

Pattern Suppressor v2.7 – Readme

Fourier Transformation plugins and actions for Adobe Photoshop.

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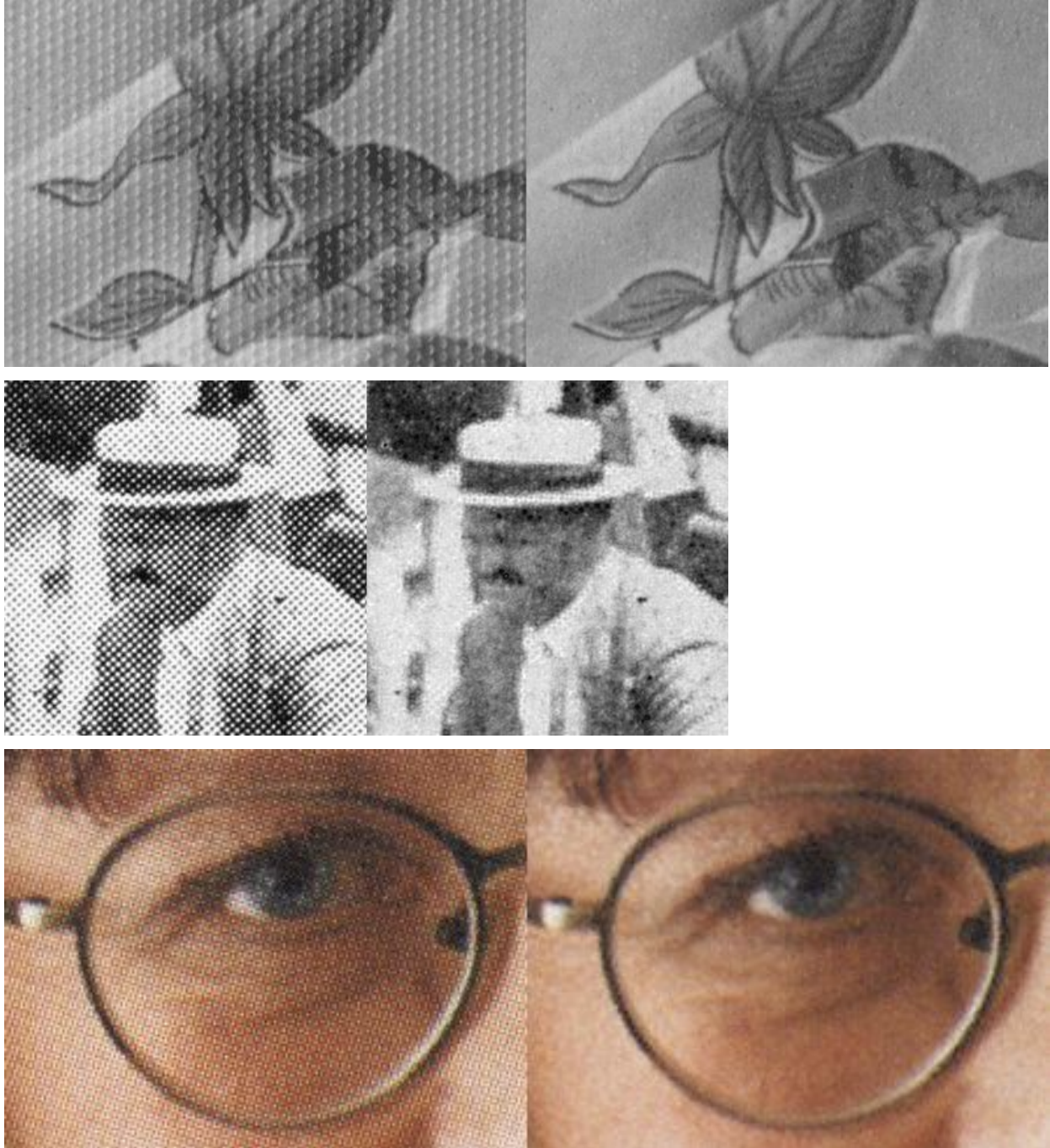
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[Libfftwx64_3-3.dll](#)

What is this?

