

# Writing Macros II

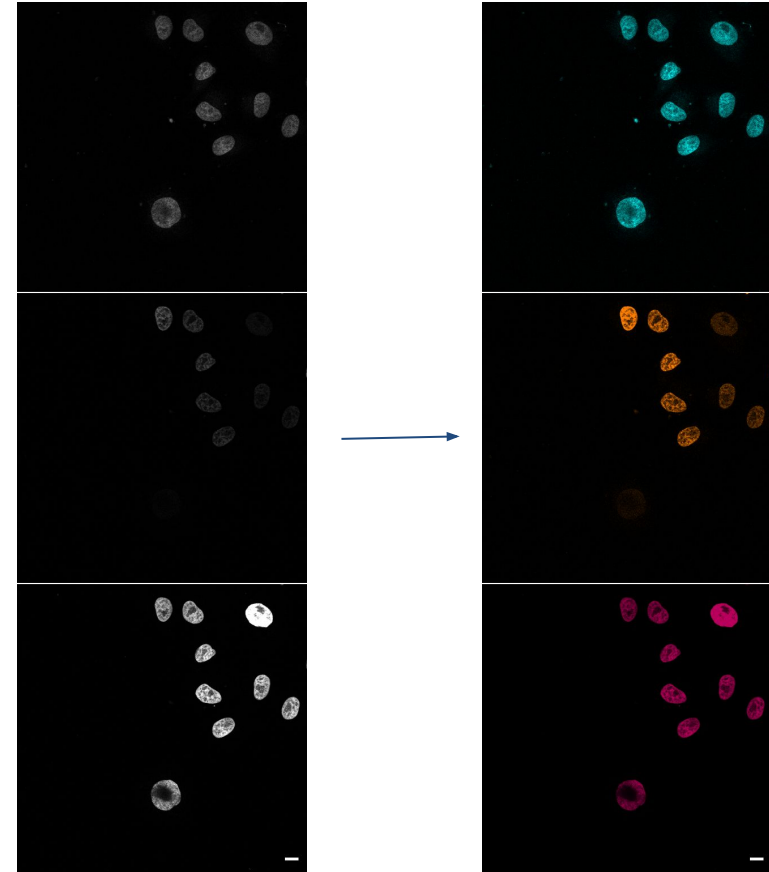
**Image Processing & Analysis for Life Scientists**

Olivier Burri, Romain Guiet & Arne Seitz

# Writing your own Macro

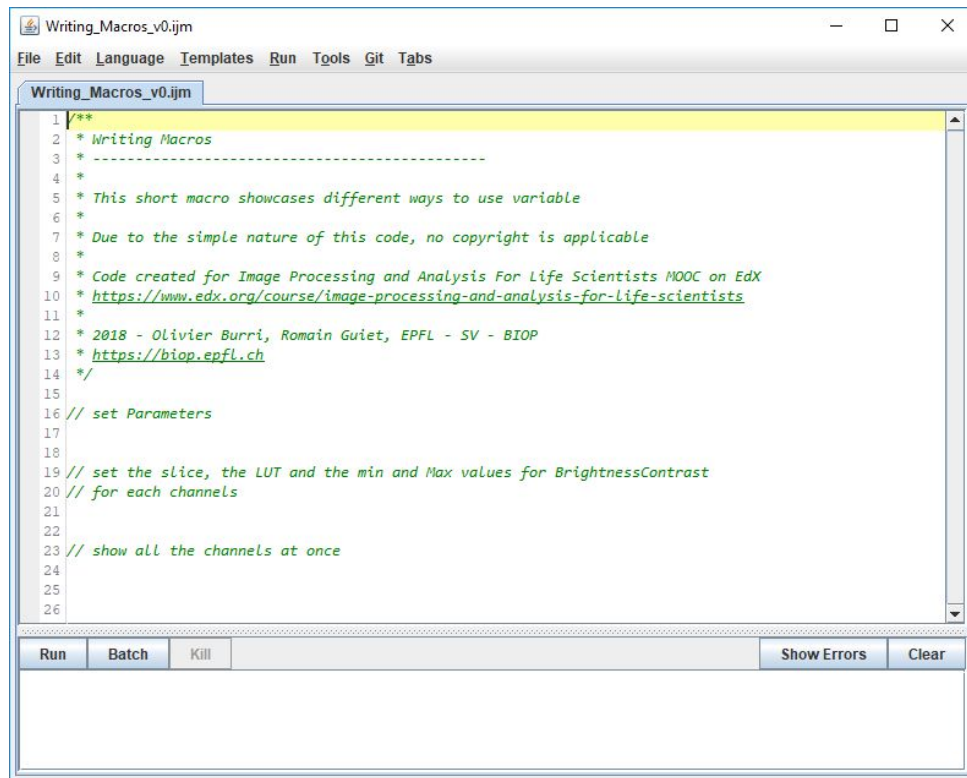
Suppose we have a series of images on which we want to:

1. Apply specific lookup tables
2. Adjust the brightness & contrast for each channel
3. Show all channels at once



# Writing Macros from Scratch

Begin by laying out your workflow  
using **comments**



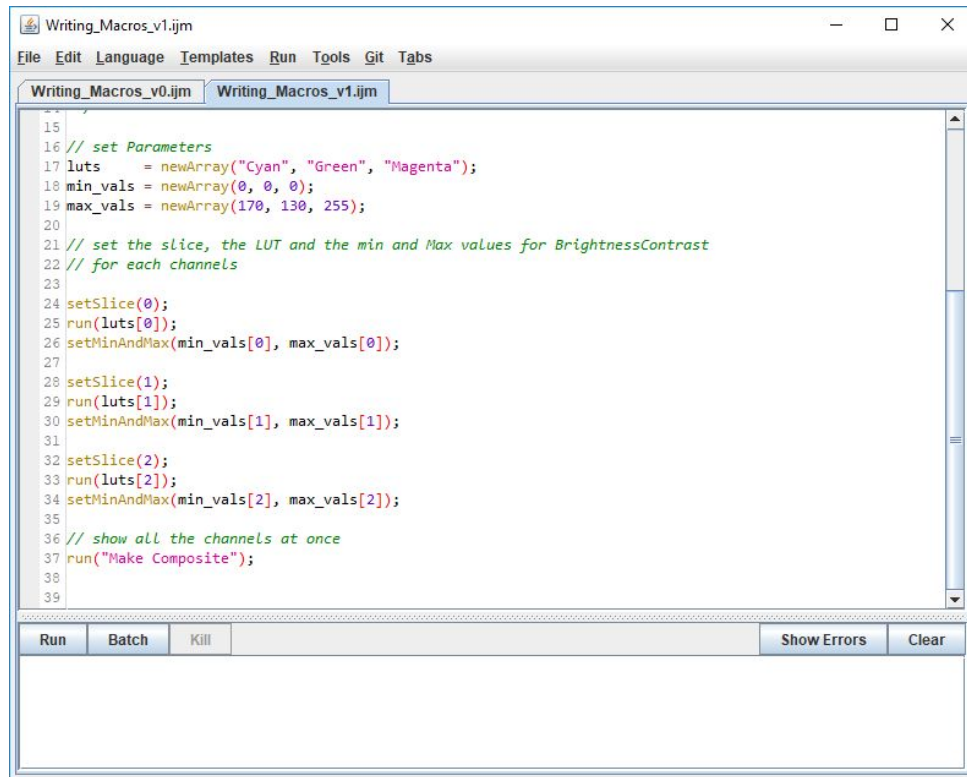
```
1 /**
2  * Writing Macros
3  * -----
4  *
5  * This short macro showcases different ways to use variable
6  *
7  * Due to the simple nature of this code, no copyright is applicable
8  *
9  * Code created for Image Processing and Analysis For Life Scientists MOOC on EdX
10  * https://www.edx.org/course/image-processing-and-analysis-for-life-scientists
11  *
12  * 2018 - Olivier Burri, Romain Guet, EPFL - SV - BIOP
13  * https://biop.epfl.ch
14  */
15
16 // set Parameters
17
18
19 // set the slice, the LUT and the min and Max values for BrightnessContrast
20 // for each channels
21
22
23 // show all the channels at once
24
25
26
```

# Writing Macros from Scratch

Write your code between the comments. This code is very similar the the first one you made in the previous slides.

