

Activity 3: Image Types and Formats

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Applied Physics 186

4 Basic Types of Digitized Image

Binary Image



i **Image Properties**
[Binary Image] (imported)-1

Properties Color Profile Comment

Size in pixels: 350 × 258 pixels
Print size: 29.63 × 21.84 millimeters
Resolution: 300 × 300 ppi
Color space: Grayscale
Precision: 8-bit gamma integer

File Name: /Users/kleo... Image.png
File Size: 3.4 kB
File Type: PNG image

Size in memory: 424.0 kB
Undo steps: None
Redo steps: None

Number of pixels: 90300
Number of layers: 1
Number of channels: 0
Number of paths: 0

4 Basic Types of Digitized Image

Grayscale Image



i **Image Properties**
[Grayscale Image] (imported)-2

Properties **Color Profile** **Comment**

Size in pixels: 768 × 576 pixels
Print size: 65.02 × 48.77 millimeters
Resolution: 300 × 300 ppi
Color space: Grayscale
Precision: 8-bit gamma integer

File Name: /Users/kleo... Image.jpg
File Size: 113.3 kB
File Type: JPEG image

Size in memory: 3.4 MB
Undo steps: 1 (1.3 MB)
Redo steps: None

Number of pixels: 442368
Number of layers: 1
Number of channels: 0
Number of paths: 0

Image taken from google search

4 Basic Types of Digitized Image

Truecolor Image



i Image Properties
[Truecolor Image] (imported)-5

Properties Color Profile Comment

Size in pixels: 4608 × 3456 pixels
Print size: 390.14 × 292.61 millimeters
Resolution: 300 × 300 ppi
Color space: RGB color
Precision: 8-bit gamma integer

File Name: /Users/kleo/D... Image.JPG
File Size: 3.2 MB
File Type: JPEG image

Size in memory: 148.4 MB
Undo steps: None
Redo steps: None

Number of pixels: 15925248
Number of layers: 1
Number of channels: 0
Number of paths: 0

Image taken by me

4 Basic Types of Digitized Image

Indexed Image



Image Properties
[Indexed Image] (imported)-3

Properties Color Profile Comment

Size in pixels: 150 × 200 pixels
Print size: 12.70 × 16.93 millimeters
Resolution: 300 × 300 ppi
Color space: Indexed color (256 colors)
Precision: 8-bit gamma integer

File Name: /Users/kleo/... Image.png
File Size: 25.6 kB
File Type: PNG image

Size in memory: 243.4 kB
Undo steps: None
Redo steps: None

Number of pixels: 30000
Number of layers: 1
Number of channels: 0
Number of paths: 0

4 Advanced Types of Digitized Image

High Dynamic Range (HDR) Image



** we can see an increased detail in the highlights and shadows of the picture taken in HDR

Image taken from viewsonic.com

i Image Properties
[HDR Image] (imported)-8

Properties **Color Profile** **Comment**

Size in pixels: 1299 x 866 pixels
Print size: 165.0 x 110.0 millimeters
Resolution: 200 x 200 ppi
Color space: RGB color
Precision: 8-bit gamma integer

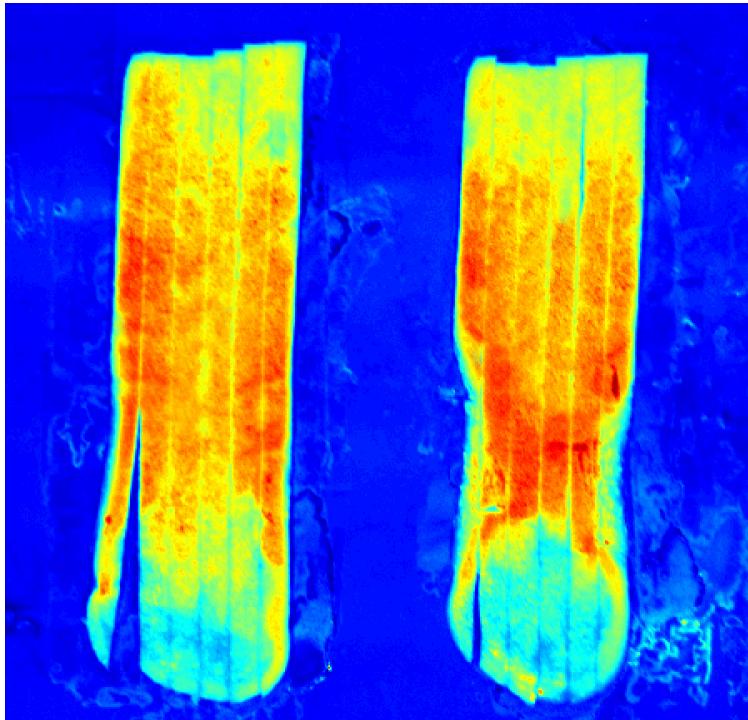
File Name: /Users/kleo... Image.jpg
File Size: 167.8 kB
File Type: JPEG image