This is a set of plugins and actions for Adobe Photoshop that will let you easily remove regular repeating patterns from images that cannot conveniently be removed by traditional means.

Example of results that can easily be achieved:



Files included

- `libfftwx64_3-3.dll` – FFTw library. Required by the Windows plugins.
- `Ft2DS.8bf` – Windows plugin for doing a Fourier transformation (channels averaged/desaturated).
- `Ft2DH.8bf` – Windows plugin for doing a Fourier transformation (per channel).

- `Ft3DH.8bf` – Windows plugin for doing a Fourier transformation (in 3D space-x, y, and color).
- `iFt2DS.8bf` – Windows plugin for doing the inverse of Ft2DS.
- `iFt2DH.8bf` – Windows plugin for doing the inverse of Ft2DH.
- `iFt3DH.8bf` – Windows plugin for doing the inverse of Ft3DH.
- `Ft2DS.plugin` – Mac plugin for doing a Fourier transformation (channels averaged/desaturated).
- `Ft2DH.plugin` – Mac plugin for doing a Fourier transformation (per channel).
- `Ft3DH.plugin` – Mac plugin for doing a Fourier transformation (in 3D space-x, y, and color).
- `iFt2DS.plugin` – Mac plugin for doing the inverse of Ft2DS.
- `iFt2DH.plugin` – Mac plugin for doing the inverse of Ft2DH.
- `iFt3DH.plugin` – Mac plugin for doing the inverse of Ft3DH.
- `Pattern Suppressor v2.7.atn` – Photoshop Actions for doing pattern suppression.
- `Readme.pdf` – This file. Duh.

Requirements and compatibility

- Requires Adobe Photoshop (64-bit) for Windows or macOS.
- *Tested and confirmed working* with CS5–CC 2021 on Windows 10 and CS6–CC 2018 on macOS 10.13 and CC 2017-18 on macOS 10.12.
Will likely work on a lot more versions, but we have not tested every combination.
- Requires basic knowledge of how to use the Brush Tool, Layers and the Actions Panel.

New in v2.6 and 2.7

- Replaced the Windows-plugins with the multi-threaded versions. Thanks to Francesco Pierfederici. This gives a performance boost (for the transformation itself, not the rest of the action). Error messages added to the readme-file.
- Version number and dates in the Actions have been updated to match the version of the plugins to avoid confusion.

New in v2 and 2.5

- **Added Mac-compatible plugins.** Thanks to Francesco Pierfederici.
- **The pattern suppressor is now also available on [Adobe Exchange](#).**
- **Added actions/plugins for processing color images/patterns.**
- Improved method for generating the suppression layer. It is more accurate, and subtracts the central “glow” to give much better results close to the central star.

Installation (Windows)

1. Copy `libfftwx64_3-3.dll` to your Photoshop installation folder. Usually this is `C:\Program Files\Adobe\Adobe Photoshop [version]\`
Optionally you can copy it to `C:\Windows\SysWOW64` instead.
2. Copy the 8bf-files to the Photoshop Plug-ins-folder. Usually this is `C:\Program Files\Adobe\Adobe Photoshop [version]\Plug-ins\`
3. Restart Photoshop if it was running.
4. Double-click `Pattern Suppressor v2.7.atn` to install the actions.
(You can also choose “Load Actions...” in your Actions Panel Menu).

The action set will be shown in your Actions Panel (can be found under *Window > Actions*).

The Plug-ins should show up under *Filter > RONC 2018* (but you shouldn't run those manually).

Installation (Mac)

1. Copy the plugin-files to the Photoshop Plug-ins-folder. By default this is `/Applications/Adobe Photoshop [version]/Plug-Ins`
2. Restart Photoshop if it was running.
3. Double-click `Pattern Suppressor v2.7.atn` to install the actions.
(You can also choose “Load Actions...” in your Actions Panel Menu).

