CPSC 301: Computing in the Life Sciences
Lecture Notes 13:
Image Processing in Python

2017-03-23

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2016 W2
Admin

• Jessica Office Hours update until end of term
  – 3 – 4pm Tuesdays and Thursdays (and still by appointment)

• Lab08 In-lab extension (announced on Piazza)
  – Disproportionate number of you found the lab a bit too long
  – So if you weren’t able to finish the in-lab during lab, this week we will mark it when doing the after-lab marking.
Looping Over Pixels

- We can iterate over all the pixels in an image by using the height and width as ranges.
  - Ex from cross1.py:
    ```python
    image = Image.open(in_file)
    (width, height) = image.size

    for i in range(width) :
        image.putpixel((i, height//2), (0, 0, 0))

    for j in range(height) :
        image.putpixel((width//2, j), (0, 0, 0))
    ```
The `Image` class has a variety of methods for manipulating images:

- **`img.copy()`** => new image
  - creates a new copy of the image
- **`img.crop((x1,y1, x2,y2))`** => new image
  - returns a copy of the box defined by the left-upper \((x1,y1)\) and right-lower \((x2,y2)\) points
- **`img.paste(another_image, box)`**
  - pastes another image into this image at the region specified by the box
- **`img.resize(size)`** => image
  - returns a resized copy of the image
- **`img.rotate(angle)`** => image
  - returns a copy of the image rotated counter clockwise by the given degrees

and a lot more …..
Examples

- `blendimage.py` blends two images at a given rate
- `embedat.py` embeds one image inside another

- Try the examples we discussed in the class at home, using your own images
  - Modify the filename string(s) (eg: `in_file`) in each Python script to be the name of your image (including the extension)
- Replacing pixels in an image
  - Replacement with `putpixel()`:`cross1.py`
  - Replacement with `[] indexing:`:`cross2.py`
- Blending images:`blendimage.py`
- You can create whatever pixel combination you want
- More examples in Lab09.
Change Log

- Images in Python: fixed incomplete sentence
- Digital Images slide: added a line about how greys are calculated