
Filters and artistic effects

Heloïse FABRE Alexandre JAMES - May 25, 2022

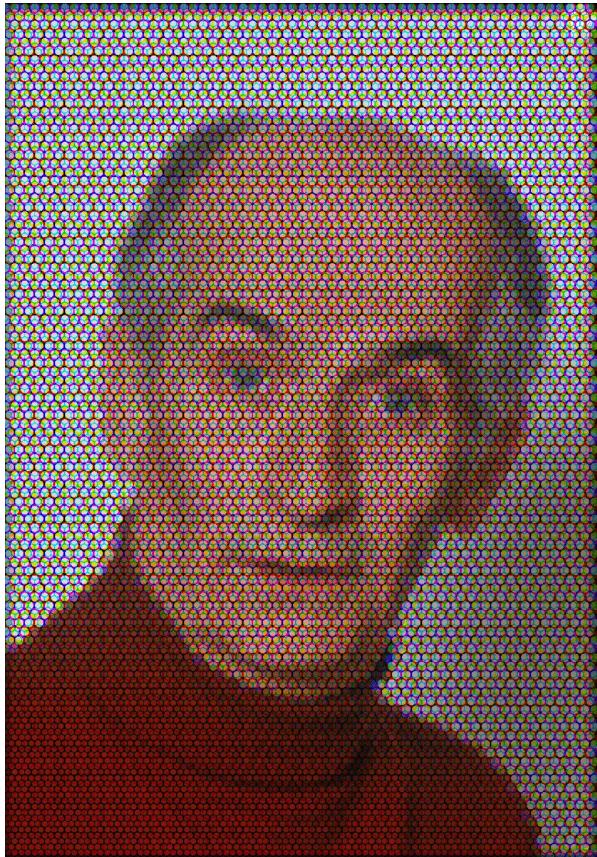
Cartoon filter

O1

Simple process:

- Edge detection
 - Laplacian of gaussian
- Reduction of the number of colors
 - Median cut
- Merge the two results





