Professor_Bear_Image_Analysis_Sepia

March 14, 2017

1 Professor Bear :: Image Analysis :: Sepia

1.1 Professor Bear github

Code for Professor Bear YouTube videos at https://github.com/nikbearbrown

1.2 Download Anaconda 4 for Python 2.7

Download Anaconda 4 for Python 2.7 version https://www.continuum.io/downloads

Anaconda 4.3.0 includes an easy installation of Python (2.7.13, 3.4.5, 3.5.2, and/or 3.6.0) and updates of over 100 pre-built and tested scientific and analytic Python packages. These packages include NumPy, Pandas, SciPy, Matplotlib, and Jupyter. Over 620 more packages are available. https://docs.continuum.io/anaconda/pkg-docs

1.3 iPython

Go to the directory that has your iPython notebook
At the command line type
jupyter notebook notebookname
ipython notebook notebookname will also work
For example,
jupyter notebook Professor_Bear_Image_Analysis_Loading_Histograms.ipynb

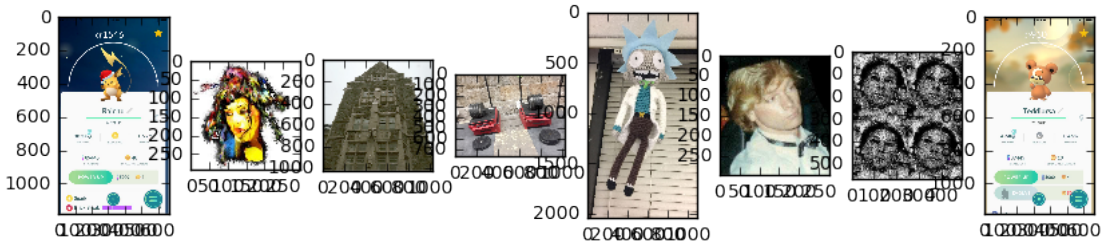
```
In [1]: # Bring in python image analysis libraries
        %matplotlib inline
        import matplotlib.pyplot as plt
        import matplotlib.image as mpimg
        import numpy as np
        from skimage import color
        import skimage.filters as filters
        from skimage.transform import hough_circle
        from skimage.feature import peak_local_max
        from skimage import feature
        from skimage import morphology
        from skimage.draw import circle_perimeter
        from skimage import img_as_float, img_as_ubyte
        from skimage import segmentation as seg
        from skimage.morphology import watershed
```

```
from scipy import ndimage as nd
from scipy.ndimage import convolve
from skimage import feature
import glob # for bulk file import

# Set defaults
plt.rcParams['image.cmap'] = 'gray' # Display grayscale images in... grays
plt.rcParams['image.interpolation'] = 'none' # Use nearest-neighbour
plt.rcParams['figure.figsize'] = 10, 10

# Import test images
imgpaths = glob.glob("./img/*.jpg") + glob.glob("./img/*.png")
# imgpaths = glob.glob("img/*.jpg") + glob.glob("img/*.png")  Windows
# Windows has different relative paths than Mac/Unix
imgset = [mpimg.imread(x) for x in imgpaths]

# Display thumbnails of the images to ensure loading
plt.figure()
for i,img in enumerate(imgset):
    plt.subplot(1, len(imgset), i+1)
    plt.imshow(img, cmap = 'gray')
```



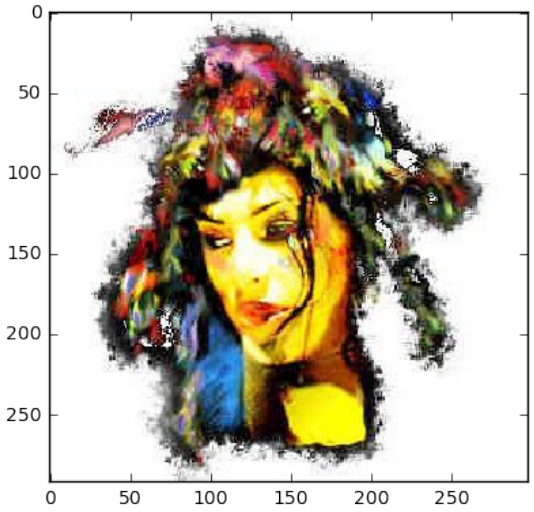
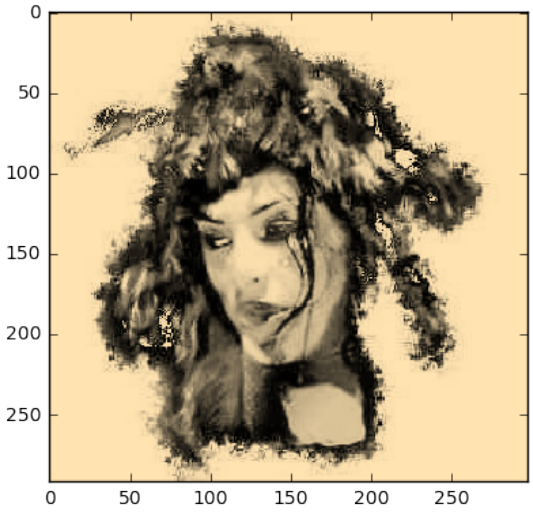
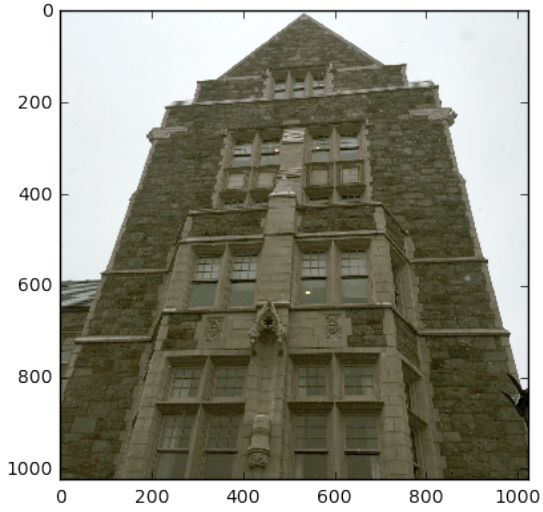
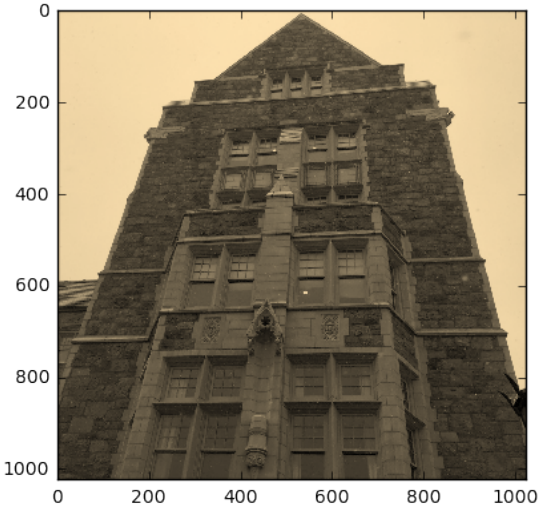
1.4 Sepia