The action set will be shown in your Actions Panel (can be found under *Window > Actions*).

The Plug-ins should show up under *Filter > RONC 2018* (but you shouldn't run those manually).

How to use

Use the actions for processing images. Don't run the filters manually.

The actions perform several additional processing steps automatically to help you get better results (padding, nyquist filtering and automatic suppression), and it should also save you a lot of time. It still allows manual input and tweaking if needed.

A video tutorial and demonstration can be found here: <https://youtu.be/FDM4IEw65j0>

If you want to work manually with Fourier Transformations for other purposes, we recommend you instead head over to github.com/rechmbrs/FtPattern. It includes more plugins, and scripts to help with the processing.

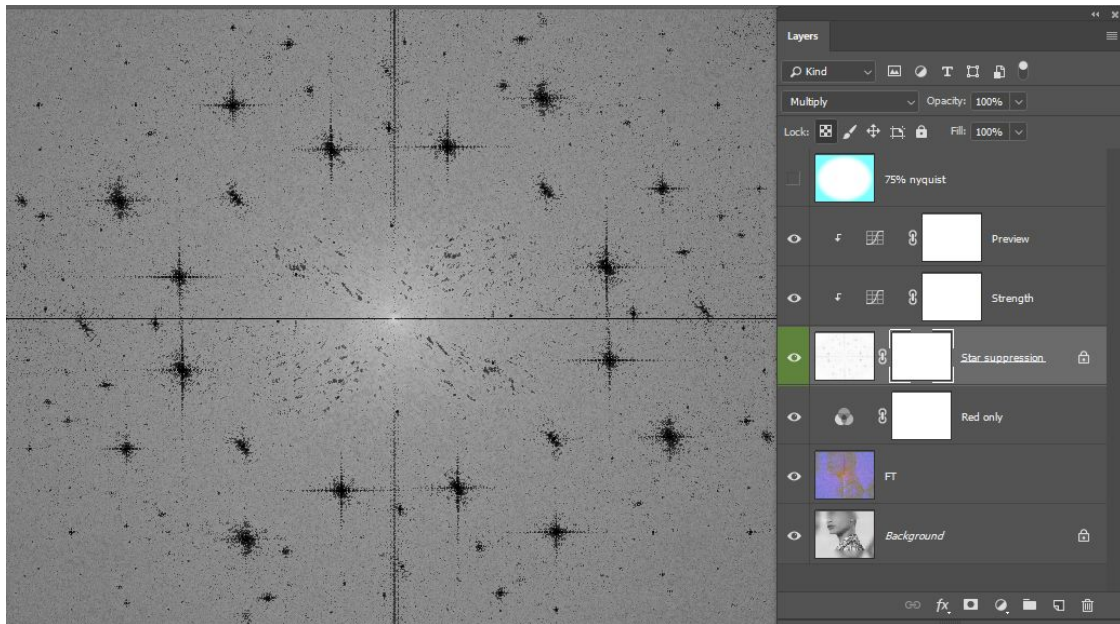
Short tutorial

We recommend watching the video, but here is the short version in written form:

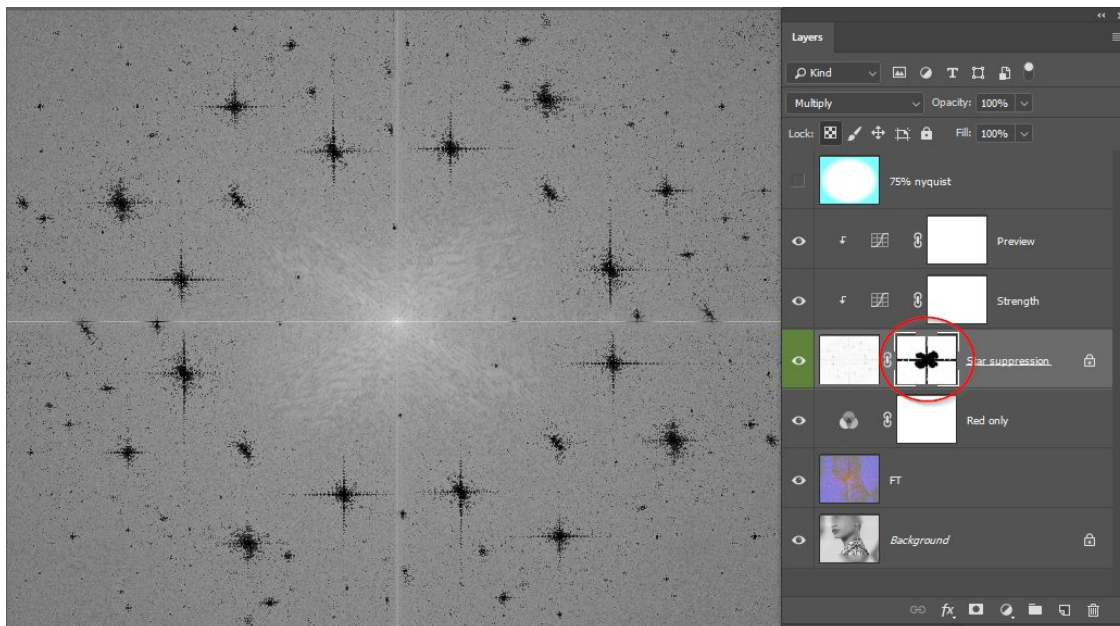
Grayscale images

The “Grayscale” actions will only process the luminosity of the image. Recommended for black and white images. If you have a tint you want to preserve you will have to blend that back in afterwards or process it like a Color image.

1. **Run one of the first two actions** (NORMAL is usually what you want).
Read the messages. The resulting image will typically look something like this:



2. As instructed by the action, use your brush tool to paint with black (on the current layer mask) to **reveal all features of the center star and the horizontal/vertical lines**, while keeping all other bright spots covered up. It should then look something like this:



Tip: If you reveal a bit too much, press X (switches foreground/background color) and paint over the area to bring the suppression back.

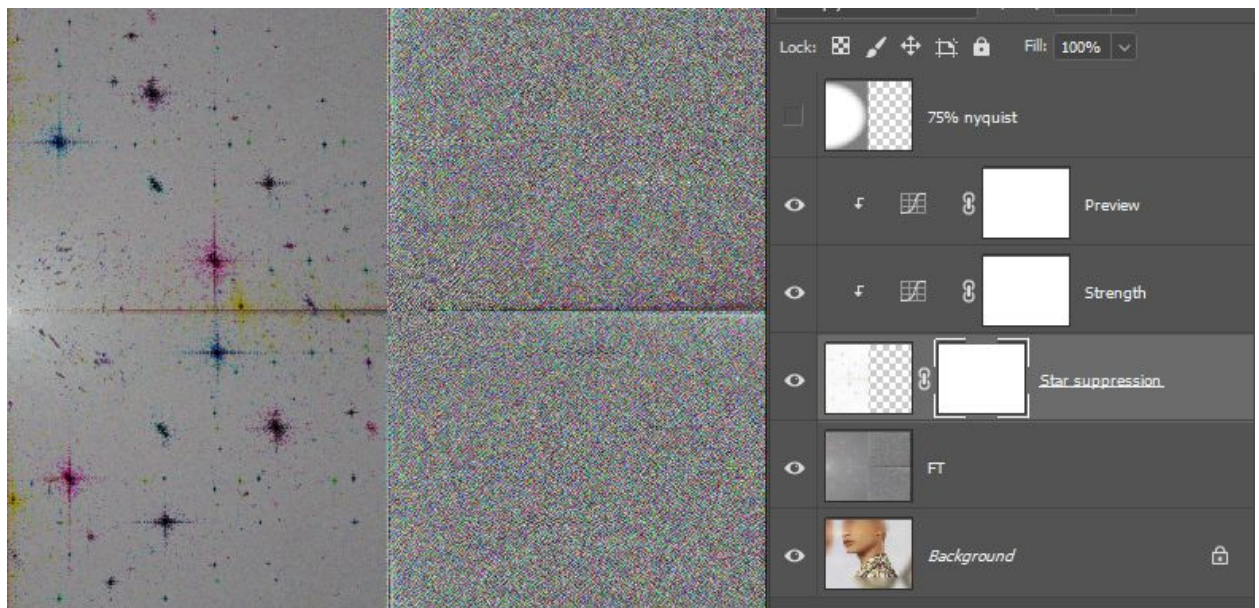
3. **Run the 2nd step “2 – Apply suppression”** to convert it back into a regular image.
Tip: If unhappy with the results, delete or hide the “iFt”-layer, and keep working on the “Star suppression” layer until happy (then run the 2nd step again).
4. **Run the 3rd step “3 – Merge & trim”**. This will remove the padding and delete the temporary layers.