Dots filter

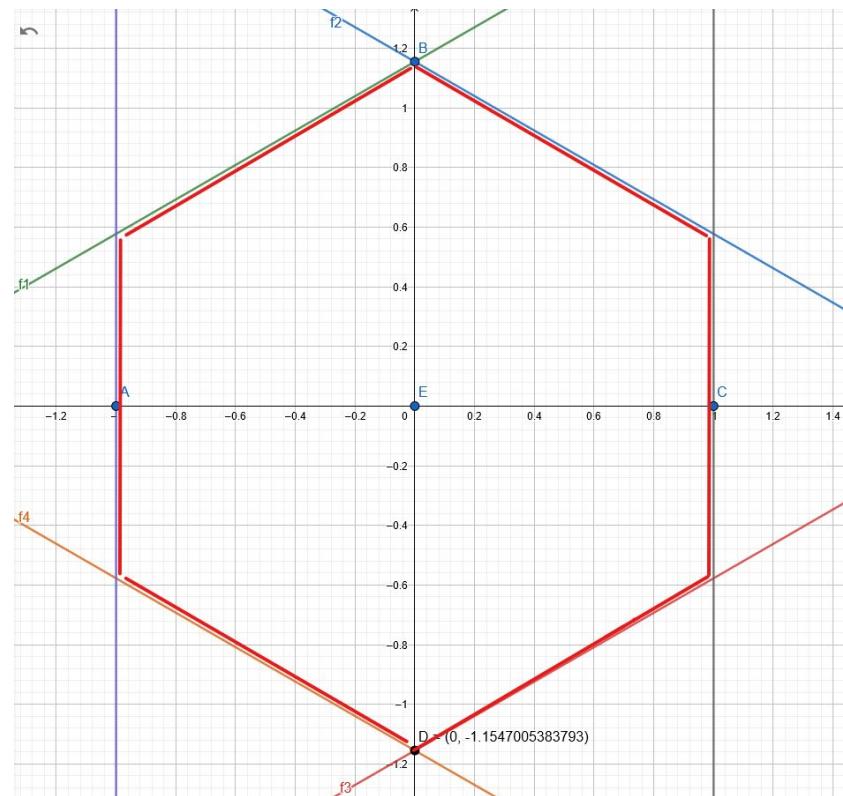
02

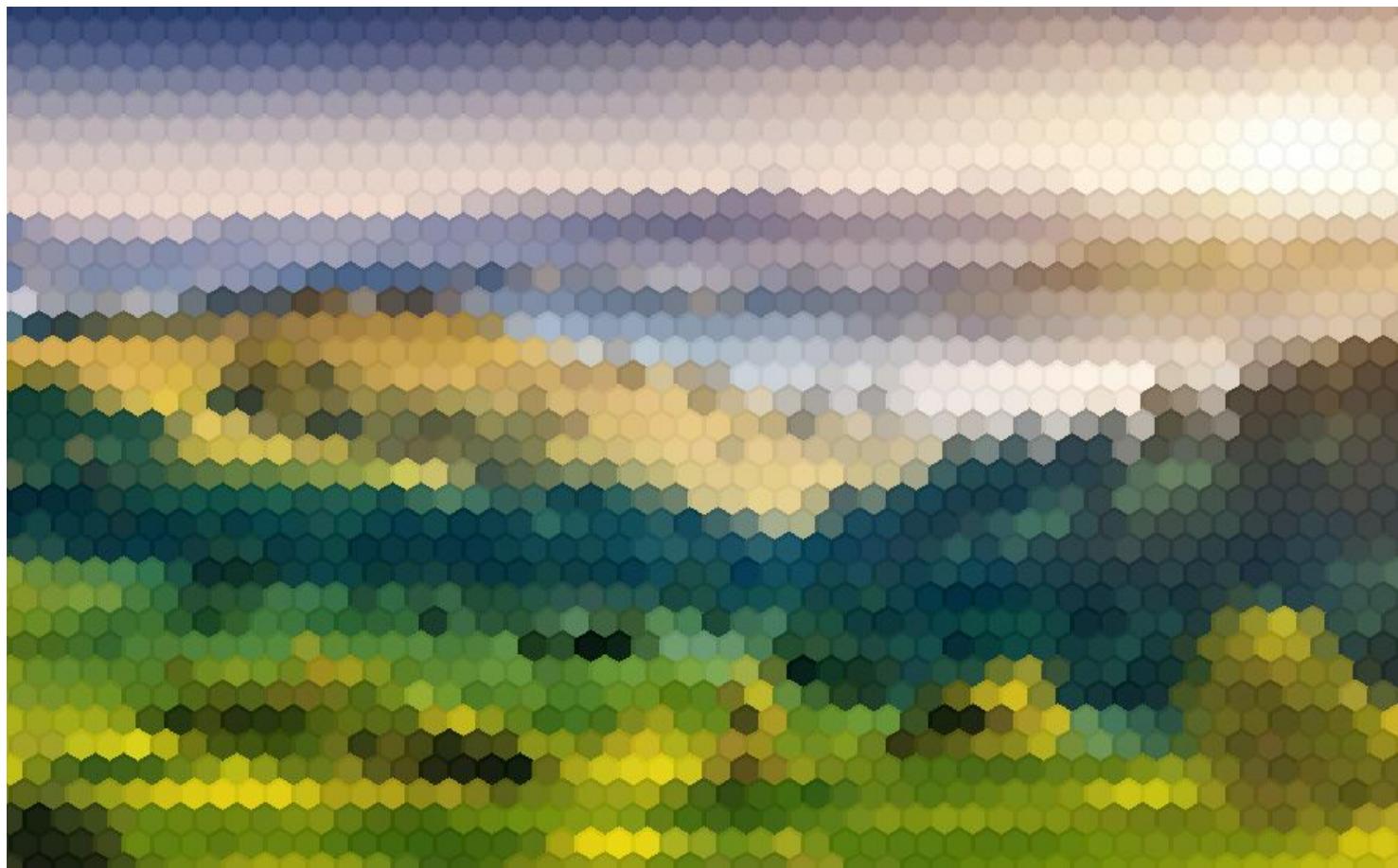
- 3 layers of aligned points for each channel of the image
- Each point has a uniform saturation given by the average of the pixels it covers
- Surprisingly detailed image for the few dots that make it up
- Pop art result

Honeycomb filter

03

- Process similar to the previous filter
- **Hexagon:** a more complex geometry than the disc
- Results in cells