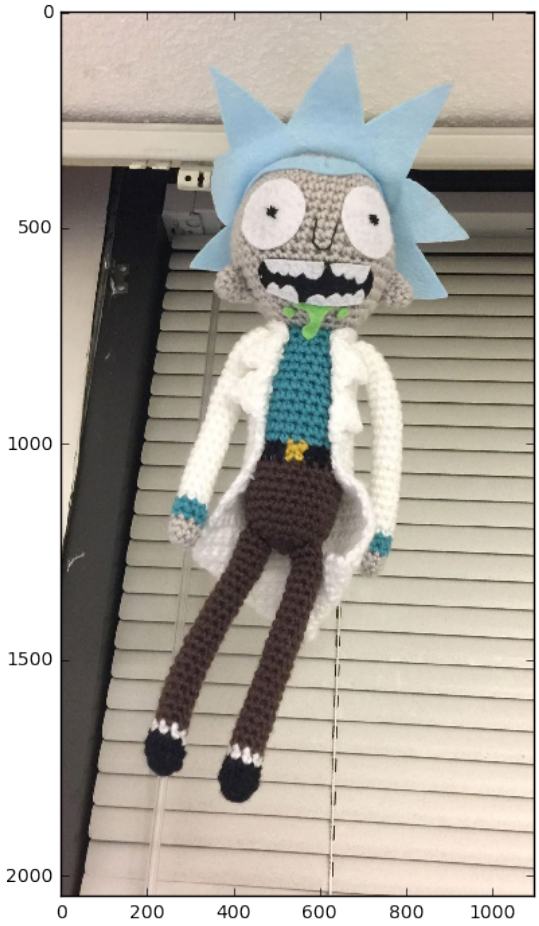
Sepia

```
In [2]: #create a kernel which will be used to the original image.
        sepia_filter = np.array([[.393, .769, .189],
                                 [.349, .686, .168],
                                 [.272, .534, .131]])

        def sepia(image, filter):
            sepia_img = image.dot(filter.T) #Dot product the image and array
            #T is the transpose of the array.
            #Since our filter lines do not have unit sum, so we need to rescale
            sepia_img /= sepia_img.max()
            return sepia_img
```

In [3]:
```
# Apply to image set
for i,img in enumerate(imgset):
    plt.figure()
    plt.subplot(1, 2, 1)
    plt.imshow(img)
    plt.subplot(1, 2, 2)
    plt.imshow(sepia(img,sepia_filter))
```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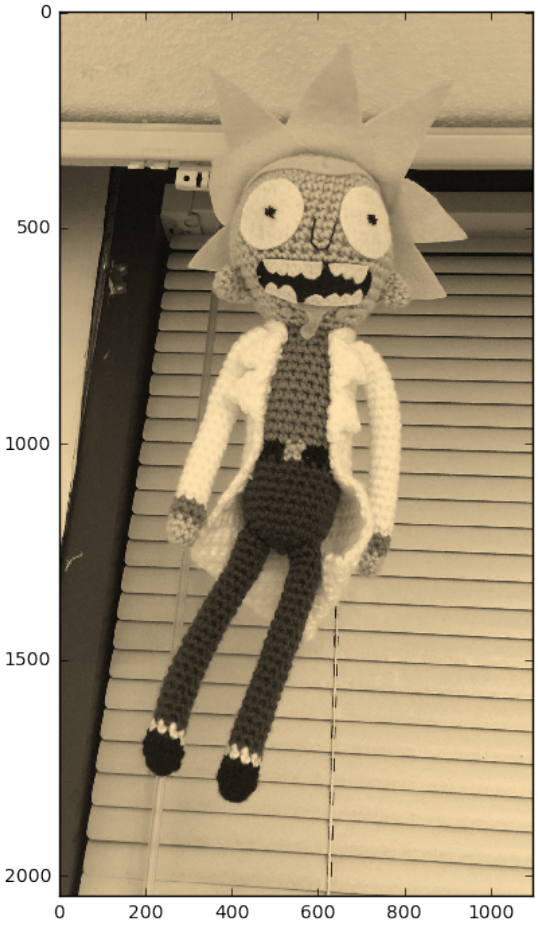
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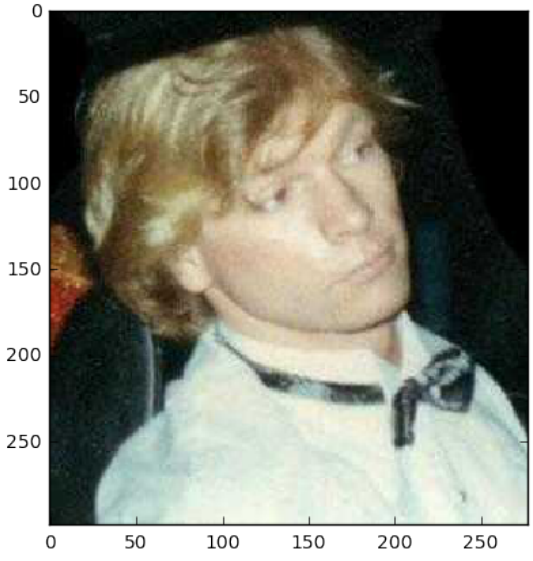
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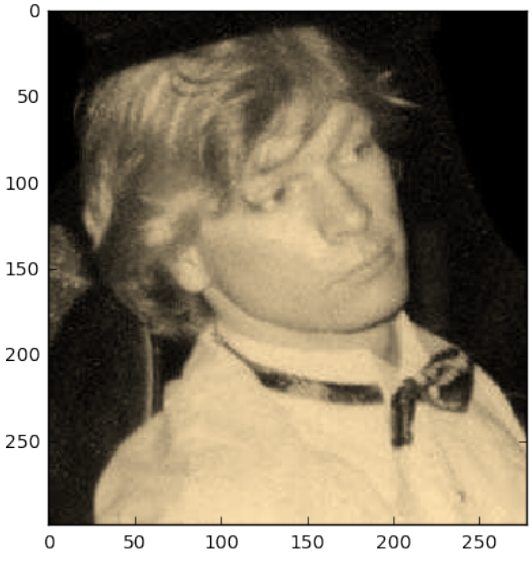
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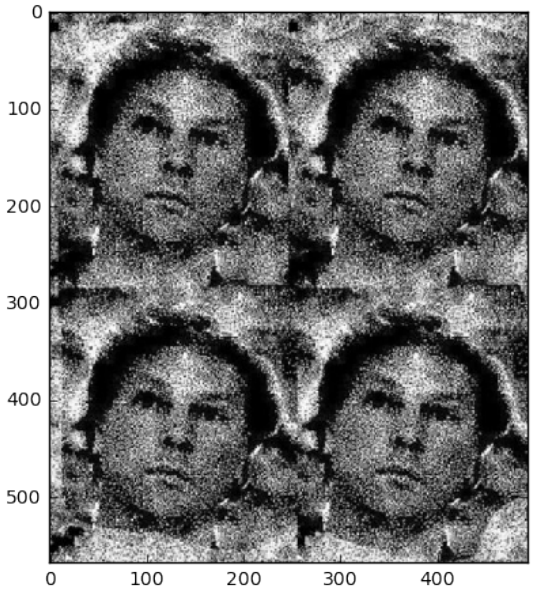