This code already works.

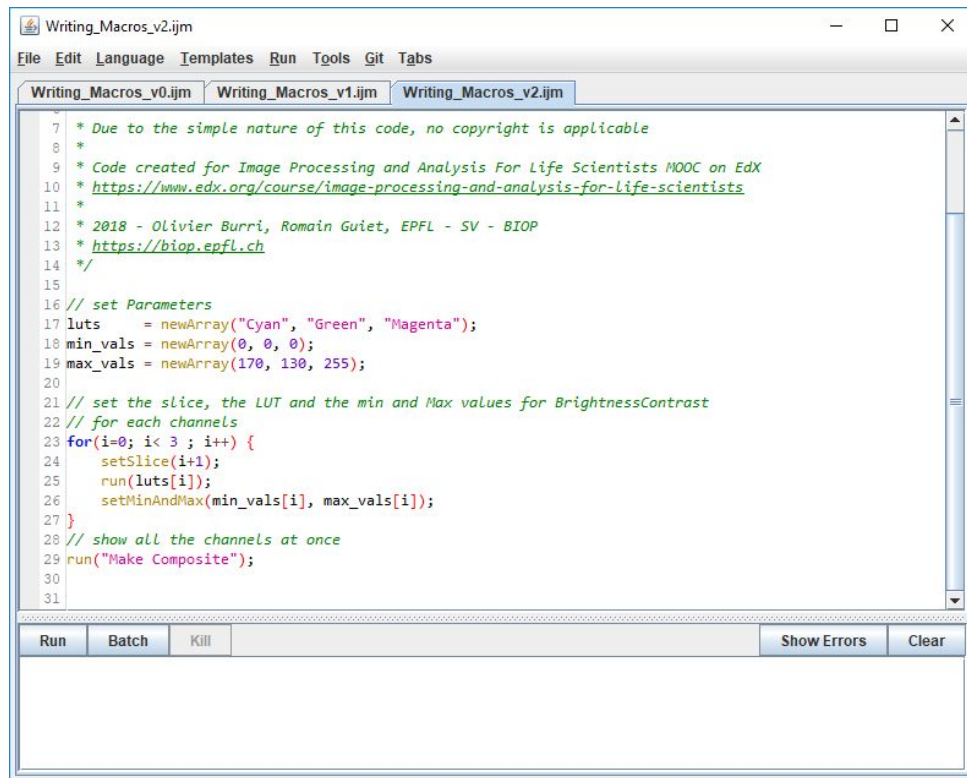
**Now you can make it more generic**



```
Writing_Macros_v1.ijm
File Edit Language Templates Run Tools Git Tabs
Writing_Macros_v0.ijm Writing_Macros_v1.ijm
15
16 // set Parameters
17 luts = newArray("Cyan", "Green", "Magenta");
18 min_vals = newArray(0, 0, 0);
19 max_vals = newArray(170, 130, 255);
20
21 // set the slice, the LUT and the min and Max values for BrightnessContrast
22 // for each channels
23
24 setSlice(0);
25 run(luts[0]);
26 setMinAndMax(min_vals[0], max_vals[0]);
27
28 setSlice(1);
29 run(luts[1]);
30 setMinAndMax(min_vals[1], max_vals[1]);
31
32 setSlice(2);
33 run(luts[2]);
34 setMinAndMax(min_vals[2], max_vals[2]);
35
36 // show all the channels at once
37 run("Make Composite");
38
39
Run Batch Kill Show Errors Clear
```