Size in memory: 10.5 MB
Undo steps: None
Redo steps: None

Number of pixels: 1124934
Number of layers: 1
Number of channels: 0
Number of paths: 0

4 Advanced Types of Digitized Image

Hyperspectral Image



This is what the image looks like but the original file cannot be read by GIMP because you need a programming software in order to read it

Image Properties
[Hyperspectral image] (imported)-11

Properties Color Profile Comment

Size in pixels: 900 × 862 pixels
Print size: 93.7 × 89.7 millimeters
Resolution: 244 × 244 ppi
Color space: RGB color
Precision: 8-bit gamma integer
File Name: /Users/kle... image.jpg
File Size: 892.5 kB
File Type: JPEG image

Size in memory: 7.2 MB
Undo steps: None
Redo steps: None

Number of pixels: 775800
Number of layers: 1
Number of channels: 0
Number of paths: 0

Image Properties
[Hyperspectral image] (imported)-11

Properties Color Profile Comment

sRGB IEC61966-2.1
IEC 61966-2.1 Default RGB colour space - sRGB
Manufacturer: IEC <http://www.iec.ch>
Copyright: Copyright (c) 1998 Hewlett-Packard Company

4 Advanced Types of Digitized Image

3D Image



Image Properties
[3D Image] (imported)-13

Properties Color Profile Comment

Size in pixels: 255 x 164 pixels
Print size: 21.59 x 13.89 millimeters
Resolution: 300 x 300 ppi
Color space: RGB color
Precision: 8-bit gamma integer

File Name: /Users/kleo... Image.jpg
File Size: 7.8 kB
File Type: JPEG image

Size in memory: 393.4 kB
Undo steps: None
Redo steps: None

Number of pixels: 41820
Number of layers: 1
Number of channels: 0
Number of paths: 0

4 Advanced Types of Digitized Image

Temporal Image



Image Properties
[temporal image] (imported)-15

Properties Color Profile Comment

Size in pixels: 462 × 352 pixels
Print size: 39.12 × 29.80 millimeters
Resolution: 300 × 300 ppi
Color space: RGB color
Precision: 8-bit gamma integer

