

# **Resizing Images**

**Bloomington Photography Club**

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# Why Resize an Image?

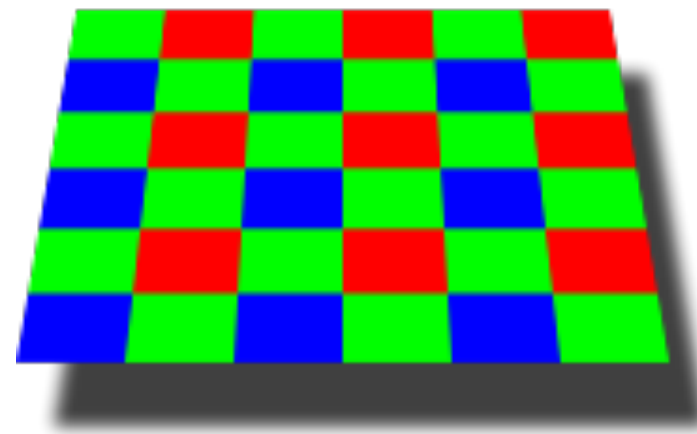
The primary reason to resize an image is to obtain a smaller file size.

- Smaller file size makes presentation software display the images faster.
- Smaller file size is more easily handled by email programs.
  - Many email programs will automatically resize to thumbnail size if the attached image is too large (usually 200 pixels wide).
- When posting a picture on the internet it is advisable to resize to a smaller image.
  - A smaller image can adequately display on a computer monitor but will not print in large enough size to make stealing of images as viable.

# File Size Impact of Resizing

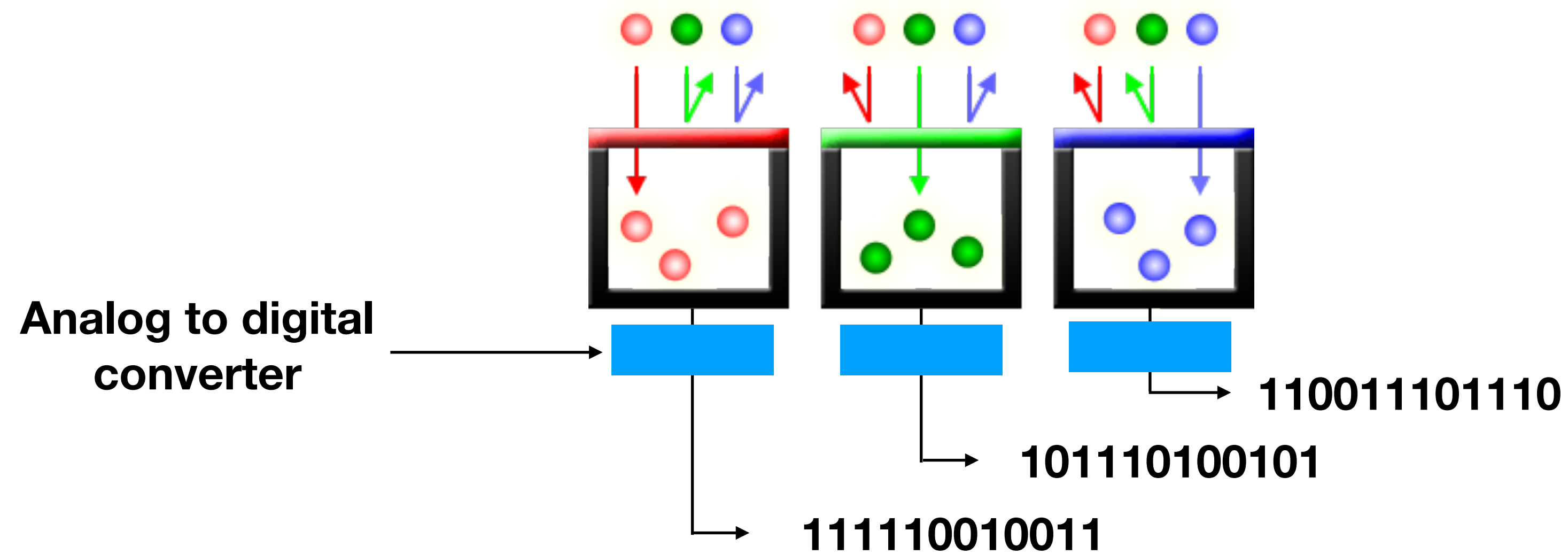
- An example JPEG image full size out of a full frame camera is 7360 pixels wide and 4912 pixels high (36 MP).
  - File size is 13,500 KB (13.5 MB).
- Resize this image to 1400 pixels wide and 934 pixels high.
  - File size is 582 KB (a 27 to 1 reduction in file size).
  - This same image when printed at 300 dpi (normal printer resolution) will only be 4.7 inches wide.