When done, you will be left with two layers, your original image at the bottom, and the processed image on top.

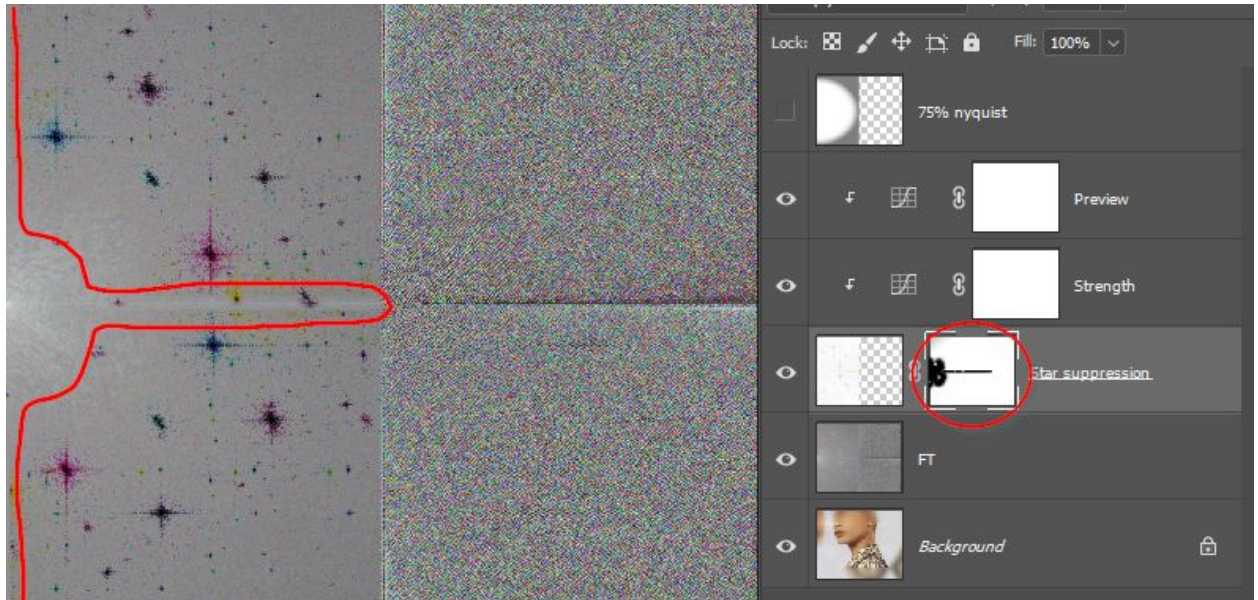
Color images

Choose either “per channel” or “3D” – they should give essentially identical results but we suggest trying “3D” for images with color patterns if unsure.

5. **Run one of the first two actions** (NORMAL is usually what you want).
Read the messages. The resulting image will typically look something like this:



6. As instructed by the action, use your brush tool to paint with black (on the current layer mask) to **reveal all features of the left center star and the horizontal/vertical lines**, while keeping all other bright spots covered up. Like this:



Tip: If you reveal a bit too much, press X (switches foreground/background color) and paint over the area with white to bring the suppression back.

