Dongwook Lee <dlee79@ucsc.edu>

Dongwook Lee (Numerical Linear Algebra), you just sent a message in Canvas.

1 message

UCSC Canvas <notifications@instructure.com> Thu, Mar 11, 2021 at 1:35 PM
Reply-To: reply+fc48308359004098-9270~78637285-1615498554@notifications.canvaslms.com
To: dlee79@ucsc.edu

[AM 213A] -- Image size vs. matrix size

Dear students,

There is one thing that could be explained in more detail about the size of the image data.

In the digital community, the size of an image file is given by the size of the pixels in the data. The convention is width x height.

In mathematics (linear algebra), though, the convention is row x column.

That said, the pixel size of the black-and-white image file is 1920x1279, and this should be interpreted as 1279x1920 in terms of the size of a 2D array (i.e., matrix).

Practically, though, when you read the data in from your Fortran code, being a column-major language, it will read-in and store the data as 1920x1279, i.e., a Fortran code will transpose the data behind the scene upon arrival.

You can check using in Fortran:
print*, shape(Data)

On the other hand, if you query the data size in your Python or Matlab code (keep in mind that they are row-major languages), you will do:

Python:
n_row = len(Data)
n_col = len(Data[0])

Matlab:
[n_row,n_col] = size(Data)

So, the summary is that, in your Fortran code, you will safely assume that you're operating on a 2D matrix of size 1920x1279.

Hope this clarifies any confusion you might have in terms of the two different conventions in specifying an image size vs. an array size.

One tip for plotting. Use the following lines:

Python:
plt.imshow(np.uint8(data),cmap='gray', vmin=0, vmax=255)

Matlab:
imshow(uint8(data));
colorbar;

Best,
Dongwook

Dongwook Lee