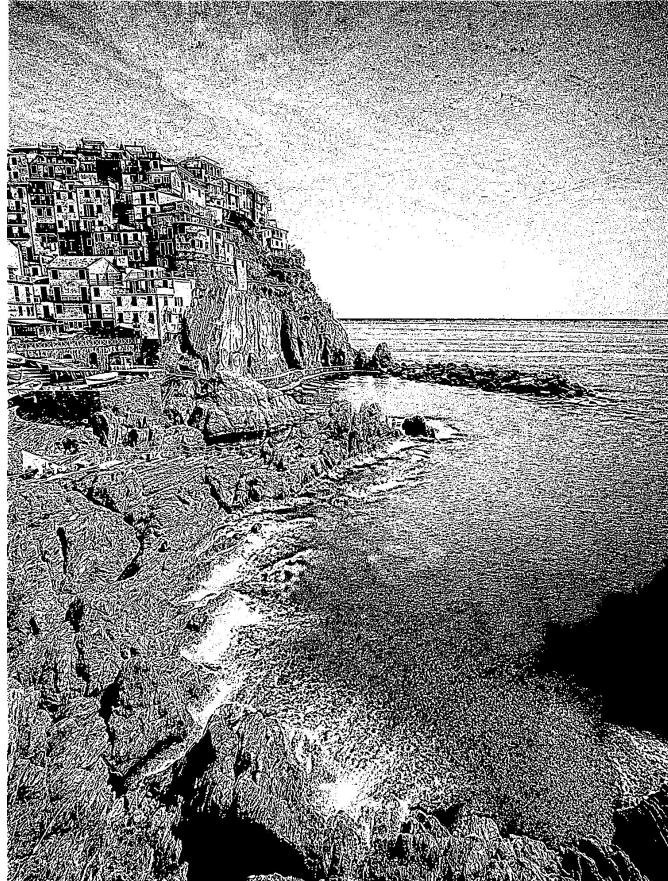
Glass tile filter

04

- Transformation $f(x, y) = (kx + \sin(x/k), ky + \sin(y/k))$
- Tendency to cluster pixels towards stable points
 - Points where the sine is zero
- Glass-like effect

Engraving filter

- Detecting edges
 - Difference of gaussian
- High contrast results
 - Linear histogram modification of the HSV
- Black or white pixels
- Engraving effect & interesting compression solution



Pixel art filter

06

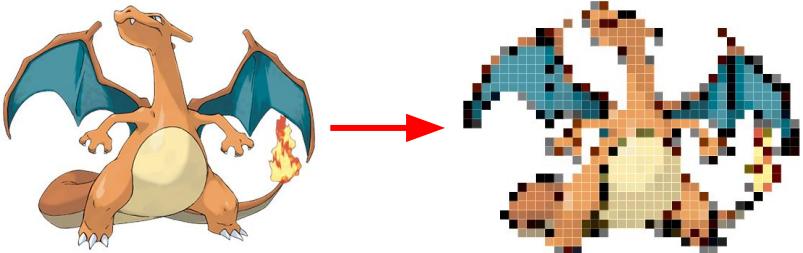
- Creation of mega pixels to reduce the resolution without changing the dimensions
- The color is given by the first pixel of the group and not by the average



Original



Objectif



- Added a grid that can be subdivided to enhance the pixel art effect
- Edges based on **laplacian of gaussian** to highlight the foreground
- Amplified by convolution of structuring element

Intermediate result



Final result



TV filter

07

- Deformation of the image into small horizontal waves
 - Transformation $f(x, y) = (kx + \sin(x/k), y)$
- Staggered red and green channels
 - Net dynamic effect in the center
- Noise using a salt-and-pepper blurred with a gaussian filter
- Horizontal lines
 - ± 10 of intensity in each color according to the sign of $\sin(ky / \text{width} + \text{height})$



TV filter

07

- Deformation of the image into small horizontal waves
 - Transformation $f(x, y) = (kx + \sin(x/k), y)$
- Staggered red and green channels
 - Net dynamic effect in the center
- Noise using a salt-and-pepper blurred with a gaussian filter
- Horizontal lines
 - ± 10 of intensity in each color according to the sign of $\sin(ky / \text{width} + \text{height})$

Features

- Make cuda: compile with the gpu version of convolution
- Filters and options all applicable with command line
- Construction of gif by varying a parameter over an interval
- Filters with variable parameters



→ App gathering all these filters!



format: ./artifo cartoon <image/all> <nb_colors> <monochrom?>
./artifo cartoon paysage.jpg [1,10,1] false





Demo

CONCLUSION

Artistic filters app

Different filters implemented

Technical details

→ Fun hands-on project :)

Qt application

Cartoon, Honeycomb, Glass, Pixel, TV, Dots, Engraving

Algorithms presented





Thank you for your attention

Heloïse FABRE Alexandre JAMES - May 25, 2022