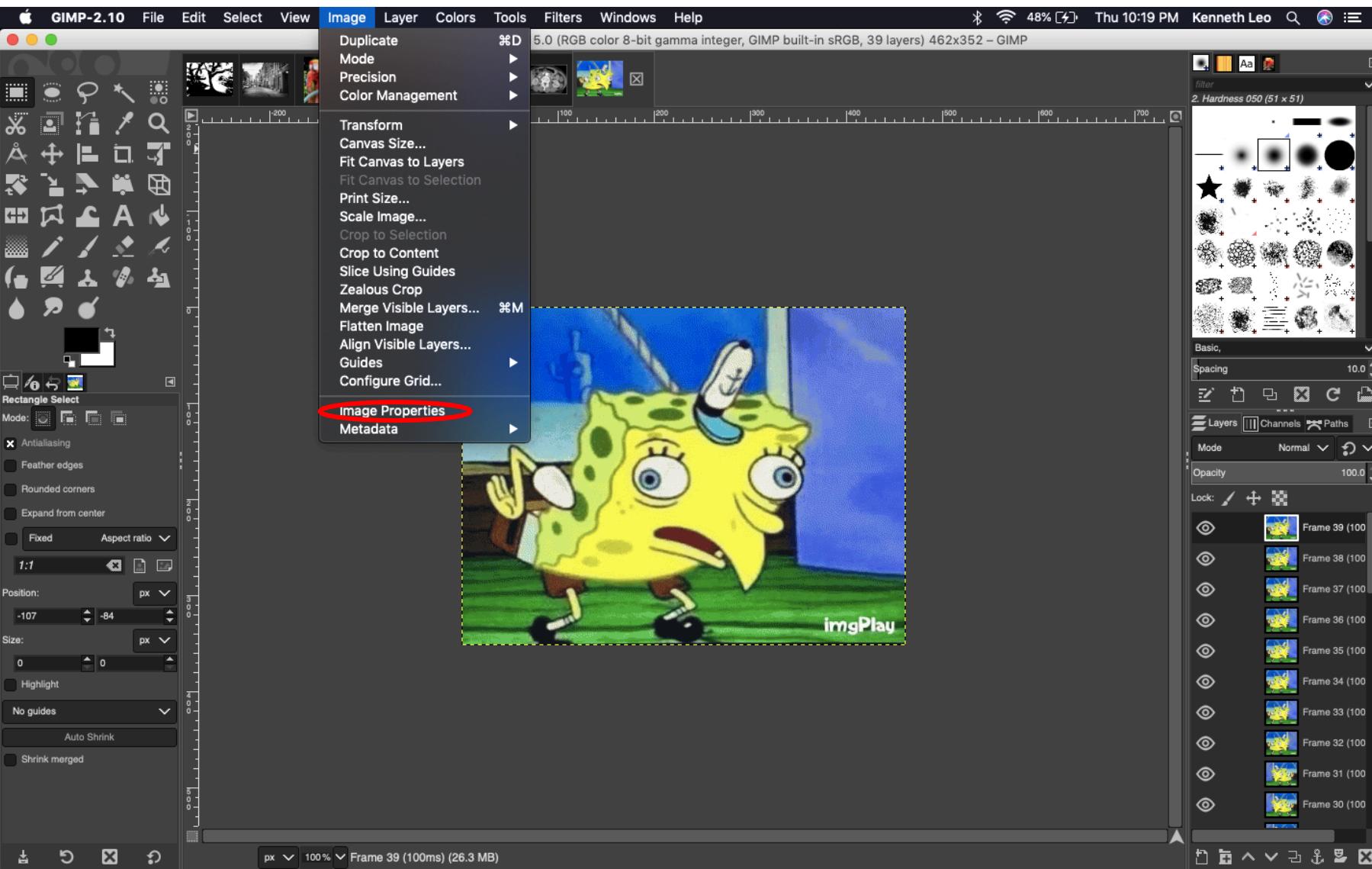
File Name: /Users/kleo...al image.gif
File Size: 2.5 MB
File Type: GIF image