7. **Run the 2nd step “2 – Apply suppression”** to convert it back into a regular image.
Tip: If unhappy with the results, delete or hide the “iFt”-layer, and keep working on the “Star suppression” layer until happy (then run the 2nd step again).
8. **Run the 3rd step “3 – Merge & trim”**. This will remove the padding and delete the temporary layers.

Normal vs. Aggressive

For most images, you want to use “Normal”. The Aggressive version will murder all fine details in the image – but you might still want that for certain types of images (like very heavy halftone patterns).

The only differences in the processing are the settings of the Curves layers. So if you want something in-between I suggest you start with the Aggressive version, then tweak the setting of the “Strength”-layer (typically by clipping the highlights slightly).

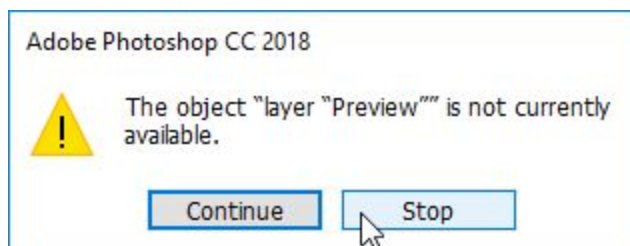
Here is a comparison between the default settings:



Error messages

Here are a few potential error messages, and their likely causes:

The object "layer "XXX"" is not currently available

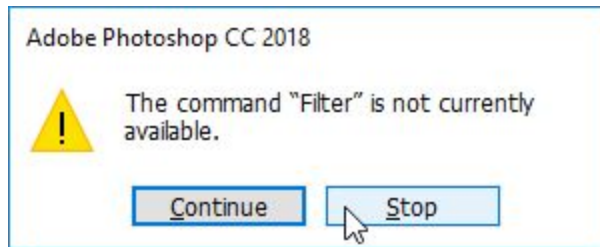


When running the actions, an error message like this will happen if the action is unable to find a layer it requires to function (The name "Preview" in the screenshot above will be replaced with

whatever layer it is unable to find). This would typically occur if you have accidentally deleted/renamed one or more vital layers during processing, or if you are running the actions in the wrong order.

Please see the tutorial for more information on how to use it correctly.

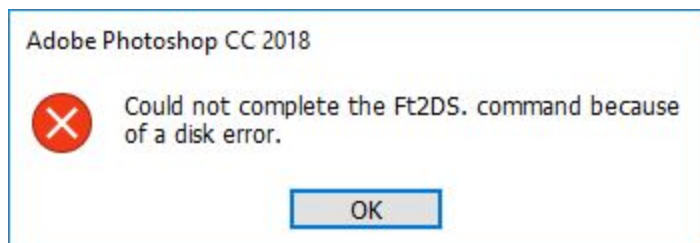
The command “Filter” is not currently available



When running any of the actions, this error message will occur if it cannot find one or more of the filters (plug-ins). This usually means you did not copy the filters to the correct folders, or you forgot to restart Photoshop after you did. Please verify that the plugins (filters) are in the correct folder for your version of Photoshop (and that you are using a 64-bit version of Photoshop that supports the filters).

If the filters are installed correctly, they should show up under *Filter > RONC 2018*.

Could not complete the XXX. command because of a disk error



This misleading error message will show up on Windows if *libfftwx64_3-3.dll* is missing. This usually means you did not copy the file to the correct folder, or you forgot to restart Photoshop after you did. Note that “Ft2DS” in the above screenshot is the name of the filter it was trying to run at the time, and will be different depending on what action/filter you were running.

Please verify that *libfftwx64_3-3.dll* is in the correct folder for the correct version of Photoshop.

How the magic works

This section is not required reading for using the actions. It is for those with an extra interest who want to learn more. It is also important information if you wish to understand and modify the actions.