# How is an Image Made?



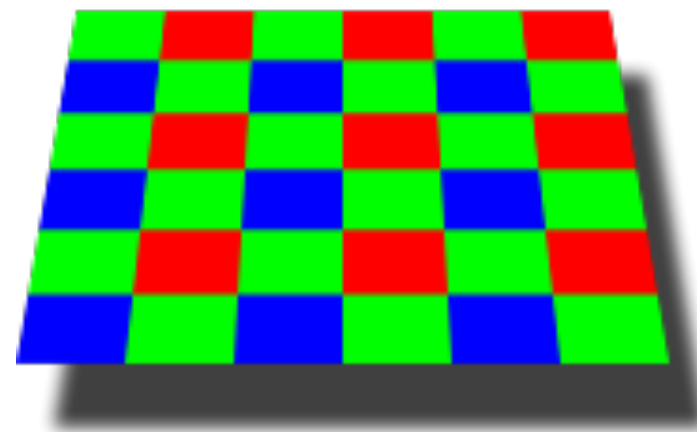
**Photo receptors on the digital camera sensor are arranged in a matrix and covered with color filters so each can record red, green or blue colors (bayer pattern).**

# How is an Image Made?



The amount of light that reaches each receptor generates a corresponding electrical charge which is converted to a digital representation through an analog to digital converter.

# How is an Image Made?



**Neighboring Red, Green and Blue pixel information is then combined to form the RGB raw color data (demosaicing).**

**So each receptor generates the data for a pixel (short for picture element).  
A 20 MP camera sensor has 20 million photo receptors.**