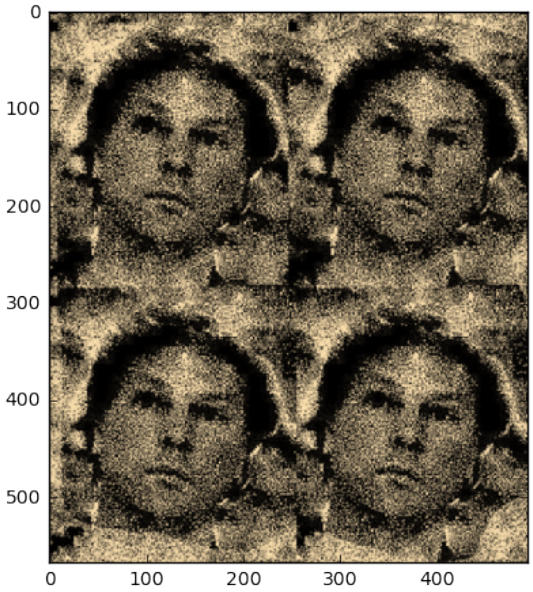


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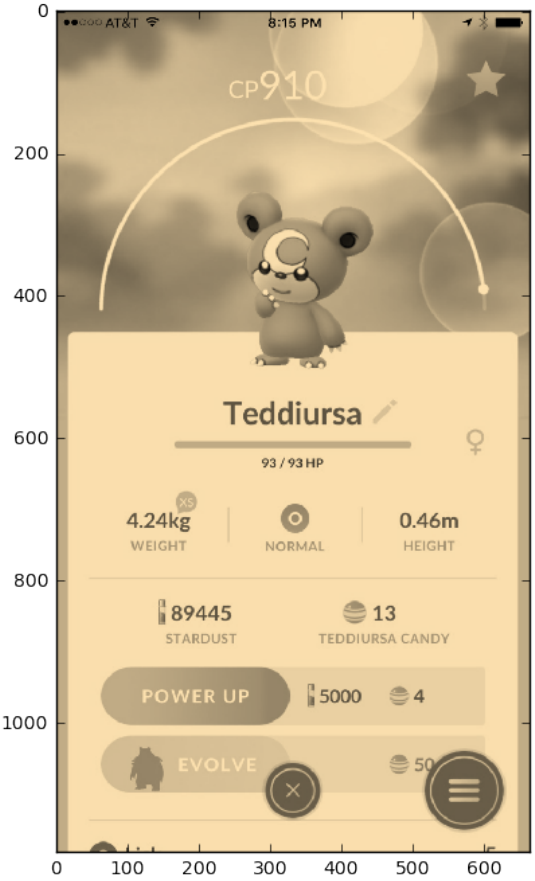
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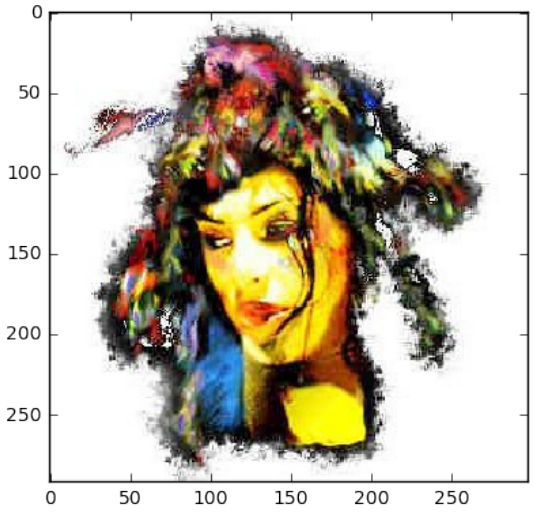
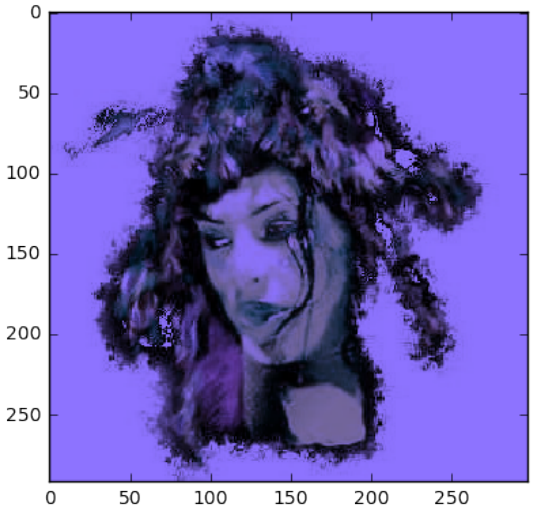
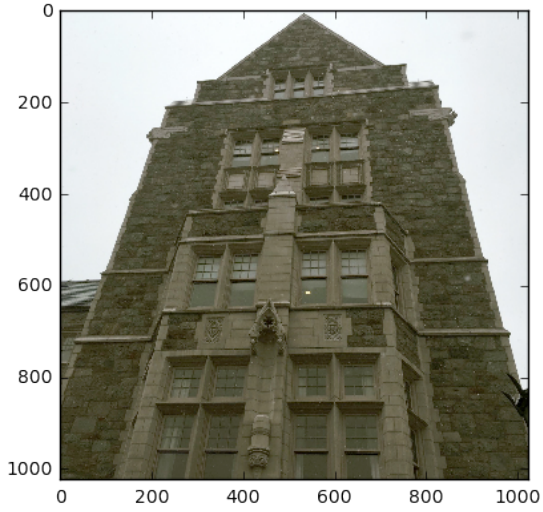
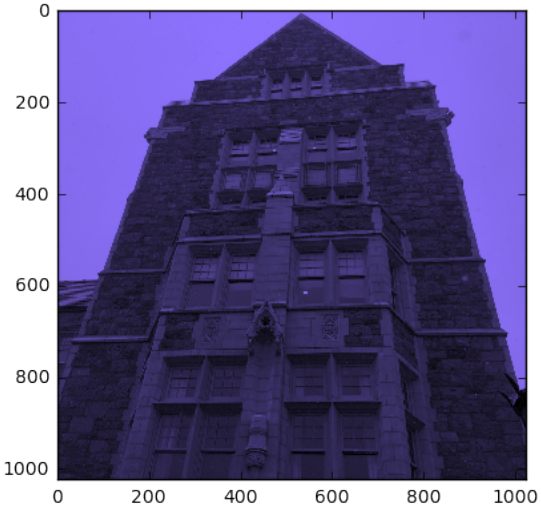
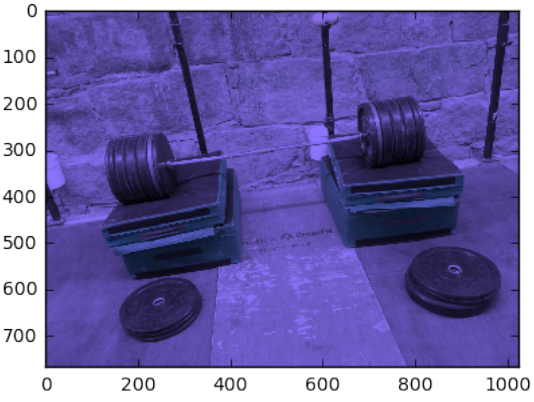
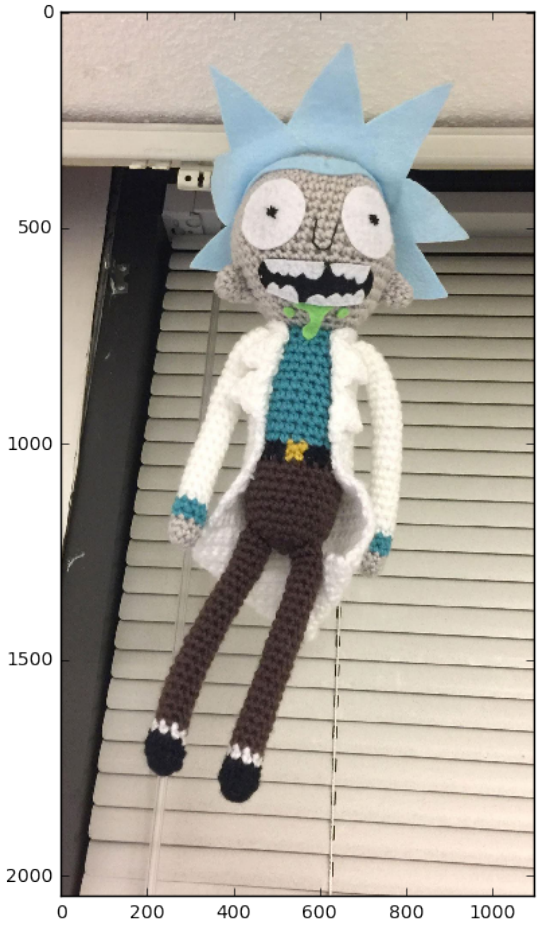
```
In [4]: purple_filter = np.array([[.03, .769, .189],
                                  [.349, .36, .1],
                                  [.55, .534, .7]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,purple_filter))
```

