. The algorithm is optimized to produce adequate results with a value of 4. A lower value will be faster but the results will look incorrect. A greater value will increase the quality of the blur, which can be appreciated when using a higher focal length value.

o **Transparency Support**: enabling this option will render a depth pass over transparent objects and take into account their depth into the Circle of Confussion computation. Use only if you really need this.

o **Exclusion Layer**: this option enables you to exclude certain objects on the scene from the Depth of Field effect. Useful to focus attention on specific areas or objects.

o **Exclusion Layer Bias**: this is an offset value used in the exclusion layer computation. Modify it if the excluded objects show DoF effect applied over some areas.

- **Eye Adaptation**: simulates eye reaction to quick luminance changes in the scene. You can customize the eye adaptation to light or to dark, either min/max exposure changes and adaptation speeds.

- **Purkinje**: this effect simulates the achromatic vision in the dark plus a spectrum shift to blue tones. You can customize the shift amount and the effect luminance threshold.

Artistic Choices

This section contains additional nice effects that add a touch to your scene. All of them are optional meaning that if disabled they won't make the shader slower. You can also combine many of them to create complex results!

- **Vignetting**: darkens or tints with a custom color the border of the scene. The alpha component controls the effect intensity. This effect can be combined with Night Vision or others to add great depth and special feeling to your scene. Optionally assign a mask texture whose alpha component will be overlaid over the image. You can find a sample grungeBorder texture inside Resources/Textures folder.

  Frame: adds a white or colored border to the screen. The alpha component controls the size of the border. Optionally assign a frame texture. You can find a sample grungeBorder texture inside Resources/Textures folder.

- **Outline**: adds a white or colored border around objetcts in the scene. The alpha component controls the edge detection threshold.

- **Sepia**: creates a classic sepia color effect! Simple but elegant.

- **Night Vision**: the night vision effect will allow you to see in complete dark. You can customize the color (greenish by default) and the luminance using the alpha component of the color picker. This effect is completed by noise and scan line effect. Works great with vignetting enabled (set a black vignette with an alpha of 32).

- **Thermal Vision**: this effect is similar to night vision but just shift color hues to simulate termal sensitivity. It also distorts the image to give the impression of temperature. This effect is also completed with noise and scan lines.

Advanced Settings

Some advanced options can be found inside the BeautifyAdvancedParams.cginc file located in Resources/Shaders folder. This file contains some parameters that are specific to custom scenarios and, because they affect the shader, they're not exposed to the common interface since they will add more shader keywords and complexity.

To activate one of these advanced options, just uncomment the corresponding line. Or comment it to disable it.

#define BEAUTIFY_ORTHO
Enables orthographic camera support. Only enable it if your camera is set to orthographic projection.

#define BEAUTIFY_ENABLE_CORE_EFFECTS
By default, this option is enabled meaning that Sharpen, Color grading and Dither will be always used. If you're just interested in one specific effect, like bloom or depth of field and don't want to use the core effects, uncomment this line.

#define BEAUTIFY_DITHER_FINAL
Dither is applied at the end of all effects. If you comment this line, dither will be applied at the start, before other effects like bloom or depth of field. Leaving dither at the end will produce less banding.

#define BEAUTIFY_EYE_ADAPTATION_DYNAMIC_RANGE

By default, Eye Adaptation effect will use a better algorithm when Best Quality setting is enabled (with Best Performance, Eye Adaptation only increase or decreate brightness on the whole image based on average luminance changes). In Best Quality, Eye Adaptation adds a more convoluted algorithm producing that ground is obscured when looking into a bright sky and vice versa. If you comment out this macro, the Best Quality setting will use the faster method used in Best Performance mode.

#define BEAUTIFY_SUN_FLARES_OCCLUSION_DEPTH
If you have objects that do not have colliders and want them to occlude the Sun flares effect uncomment this line.

#define BEAUTIFY_ACES_FITTED
Uses an alternate ACES tonemap operator which does less saturation on brights.
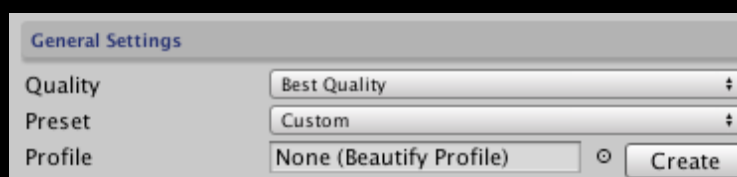
Using Profiles

A profile is a special file that stores all settings in Beautify inspector. You can have multiple profiles in your project and assign them in Editor or at runtime.

Profiles are useful to:

- Store and load multiple configurations with ease.
- Duplicate existing settings and create variations.
- Apply custom styles to different scenes (eg. main menu, custom levels, …)
- Along the global Quality setting, they can be used to provide different performance options by using or not specific effect parameters (eg. depth of field downsampling).

To create a new profile: click "Create" next to Profile field in Beautify's inspector. A new file wil be created in the root of your project. This file contains a copy of all settings of Beautify. Rename this file and move it to any folder you wish. The new profile will automatically be assigned so any change you do to the profile will also affect Beautify.

To assign a profile: just drag & drop the profil file to the "Profile" field shown above. It can also be assigned using script:

Beautify.instance.profile = Resources.Load<BeautifyProfile>("path-to-profile").

To unassign a profile: click on the profile field and hit "DELETE" key. To completely remove the profile file, your delete the file from the project.