Ft plug-ins

The plugins (filters) use a Fourier transformation to convert the current layer into the frequency domain. The inverse versions convert back. The plugins work on 8, 16 and 32-bit images, but 8-bit is *not* recommended as it does not have the precision required – you get noise generated by truncation errors (you will notice this mainly as unwanted brightness/contrast shifts after you convert it back). See github.com/rechmbrs/FtPattern for additional Fourier transform plugins, and a script for working with them.

The **Ft2DS**-filter (Fourier Transformation, 2D, Single channel) averages the channels before transformation. Frequency amplitudes are stored in the red channel, phase in the green channel, and the blue channel is used to store a copy of the input (but it is not actually used for anything). Note that the actions using this filter will use it on the Luminosity of the image.

The **Ft2DH**-filter (Fourier Transformation, 2D, Half width) performs the transformation per color channel. Frequency amplitudes are stored on the left half, phase on the right half. This can be done because the missing half is actually just a duplicate rotated 180 degrees (as you can see when running Ft2DS). The rightmost 2 columns of pixels from the input will be ignored, so you should pad the image before processing (it needs the 2 extra columns to store all the frequencies). This 2 column pad is performed automatically in the Pattern Suppression action.

The **Ft3DH**-filter (Fourier Transformation, 3D, Half width) performs the transformation in 3D space (the three channels being treated like X, Y, and Z-coordinates). Frequency amplitudes are stored on the left half, phase on the right half. The rightmost 2 columns of pixels from the input will be ignored, so you should pad the image before processing (it needs the 2 extra columns to store all the frequencies).

When an image is in the frequency domain you should see several bright stars/spots on the left side (or in the red channel for Ft2DS) if your image contains periodic repeating patterns.. Suppressing these frequencies by darkening those bright spots will lead to suppression of the patterns in the image. Note that the large star in the center, and the two lines that usually run through it, should NOT be suppressed (or your image will basically be destroyed).

The iFt-plugins convert the data back from the frequency domain into a regular image.

Action set

The action set aims to **drastically** speed up and simplify the process of suppressing the patterns in the image, and to perform additional processing that is normally missed by users but that will improve quality of the results (old tutorials will just tell you to paint over the spikes with a black or gray brush, but just doing that will give inferior results).

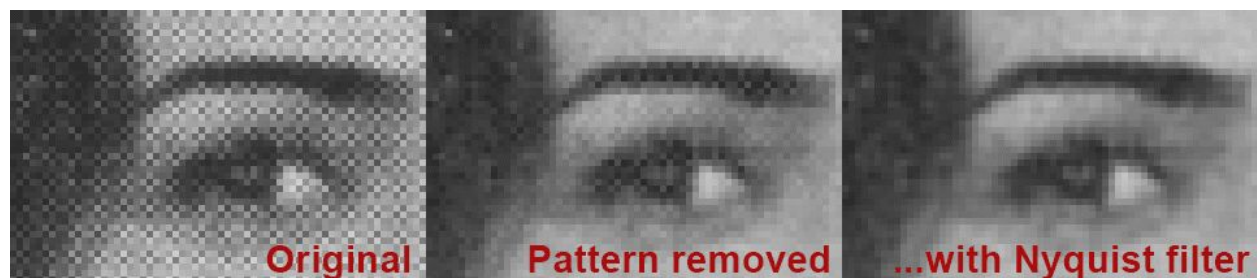
The first part of the action will start by padding the image before doing the Fourier Transformation. This will prevent a lot of the unwanted patterns at the image edges after performing pattern suppression, and padding is also required as the two rightmost columns of

pixels when doing the color transformations is needed for processing (and should not contain useful image data). It then duplicates the image layer (so you have a backup of the original) and performs the Fourier Transformation (using the chosen Ft plugin).