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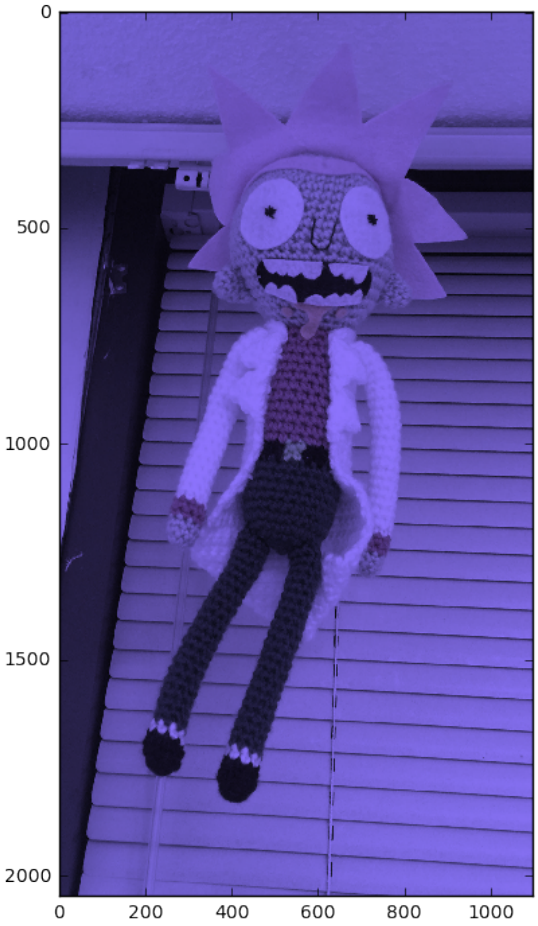
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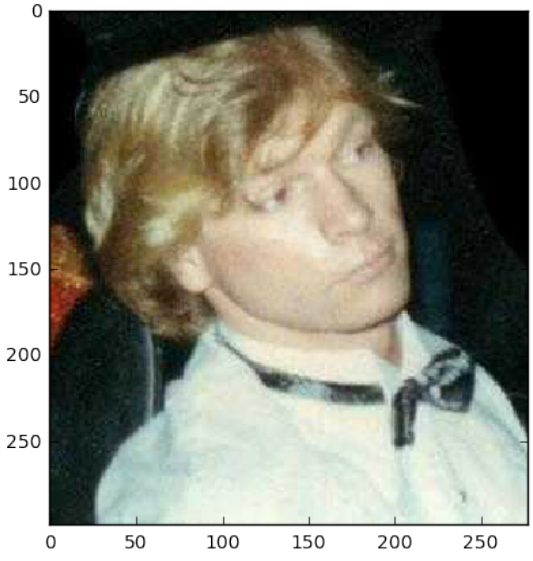
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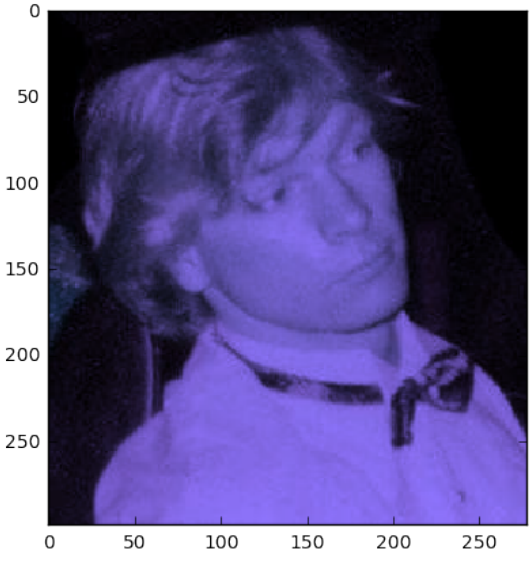
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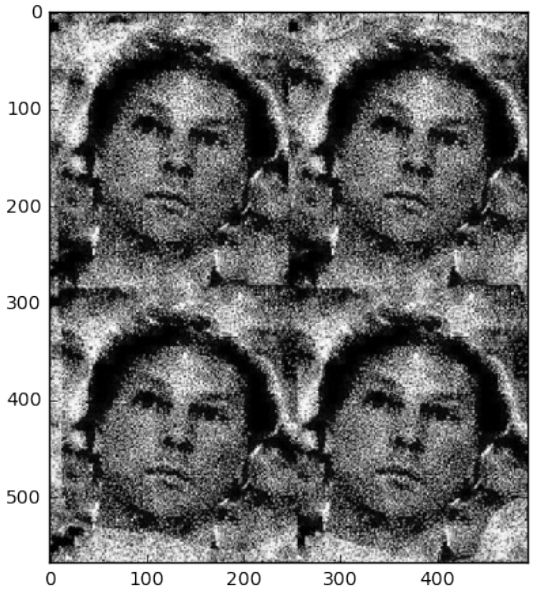