Once a profile is assigned: if you change any parameter on Beautify's inspector, it won't change the profile! To apply your changes (to update the profile), click "**Apply**". Or click "**Revert**" to load the profile settings again and replace any change you did:

FAQ (Frequent Asked Questions)

Can Beautify work with other image effects?

Yes – however you need to experiment with image effects order. Beautify works better after Antialias as it can remove the extra blur it can add (especially FXAA).

Skybox banding is not completely removed. What can I do?

Enable HDR in your camera to improve dithering effect and banding removal.

What differences exist between the Best Performance and Quality settings?

Beautify includes two main shader variants – one for desktop with all the goodies and best algorithms and one for mobile.

The mobile version (Best Performance) has reduced quality across the shader. It's a little bit less accuarate with regards to the sharpen effect although unnoticieable. Bloom and anamorphic flares is simplified in this mode.

Depth of Field effect has its own performance options, since this is a very complex effect. Irrespective of desktop or mobile setting, ensure you set the appropiate downsampling and sample count.

When I launch a build, it takes lot of time to complete. What can I do?

Beautify makes use of several shader keywords (using multi_compile directive) to ensure only the useful code in shaders is executed. Multi_compile are directives that are included in the shader files that make the compiler create different variants for each shader, mixing different shader options in each variant. This way, when you enable one option or another (eg. outline, night vision, …) Unity will pick up the appropiate variant which has optimized code for that combination of features.

To reduce the build time, just open the Build Options section and disable the effects you are not interested to include in your build. Disabled effects in this section won't be available in the shader (the shader itself is modified automatically by Beautify) so Unity does not have to generate those variants hence reducing build time and resulting binary size.
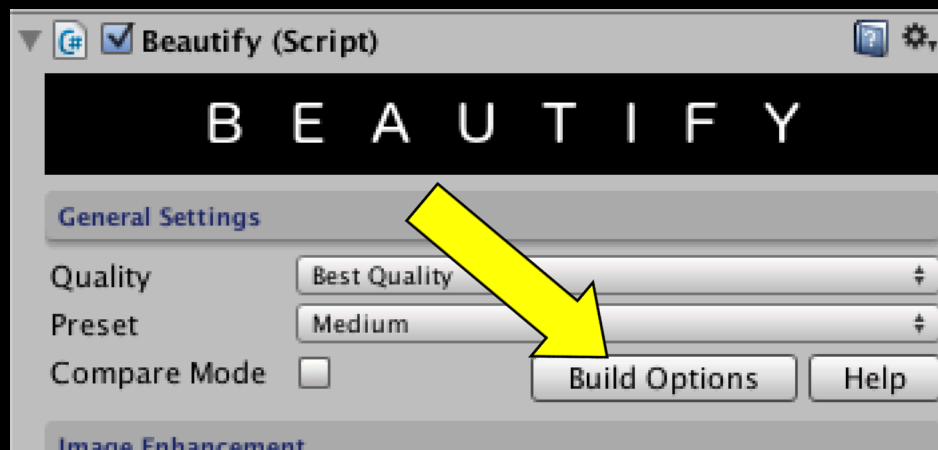
(Check out our Shader Control asset to manage other shader keywords in your project)

Can I exclude my UI from Beautify?

Yes, you need to edit Beautify.cs script and add [ImageEffectOpaque] just before the method OnRenderImage, so it reads:

```
[ImageEffectOpaque]
void OnRenderImage(…)
```

I get shader error on Playstation 4!

Use the High Quality setting mode and remove BeautifyMobile.shader from Beautify/Resources/Shaders folder.

I get shader error on Xbox One!

This error occur because the shader compiler provided with XBox DevKit only accepts Windows file encondings. To solve this issue, create a new text file per each file found in Beautify/Resources/Shaders folder and copy/past the contents, replacing the old files with the new ones.

Can I make bloom affect only emissive materials?

Unity does not render emission separately from lighting when HDR is enabled so this is not possible. But as emissive materials are also affected by lighting, the resulting brightness value will always be higher that other non-emissive materials, so a workaround is setting the threshold high enough so only emissive materials are affected. You can also use the Layer Mask option to restrict bloom to emissive objects

How to enable Orthographic Camera support?

To enable support for orthographic camera, locate and edit the file "BeautifyAdvancedParams.cginc" located inside the folder "Beautify/Resources/Shaders".

You will see a self-explanatory configuration file with a global shader define which is commented out by default:

```
// Uncomment this one to support Orthographic Camera
//#define BEAUTIFY_ORTHO
```

Is it possible to disable core effects like vibrance, dithering or sharpen?

Yes, they are heavily optimized at the core but you can disable them if you just want to use any other effect (for optimization purposes for example).

To disable the core effects, locate and edit the file "BeautifyAdvancedParams.cginc" located inside the folder "Beautify/Resources/Shaders".

```
// Comment out this one to disable sharpen, dithering, brightness,
contrast and vibrance effects
#define BEAUTIFY_ENABLE_CORE_EFFECTS
```

Bloom burns/saturates the lights, can I spread it or make it softer?

Yes, in addition to adjusting threshold and intensity, you can try the "Customize" option (in Best Quality mode). This option will allow you to adjust the weight for each one of the 6 hdr bloom layers. Reduce the weight for the first 3 layers. Also try the "Boost" sliders for layers 5 and 6.

Support

Please visit kronnect.com for questions, support and more info.

Feedback & Review!

We take a lot of effort to optimize and maintain Beautify. If you like it, please rate or review it on the Asset Store, or send us an email telling your story/project/issues. We'll help asap!