# Writing Macros from Scratch

The repeating parts of the code have been placed in a **for** Loop

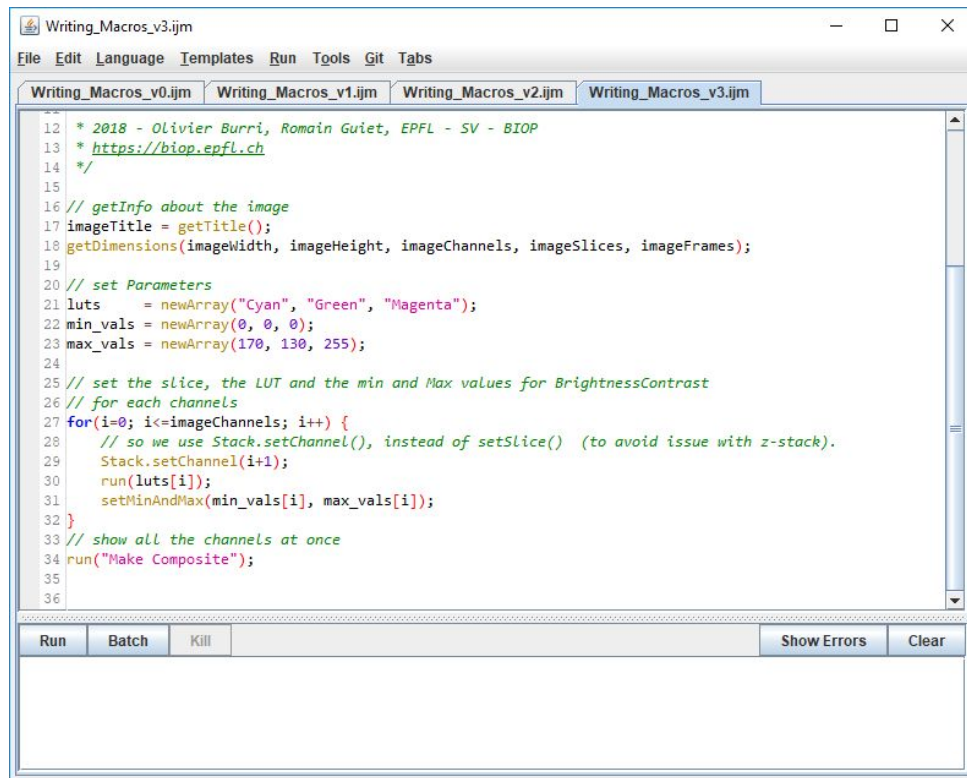


```
Writing_Macros_v2.ijm
File Edit Language Templates Run Tools Git Tabs
Writing_Macros_v0.ijm Writing_Macros_v1.ijm Writing_Macros_v2.ijm
7  * Due to the simple nature of this code, no copyright is applicable
8  *
9  * Code created for Image Processing and Analysis For Life Scientists MOOC on EdX
10 * https://www.edx.org/course/image-processing-and-analysis-for-life-scientists
11 *
12 * 2018 - Olivier Burri, Romain Guet, EPFL - SV - BIOP
13 * https://biop.epfl.ch
14 */
15
16 // set Parameters
17 luts    = newArray("Cyan", "Green", "Magenta");
18 min_vals = newArray(0, 0, 0);
19 max_vals = newArray(170, 130, 255);
20
21 // set the slice, the LUT and the min and Max values for BrightnessContrast
22 // for each channels
23 for(i=0; i< 3 ; i++) {
24     setSlice(i+1);
25     run(luts[i]);
26     setMinAndMax(min_vals[i], max_vals[i]);
27 }
28 // show all the channels at once
29 run("Make Composite");
30
31
Run Batch KIII Show Errors Clear
```

# Writing Macros from Scratch

To account for the possibility of multiple channels:

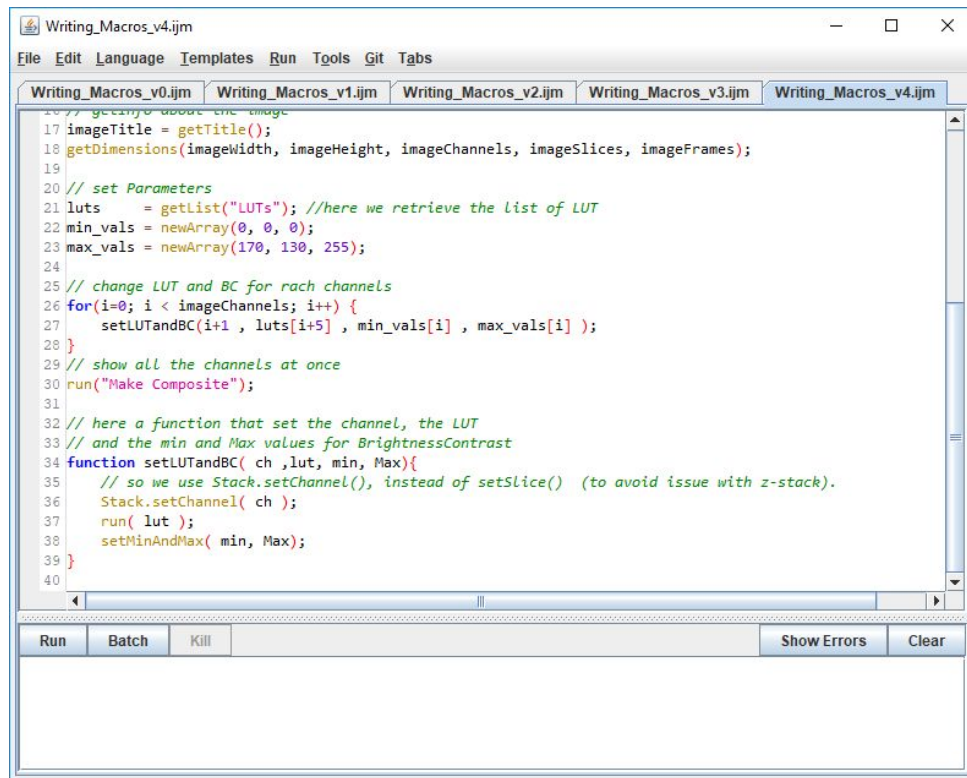
- We get the dimensions of the image to know the number of channels using **getDimensions()**
- We use **Stack.setChannel()** instead of **setSlice()** which will not work in case of hyperstacks.



```
12 * 2018 - Olivier Burri, Romain Guet, EPFL - SV - BIOP
13 * https://biop.epfl.ch
14 */
15
16 // getInfo about the image
17 imageTitle = getTitle();
18 getDimensions(imageWidth, imageHeight, imageChannels, imageSlices, imageFrames);
19
20 // set Parameters
21 luts = newArray("Cyan", "Green", "Magenta");
22 min_vals = newArray(0, 0, 0);
23 max_vals = newArray(170, 130, 255);
24
25 // set the slice, the LUT and the min and Max values for BrightnessContrast
26 // for each channels
27 for(i=0; i<=imageChannels; i++) {
28     // so we use Stack.setChannel(), instead of setSlice() (to avoid issue with z-stack).
29     Stack.setChannel(i+1);
30     run(luts[i]);
31     setMinAndMax(min_vals[i], max_vals[i]);
32 }
33 // show all the channels at once
34 run("Make Composite");
35
36
```

# Writing Macros from Scratch

- To encapsulate functionality, we create a function to set the lookup table and display
- It is then used in the loop



```
Writing_Macros_v4.ijm
File Edit Language Templates Run Tools Git Tabs
Writing_Macros_v0.ijm Writing_Macros_v1.ijm Writing_Macros_v2.ijm Writing_Macros_v3.ijm Writing_Macros_v4.ijm

16 // getting info about the image
17 imageTitle = getTitle();
18 getDimensions(imageWidth, imageHeight, imageChannels, imageSlices, imageFrames);
19
20 // set Parameters
21 luts = getList("LUTs"); //here we retrieve the list of LUT
22 min_vals = newArray(0, 0, 0);
23 max_vals = newArray(170, 130, 255);
24
25 // change LUT and BC for each channels
26 for(i=0; i < imageChannels; i++) {
27     setLUTandBC(i+1, luts[i+5], min_vals[i], max_vals[i]);
28 }
29 // show all the channels at once
30 run("Make Composite");
31
32 // here a function that set the channel, the LUT
33 // and the min and Max values for BrightnessContrast
34 function setLUTandBC( ch, lut, min, Max){
35     // so we use Stack.setChannel(), instead of setSlice() (to avoid issue with z-stack).
36     Stack.setChannel( ch );
37     run( lut );
38     setMinAndMax( min, Max);
39 }
40
```

Run Batch PSIII Show Errors Clear