Size in memory: 26.3 MB
Undo steps: None
Redo steps: None

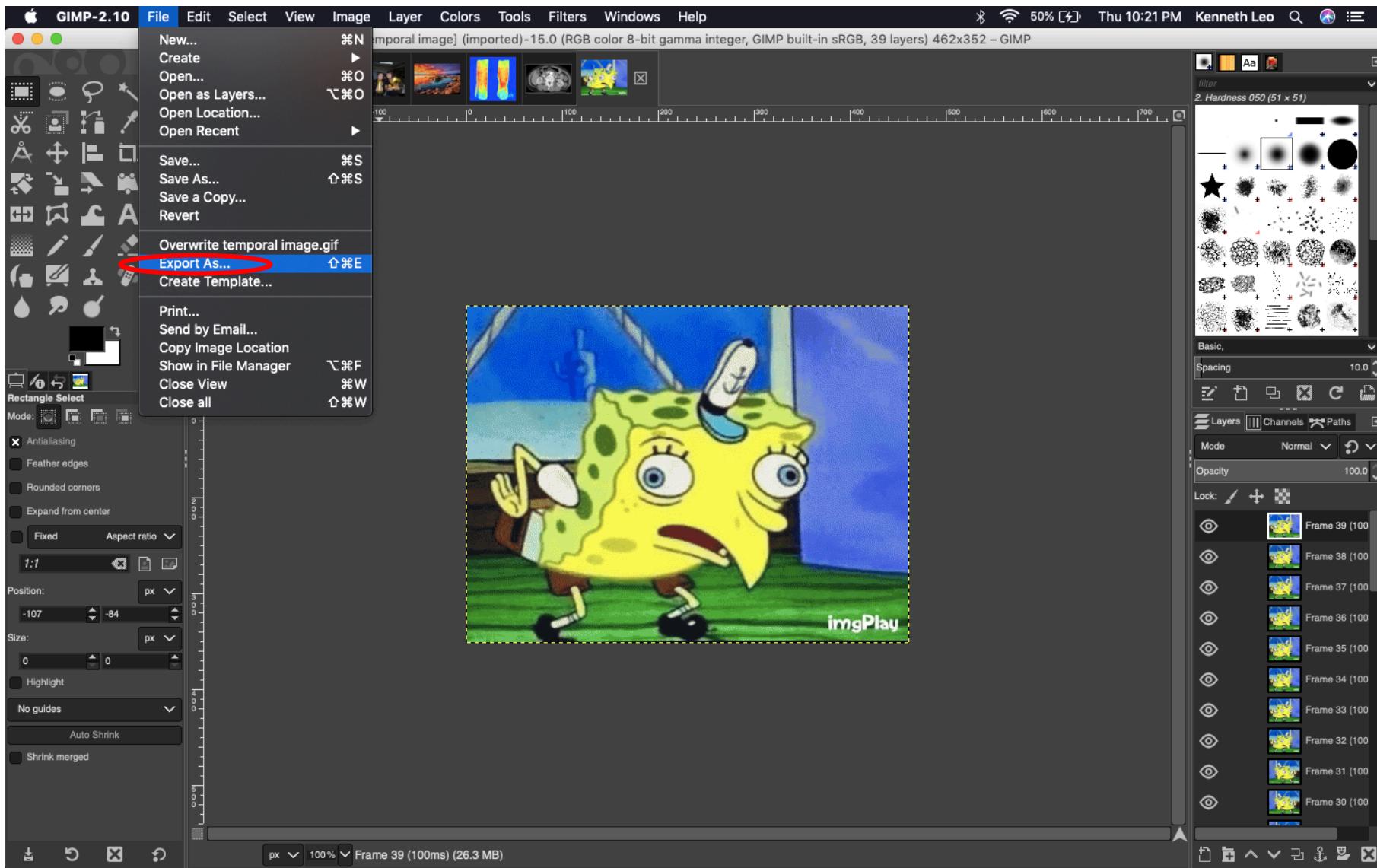
Number of pixels: 162624
Number of layers: 39
Number of channels: 0
Number of paths: 0

More layers because of compression of 'multiple single images'!