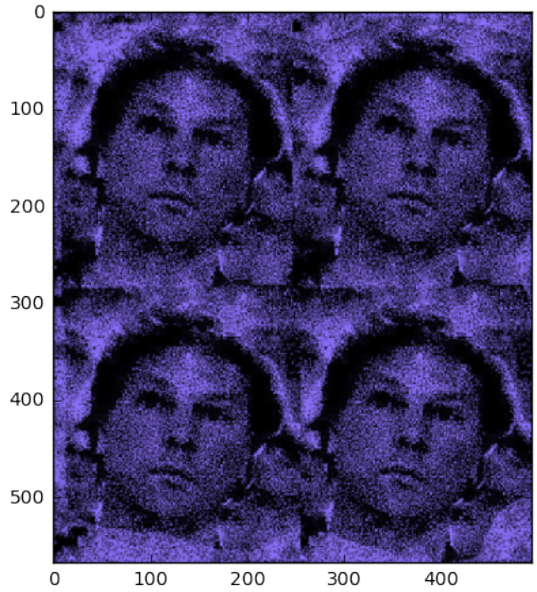


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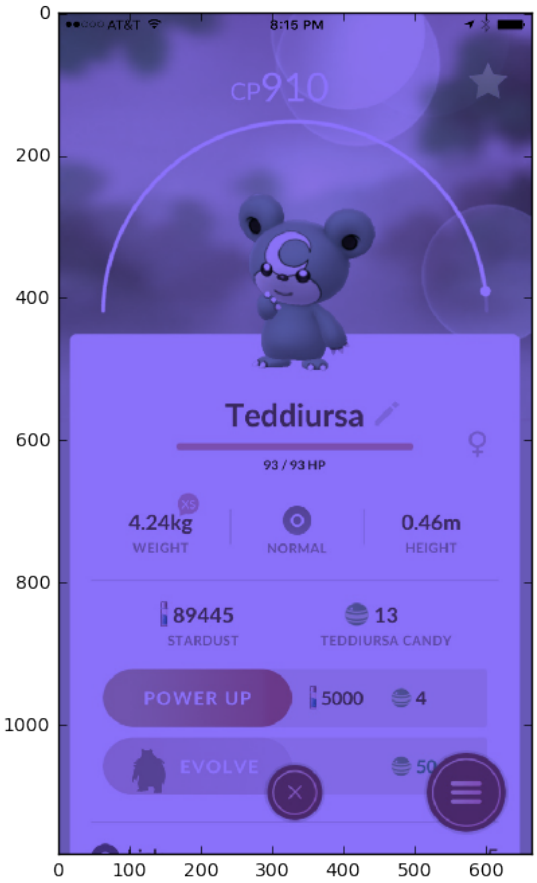
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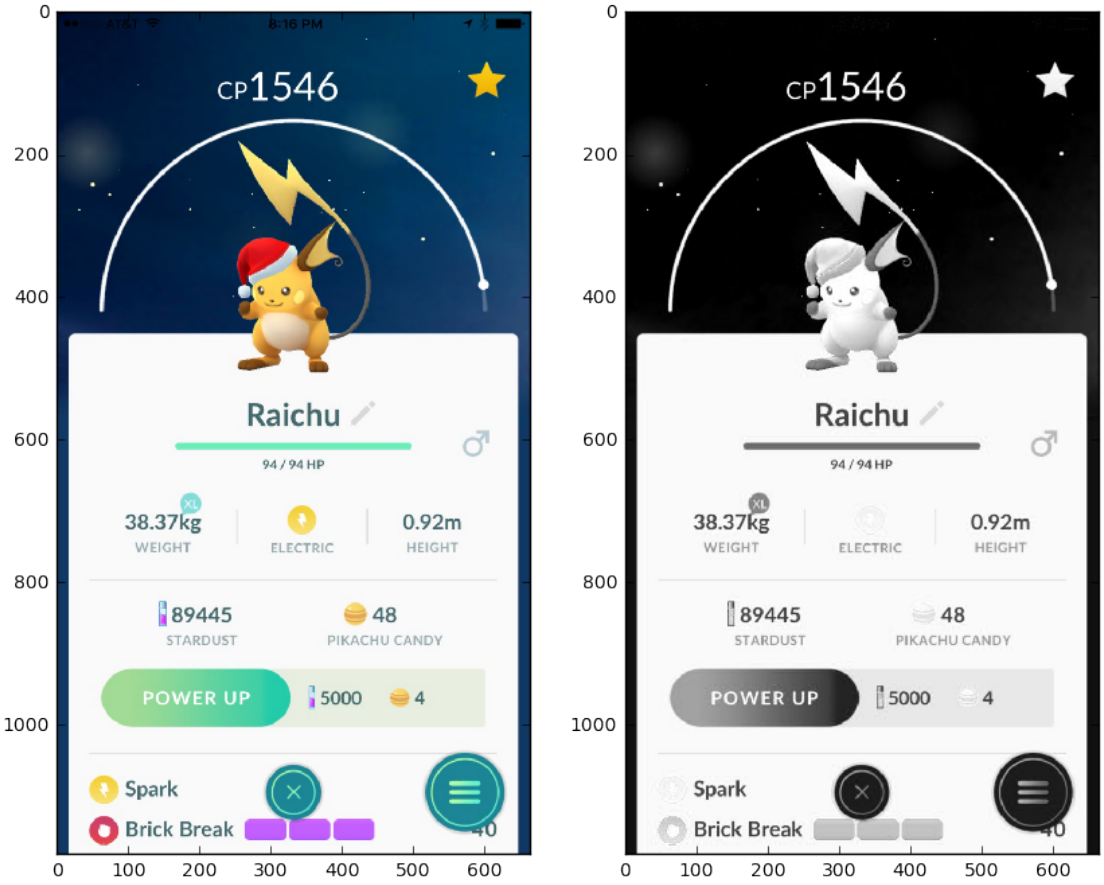
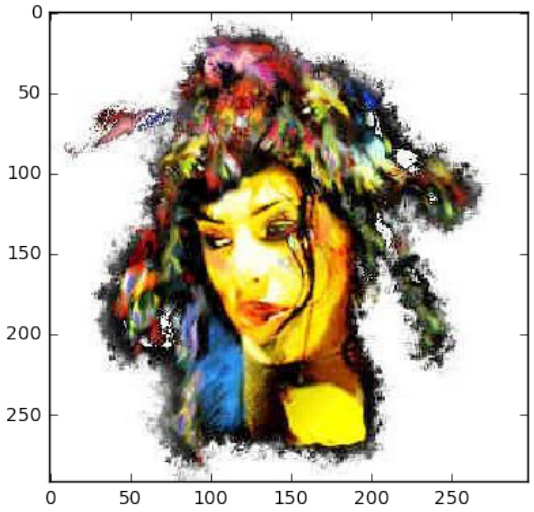
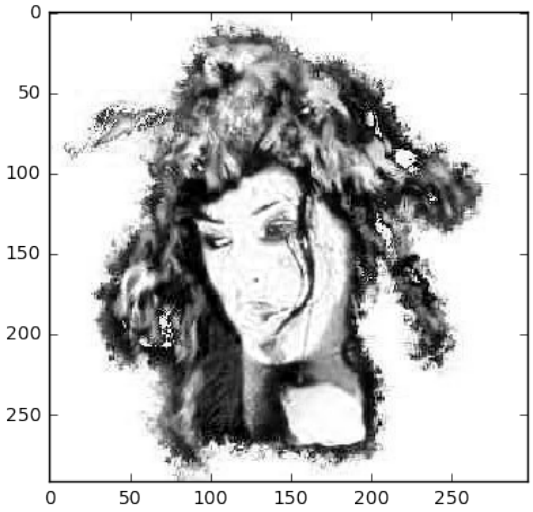
