

Cropping Pictures

Cropping is one of the essential functions in image processing and manipulation. Cropping an image means to cut out a certain part of the image and to discard the rest.

For instance, in the following picture, the main subject is the little girl with the snow bear. There is too much extra stuff on the edges of the picture. To have a nice picture, I would like to have the little girl with the snow bear. I would like to crop the picture as shown:



This image was originally 1094 x 821 pixels. To find the area I wanted to crop, I plotted the image as a figure in Google Colab. It looked like the upper left corner of the area I wanted to crop was a little less than 400 across, and a little more than 100 down. I decided to try using x- and y-coordinates (380, 110). I then looked over to the bottom right corner of the area I wanted to crop, and settled on the coordinates there to be (790, 700). My cropped picture has just the girl and the snow bear and has 410 x 590 pixels.

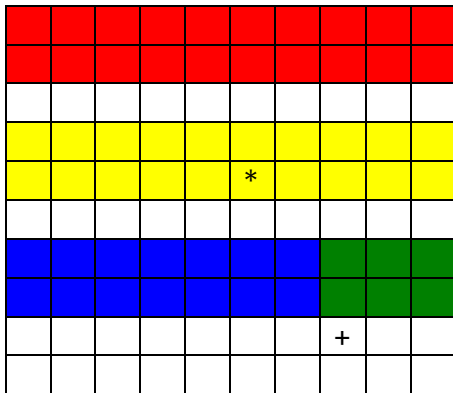


Let's now think about how we might write an algorithm to crop pictures. Given a picture, what do we need to know to crop it? We need to know the coordinates of the pixel in the top left corner of the area we want to crop, and we need to know the coordinates in the bottom right corner. Our algorithm might look like the following:

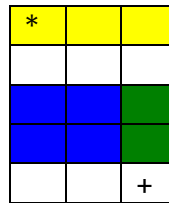
Crop Algorithm

Given a picture, x- and y-coordinates of the upper left corner, and the x- and y-coordinates of the bottom right corner of the area to be cropped, do the following:

- Create a new picture with the appropriate width and height.
- Copy the pixels from the original picture starting at the given coordinates to the pixels in the new picture.
- Return the new picture.



Suppose in this picture, we want to crop a portion of this starting at pixel (5, 4), with a width of 3 and a height of 5. We will begin copying starting at pixel (5, 4) (the pixel with the *), and continue copying all of the pixels until we get to the pixel (7, 8). This gives us the following section of the original image:



Understanding how to choose the coordinates and how to determine the width and height of the cropped section are the key ideas in how to use a crop function. You will experiment with this in the next activity.

Activity: Cropping and Scaling