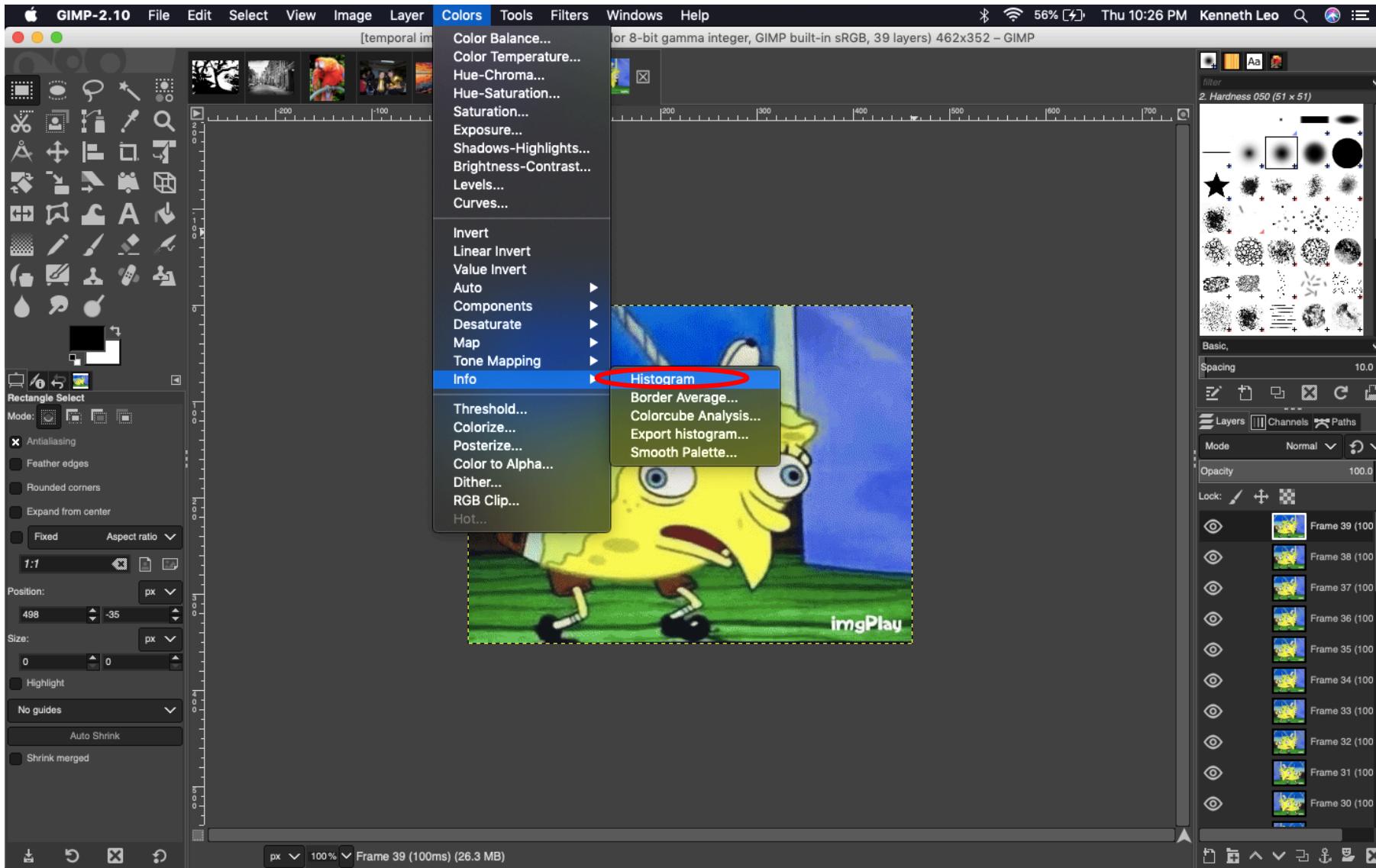
Where to find? *Image Properties*



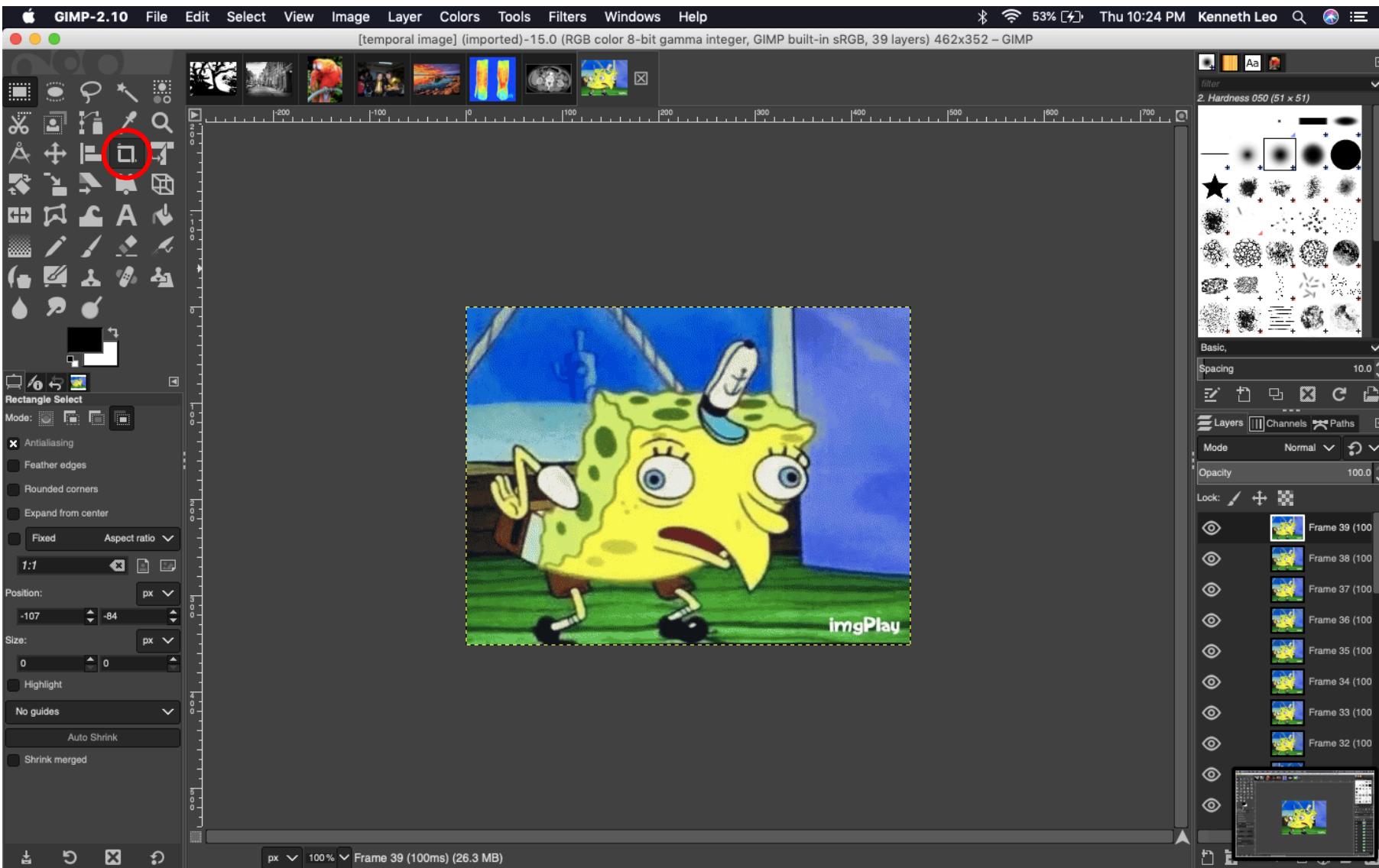
Where to find? *Export/Make a Copy*



Where to find? *Image Properties*



Where to find? *Crop*



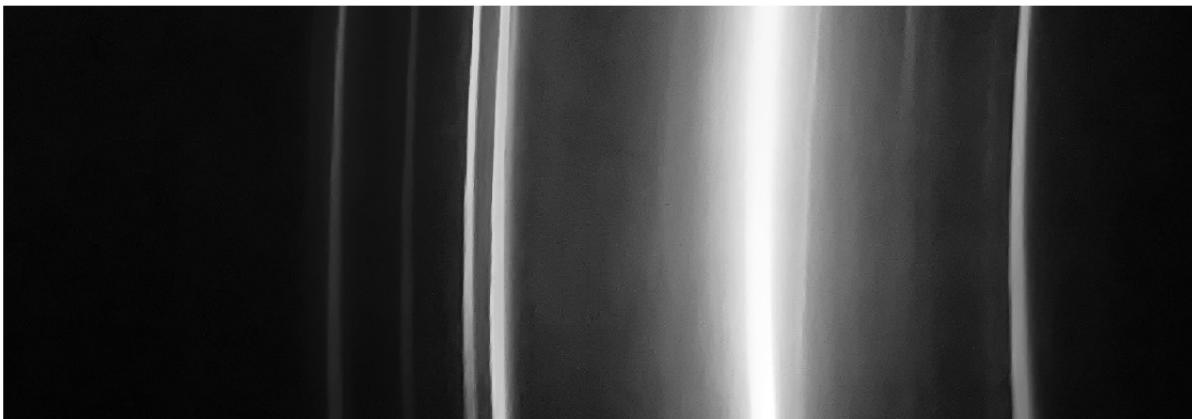
Truecolor Image



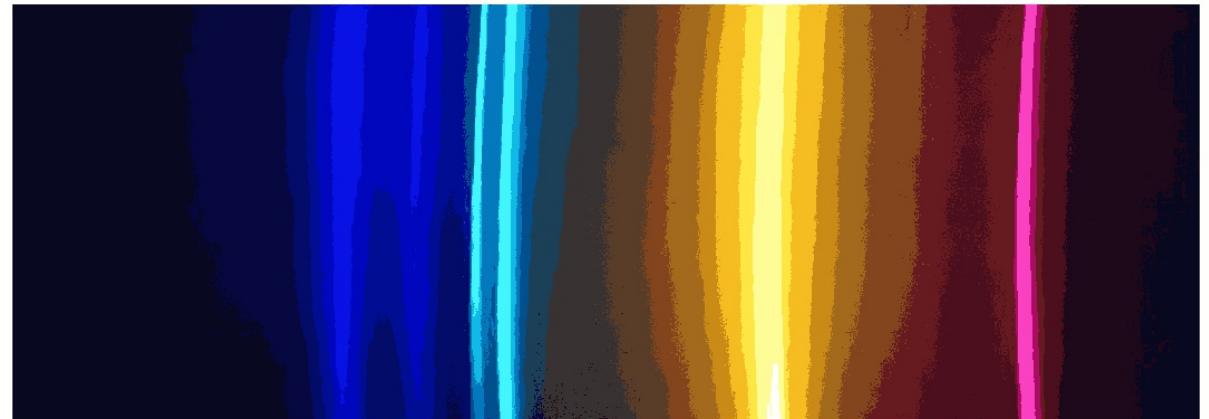
Binary Image



Grayscale Image



Indexed Image



| | | | |
|---------------|-------------------|--------|------------|
| indexed.jpg | Today at 10:57 PM | 82 KB | JPEG image |
| truecolor.jpg | Today at 10:57 PM | 107 KB | JPEG image |
| binary.jpg | Today at 10:57 PM | 39 KB | JPEG image |
| grayscale.jpg | Today at 10:56 PM | 97 KB | JPEG image |

We can see that the truecolor image has the highest file size. This is because it contains the most information out of the four. On the other hand, the binary image has the smallest file size due to the fact that the image is just a 2D array composed of 0s and 1s.

Truecolor image – has the most complete details

Binary image – composed of black and white color only, no other colors found

Grayscale image – A grayed version of the truecolor, not purely black and white

Indexed image – colors have been limited depending on the number of indices you used, the indices kind of represent the number of bins you divided the colormap into.