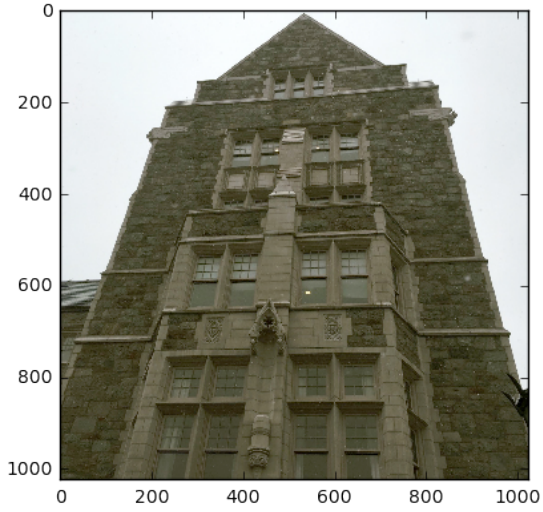
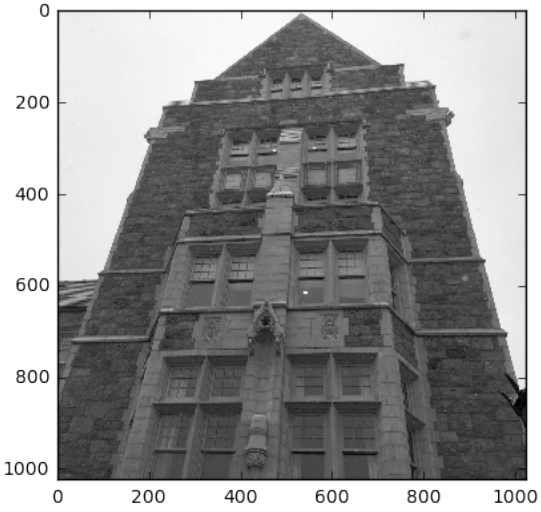
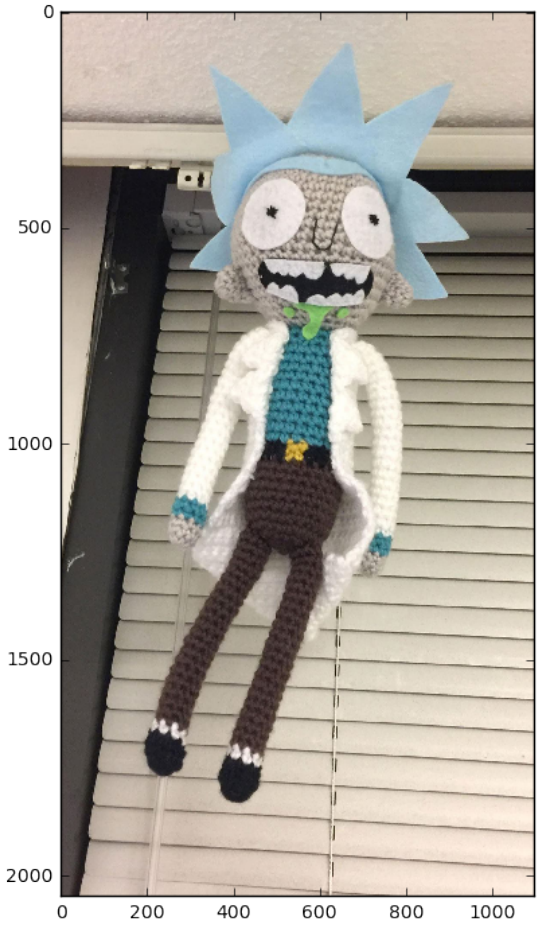
```
In [5]: filter_a = np.array([[1.0, 0.0, 0.0],
                             [1.0, 0.0, 0.0],
                             [1.0, 0.0, 0.0]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,filter_a))
```