# How is this Applied to an Image?

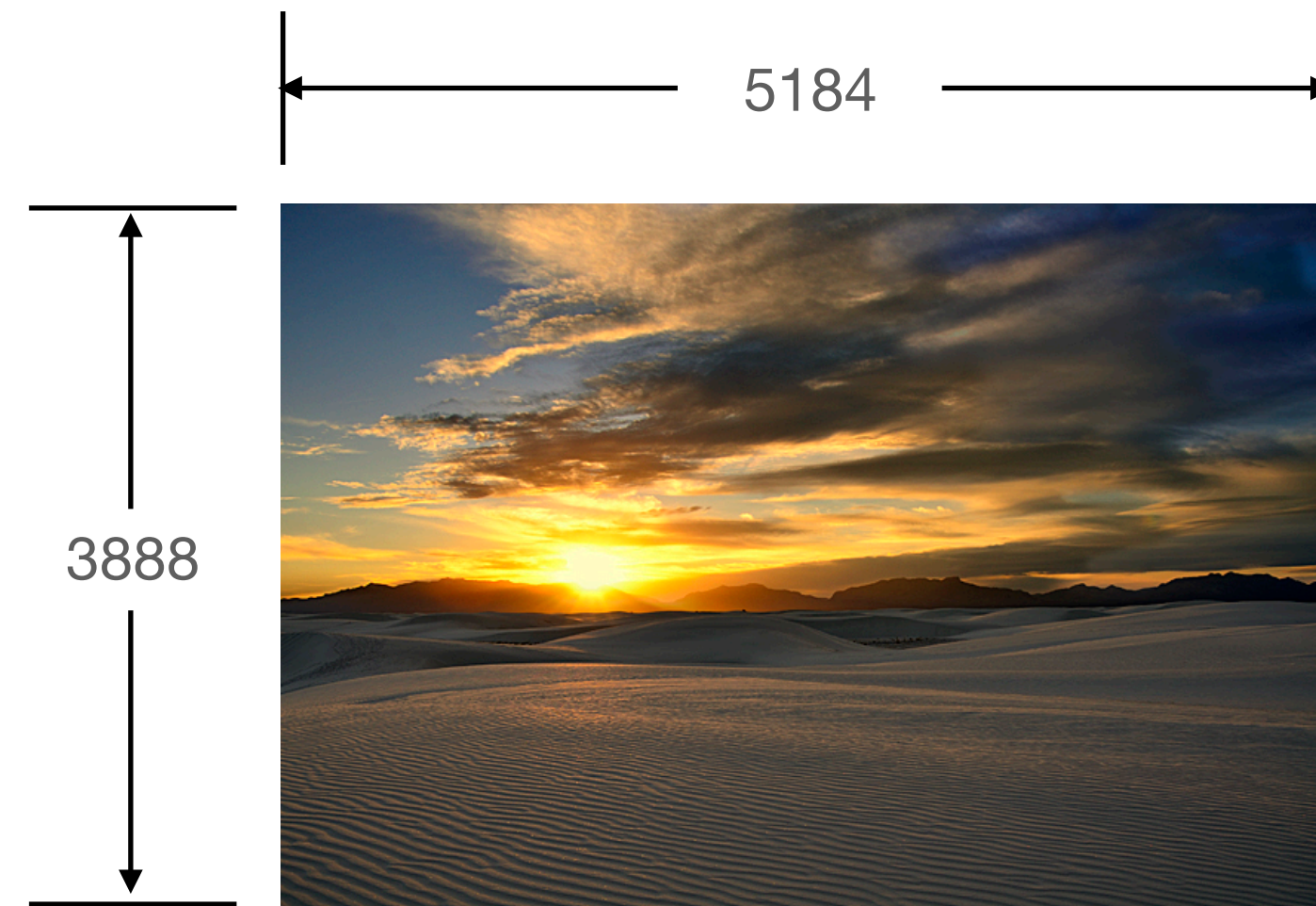


The size of an image is stated by the number of pixels in width and the number of pixels in height.

This image is 5184 X 3888 (i.e. 5184 pixels wide and 3888 pixels high).



# Aspect Ratio is Important!



The aspect ratio of an image is the ratio of the width to the height. The ratio is usually shown in whole numbers. i.e. 3:2, 4:3, 16:9, etc. 1:1 would be a square image.

You can see that this image is 4:3 as you can divide each dimension by 1296 and get the ratio.