To automatically cover up the bright spots in the amplitude data (the source of repeating patterns in the image) the action will make a duplicate of the amplitude information and use radial blur (zoom+spin) to generate an image consisting only of the radial “glow”. This is then subtracted from another copy and squared, leaving isolated dark stars on a white background. It sets that to Multiply over the original amplitude to cancel out the bright spots. In short, it makes dark spots on top of the bright spots to suppress them. A curves layer is used to adjust the suppression to either avoid suppressing too much by clipping the highlights (“NORMAL suppression”), or to exaggerate the suppression by darkening it and not clip anything (“AGGRESSIVE suppression”). You can tweak the curves layer to e.g. get something in-between. It also makes a “Preview”-layer that on NORMAL makes the suppression easier to see while masking (but is ignored when processing)

Some features of the central star and the two lines that usually run through the middle are also covered up by the automatic suppression, so a layer mask is added and the user is asked to bring these back by painting on the mask (painting with black hides parts of the suppression layer).

On top it generates a layer with a Nyquist filter. This is an anti-aliasing filter that prevents unwanted artefacts from the highest frequencies during transformation (almost like moiré). It will have the most impact on images with extremely fine (per-pixel) details/patterns. The outer edges of the amplitude data represents the highest frequencies in the image, many of them are outside of the [Nyquist frequency](#) and this layer simply suppresses them by 50 % – with a gradual transition. The final image will be slightly softer with this filtering, but this should primarily be due to less high-frequency noise and pixel-sized artefacts (and hopefully not from lack of actual useful image details). You can set opacity to 0% or fill with white to disable it.



The 2nd action (“2 – Apply suppression”) will merge a copy of the relevant layers and run the inverse Fourier transformation on it. It keeps all the layers intact, so if unhappy with the results you can simply remove the “iFt”-layer and keep working on the pattern suppression layer.

Tip: Instead of deleting the layer, you can hide it (and I suggest renaming it as well). This lets you quickly make multiple suppression attempts and compare them.

The 3rd and final action will simply crop away the padding created in the first step, and remove all the extra layers used during the process. You will be left with your iFT-layer (and any extra versions you made) on top, and the original unaltered image at the bottom.

Source code

Source code, plugins for additional types of transformations, and a script for working with them, can be found at github.com/rechmbrs/FtPattern

Copyright

In short, these tools are free for personal and commercial use. Here are the details:

Fourier Transformation plugins

The copyright for the Ft2DS, Ft2DH, Ft3DH, iFt2DS, iFt2DH and iFt3DH plugins is an extension of the FFTw copyright and the assumed copyright for FFT_RGB routines from Alex Chirikov original source code while at Drexel University.

Modifications to FFT_RGB have been made by:

- Alex Chirokov
Drexel University, 2005
- Phil Thornton, www.mdr.co.nz
April 2010
- Ron Chambers, rechmbrs@gmail.com
February 2018
- Francesco Pierfederici, fpierfed@megabeets.com
August 2018

Release of the plugin-files as continuation of FFT_RGB routines FFT.8bf and IFFT.8bf. The 8bf routines are plugins for Adobe Photoshop and have used the Adobe Photoshop SDK routines**. Compilation and rules for coding were set by Microsoft Visual Studio 2017 Community.

The original Chirokov code was available in the public domain with no specific license attached. However, it makes use of the fftw library, which is published under the GNU license, which inter alia provides that any software using it must also be published under the GNU. This means you must publish the source, and it must be free.

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Pattern Suppressor actions

The actions were created by Jonas Madsen Rogne (jonas@rognemedia.no) aka Chain, with technical advice from Ronald Chambers (rechmbrs@gmail.com). You are free to modify and redistribute the actions. But you may not sell them or claim ownership.

Libfftwx64_3-3.dll

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In addition, we kindly ask you to acknowledge FFTw and its authors in any program or publication in which you use FFTw . (You are not required to do so; it is up to your common sense to decide whether you want to comply with this request or not.) For general publications, we suggest referencing: Matteo Frigo and Steven G. Johnson, “The design and implementation of FFTW3,” Proc. IEEE 93 (2), 216–231 (2005).

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