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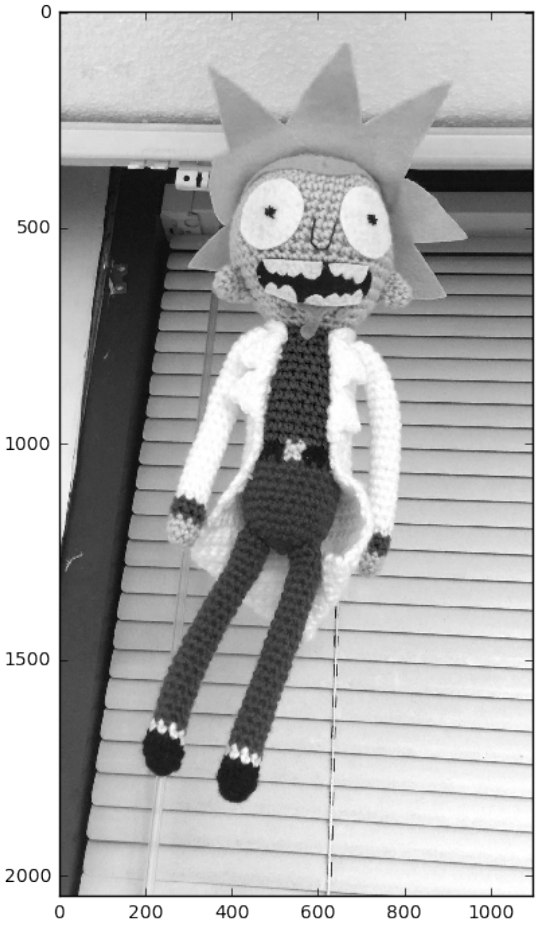
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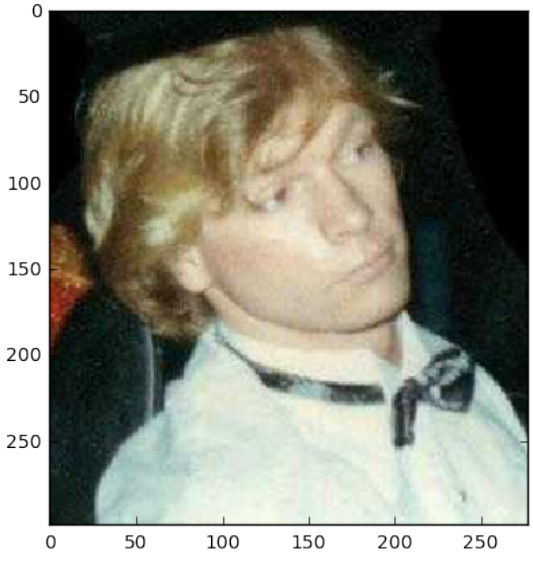
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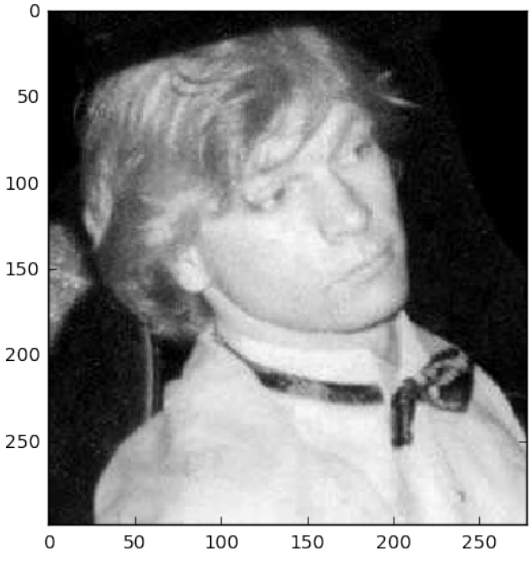
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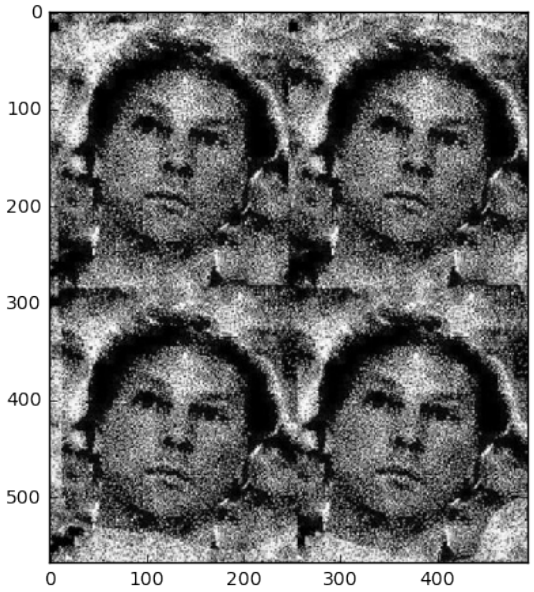