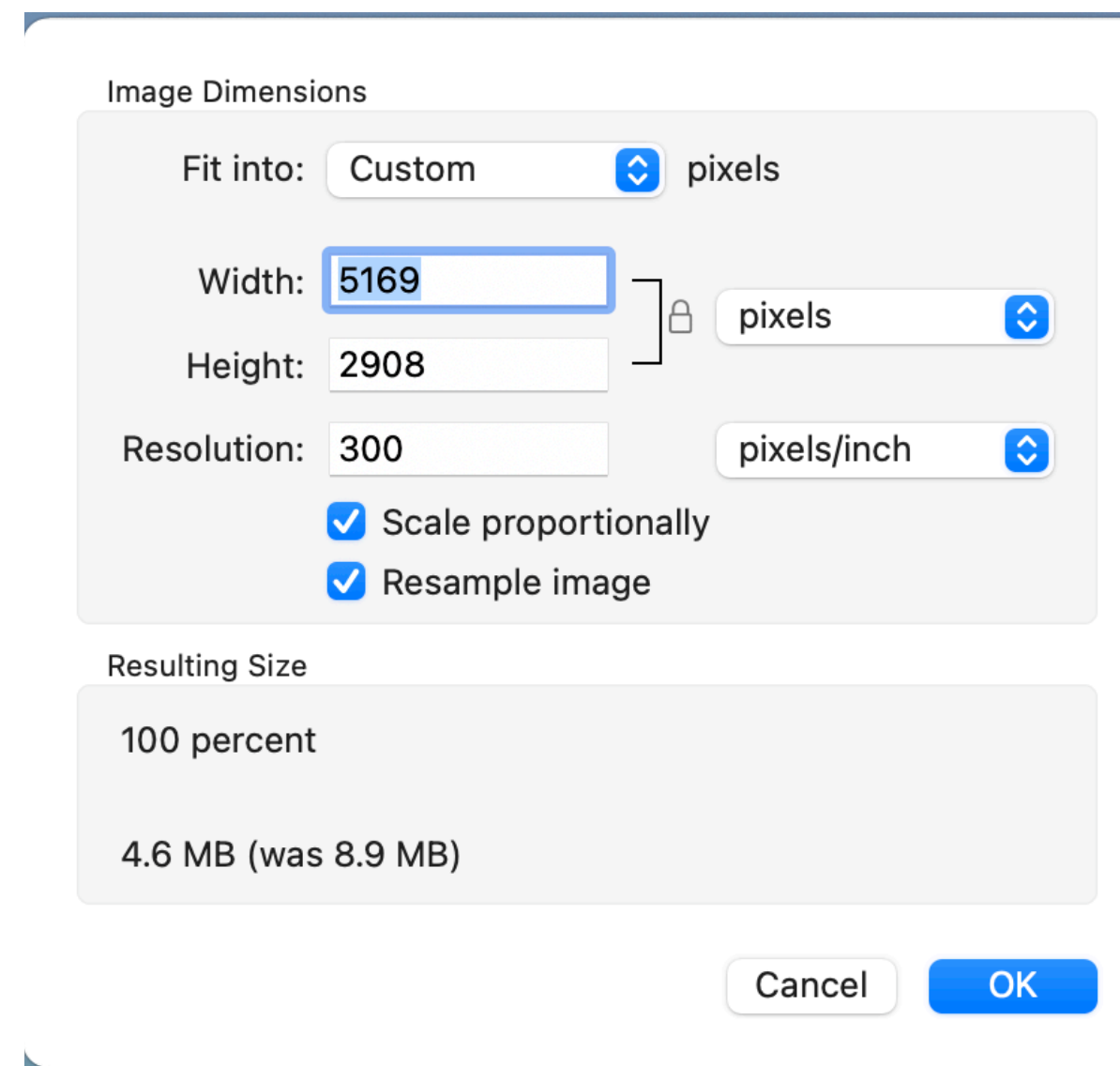
$$5184/1296=4 : 3888/1296=3$$



# Aspect Ratio

- Most full frame and many crop sensor cameras use the old 35mm standard of a 3:2 aspect ratio.
- A newer set of mirrorless cameras use a 4:3 aspect ratio. This is a slightly more square image which allows the camera to use more of the round space captured by the lens.
- HDTV's aspect ratio is 16:9 and many computer screen aspect ratios are 16:10.
- To change the aspect ratio of an image without distorting the image it must be cropped to the desired aspect ratio.

# Resizing an Image



- Usually when you resize an image you are making it smaller. Making an image larger requires a special software which is beyond the scope of this tech tip.
- It is very important to maintain the aspect ratio when you resize. If you fail to do this the resulting image will be either stretched out in one direction or pinched in one direction.

# Resizing an Image for Electronic Display

- When resizing an image for electronic display use the pixels sizing parameter. Make sure the aspect ratio is locked and then specify the pixels you want in either the height or the width. The other side will be calculated by the resizing software automatically.
- Many resizing programs allow you to specify the long side which is the width for landscape oriented images or the height for portrait oriented images. This is really nice if you are resizing several pictures or doing it by a batch process.
- When resizing for electronic display the resolution field (pixels per inch) is not used.

# Resizing an Image for Electronic Display

- Say I resized the preceding image to 720 pixels on the width. The software calculates the height to be 540 pixels.
- Now I display the picture on my computer screen which is 5120 X 2880 pixels and 25" wide. The picture takes  $720/5120=0.14$  of the screen; 25" X 0.14 is 3.5" So my 720 picture is 3.5" wide.
- On my laptop which is 2560 X 1600 pixels and 11" wide,  $720/2560=0.28$  times 11" the image is 3.1" wide.
- On my iPad which is 2388 X 1668 and 8.5" wide,  $720/2388=0.30$  times 8.5" makes the image 2.6" wide.
- The image is even smaller on my iPhone and of course is much larger when we project it up on a large screen.
- So the size of the image is entirely determined by the pixel size of the image and the size of the screen in pixels and actual screen width. The resolution field is ignored.
  - (Note: when converting to full screen mode the graphics card will "scale up" the image to fit the screen)

# When is the Resolution Parameter Used?

- This parameter becomes very important when resizing for printing as noted below.
- Resolution also becomes important in certain editing functions such as adding text to an image.
  - Text size is specified in points. There are 72 points per inch. The only way the editing software can calculate the size to make text in an image is to convert the points to pixels and it uses the resolution parameter to do this.
  - Once the text is placed and saved on the image it becomes pixels and the resolution parameter is no longer used for electronic display.

# Resizing an Image for Printing

- Of course when **printing** a picture, it is entirely different. Here you are targeting a certain sized paper such as 11 X 8 inches and you want your image to fit properly on the paper.
- In most cases you also have the ability to specify the printer resolution or number of dots per inch (dpi) the printer will use. A very common, good print resolution is 300 dpi.
- Let's say we want to resize the previous image to 10" X 7.5" for printing on 11 X 8 paper.
- It is desirable to set the resolution parameter to the same resolution in pixels per inch that you will be printing the image in dpi. This allows the printer software to convert each pixel color into the correct color for the corresponding dot. Otherwise the printer software is required to conduct another calculation similar to the demosaicing calculation your camera preformed on the picture.
  - For example set the resolution parameter on the resizing program to 300 pixels per inch and the printer resolution to 300 dpi.
- Set the size parameter to inches, lock the aspect ratio and set the width to 10. The software would calculate 7.5" for the height (i.e.  $10/4 \times 3 = 7.5$ ). Now the image will fit exactly on the page with the correct resolution to print at 300 dpi.
  - If you fail to match these two parameters, the size specified in resizing will not match the size printed on the paper.