# Table of Contents

# Title: IMAGE MANIPULATION WITH MATLAB

# Author: Filippo Valmori

# Date: 21/03/2023

# Reference: [1] Digital signal processing - Fundamentals and applications (Li Tan, 2013) [Ch.14]

```
close all
clearvars
clc
```

# PARAMETERS

```
ImageId = 'ex18_image.jpg';
      % Input image name and extension
Nbins = 10;
      % Number of bins for grey image equalization (NB: shall be between 1 and
 256)
Nclr = 4;
       % Number of colors of indexed-color image (NB: shall be between 1 and
 256)
SzK = 37;
      % Laplacian edge filter kerlel size
Sigma = 0.5;
      % Laplacian filter standard deviation
```

# PROCESSING

```
Xrgb = imread(ImageId);
      % Load RGB image

Xgrey = rgb2gray(Xrgb);
      % Convert RGB to grey-scale image
```

```matlab
Xequal = histeq(Xgrey,Nbins);
      % Equalize grey-scale image

[Xidx,MapO] = rgb2ind(Xrgb,Nclr);
      % Convert RGB to indexed-color image and extract color-map
MapG = MapO;
      % Create green color-map
MapG(:,1) = 0;
      % Remove red tones (R) from color-map
MapG(:,3) = 0;
      % Remove blue tones (R) from color-map
MapV = MapO;
      % Create violet color-map
MapV(:,2) = 0;
      % Remove green tones (R) from color-map

KernL = fspecial('log',SzK,Sigma);
      % Get Laplacian of Gaussian kernel for edge filtering
Xedge = filter2(KernL,im2double(Xgrey));
      % Convert grey-scaled image to double precision and then filter
```
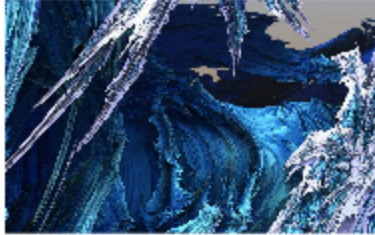
# RESULTS

```matlab
figure('Name','1. COLOR FILTERING','NumberTitle','off')
subplot(2,2,1)
imshow(Xrgb)
title('Original RGB')
subplot(2,2,2)
imshow(Xidx,MapO)
title(sprintf('Color-compressed (%d)',Nclr))
subplot(2,2,3)
imshow(Xidx,MapG)
title('Color-filtered (Green)')
subplot(2,2,4)
imshow(Xidx,MapV)
title('Color-filtered (Violet)')


figure('Name','2. EQUALIZATION','NumberTitle','off')
subplot(2,2,1)
imshow(Xgrey)
title('Gray')
subplot(2,2,2)
imshow(Xequal)
title(sprintf('Equalized-Gray (%d)',Nbins))
subplot(2,2,3)
imhist(Xrgb)
title('Histogram before equalization')
subplot(2,2,4)
imhist(Xequal)
title('Histogram after equalization')

figure('Name','3. EDGE FILTERING','NumberTitle','off')
```
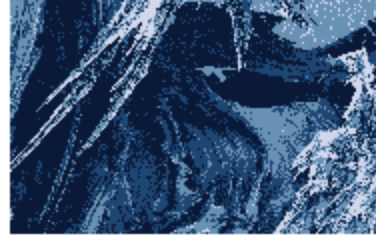
```
imshow(Xedge)
title('Laplacian edge-detected')
```
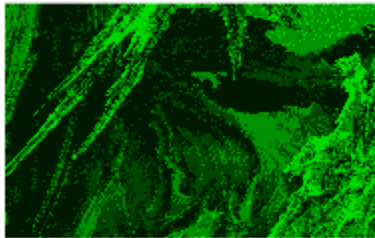


Original RGB

Color-compressed (4)

Color-filtered (Green)

Color-filtered (Violet)

## Gray



## Equalized-Gray (10)



## Histogram before equalization



## Histogram after equalization



**Laplacian edge-detected**



*Published with MATLAB® R2022a*