** I created the binary, grayscale, and indexed images in Python using Jupyter notebook. The code I wrote only requires the truecolor image as the input. My notebook file can be viewed and downloaded here: <http://tiny.cc/Activity3AP186>

Common Image File Formats

Source: <https://guides.lib.umich.edu/c.php?g=282942&p=1885348> and <https://www.widen.com/blog/whats-the-difference-between-png-jpeg-gif-and-tiff>

- JPEG
 - **Pros:** Used for websites and e-mails because of its small file size.
 - **Cons:** Some information can be lost because of compression
 - **Extension:** .jpg, .jpeg
- PNG
 - **Pros:** Compressed but without loss of quality. Transparent. Best used for logos, charts, and diagrams.
 - **Cons:** Cannot be used when sharing high-quality resolution photos on the web
 - **Extension:** .png

Common Image File Formats

Source: <https://guides.lib.umich.edu/c.php?g=282942&p=1885348> and <https://www.widen.com/blog/whats-the-difference-between-png-jpeg-gif-and-tiff>

- **TIFF/TIF**
 - **Pros:** Used for professional publications, archival copies and high quality prints because no compression is made. This means that all information are saved.
 - **Cons:** Very large file sizes (not suitable to use for web images)
 - **Extension:** .tif, .tiff
- **BITMAP**
 - **Pros:** No compression/ no information loss which means very high quality images. Can also be used for archival copies and high-res images.
 - **Cons:** Proprietary format (only for Windows)
 - **Extension:** .bmp

Common Image File Formats

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- **GIF**
 - **Pros:** Can allow transparency and can be animated. Very small in size and can be very portable
 - **Cons:** Not very detailed
 - **Extension:** .gif
- **RAW Image files**
 - **Pros:** Holds many image information since they are unprocessed images straight from a camera/scanner.
 - **Cons:** Cannot be used immediately because it still needs to be processed on an editor (Adobe Photoshop for example)
 - **Extension:** .raw, .cr2, .nef, .orf, .sr2, etc.

Self-Evaluation

- Technical Correctness – 5 / 5
 - I understood the concept and I was able to produce all the need outputs, I even included screenshots of properties and even the sources of my information
- Quality of Presentation – 5 / 5
 - The way I presented my report was easy to understand and follow. I simply provided screenshots for the ‘Where to find?’ part because it is easier to visualize rather than explaining it through words.
- Initiative – 2
 - I did not just copy paste all the information but somewhat provided necessary details that I find important. I even wrote the pros and cons of each common file types that I found. I even wrote a code that convert a truecolor image to binary, grayscale, and indexed images.