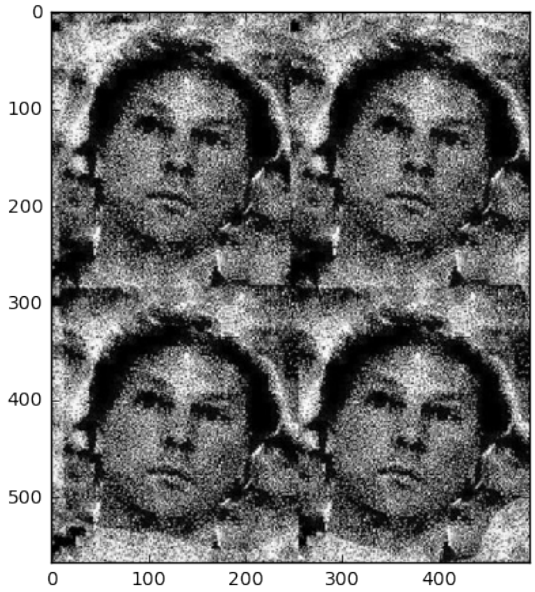


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TEDDIURSA CANDY
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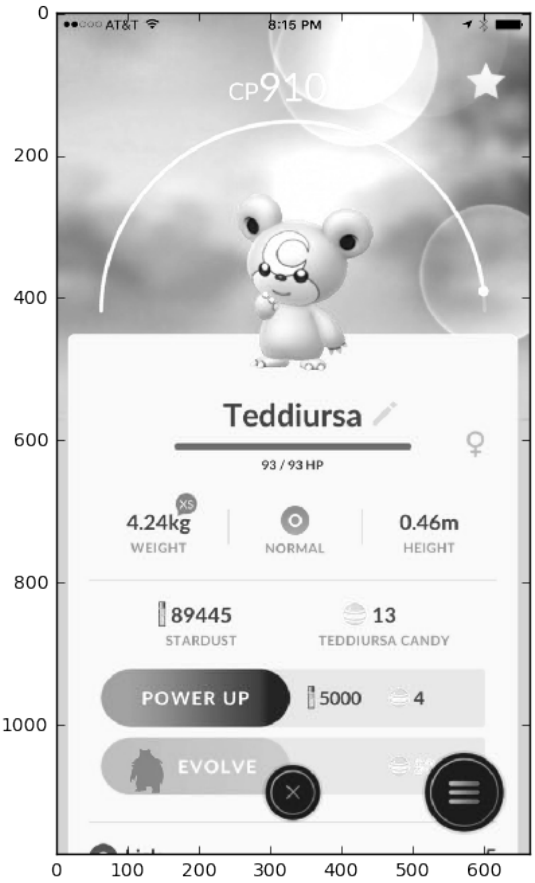
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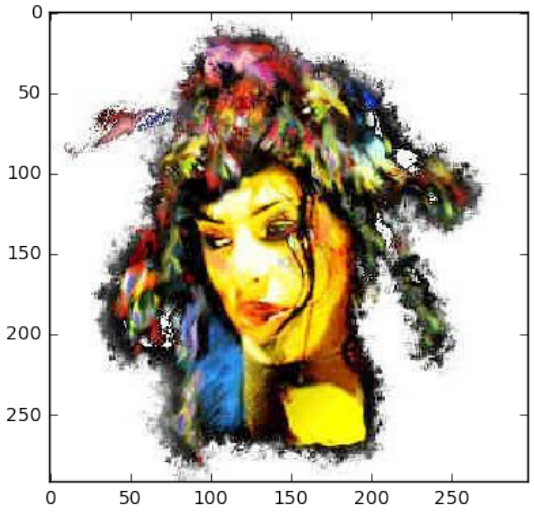
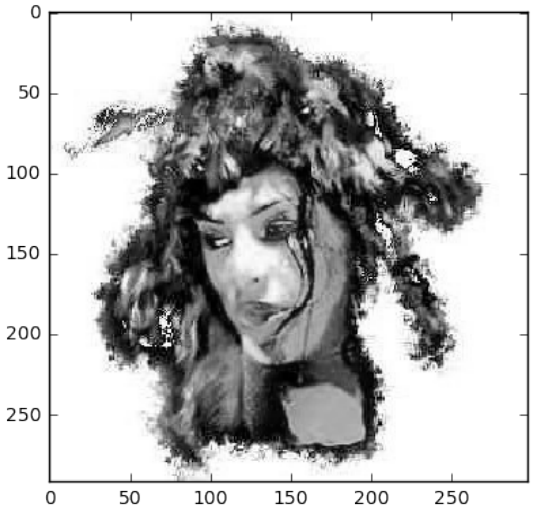
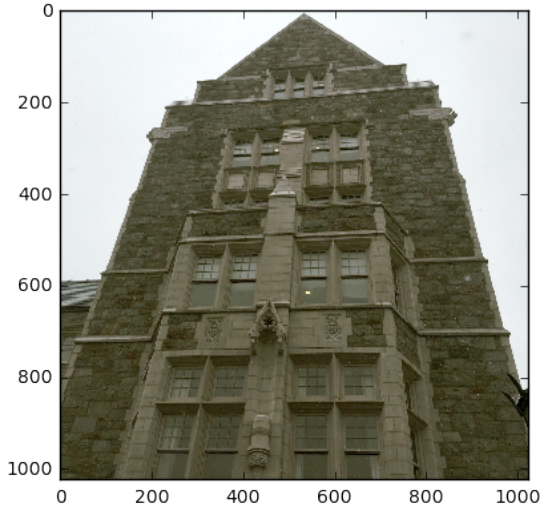
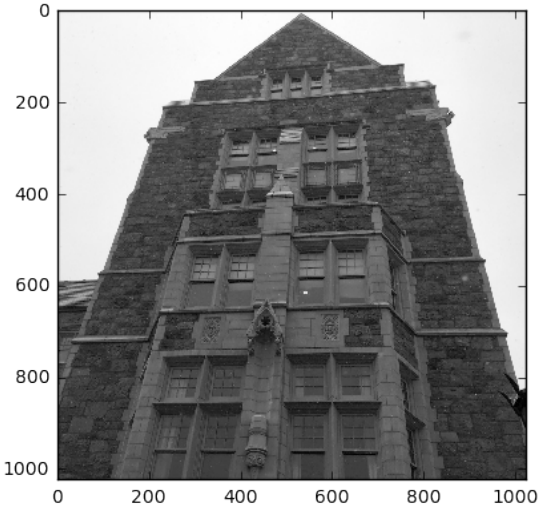
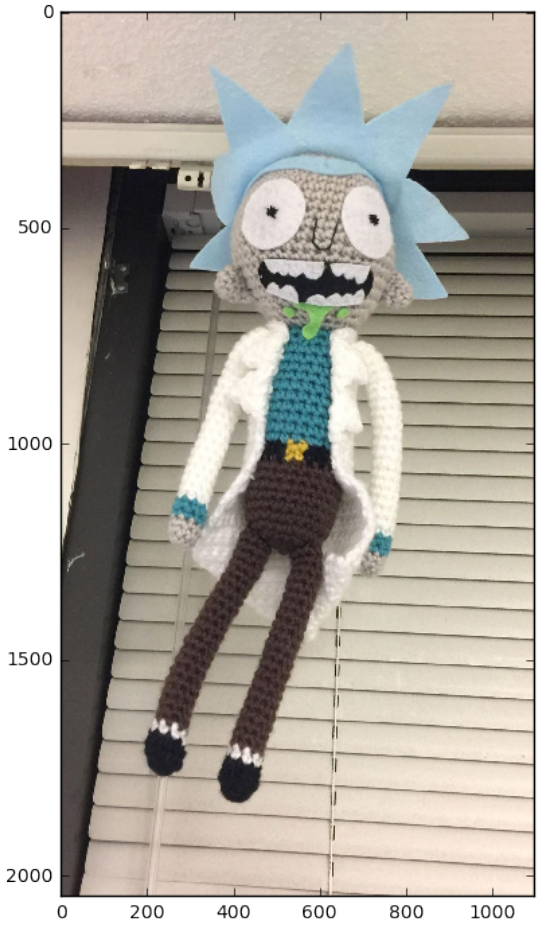
```
In [6]: filter_all = np.array([[1.0, 1.0, 1.0],
                               [1.0, 1.0, 1.0],
                               [1.0, 1.0, 1.0]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,filter_all))
```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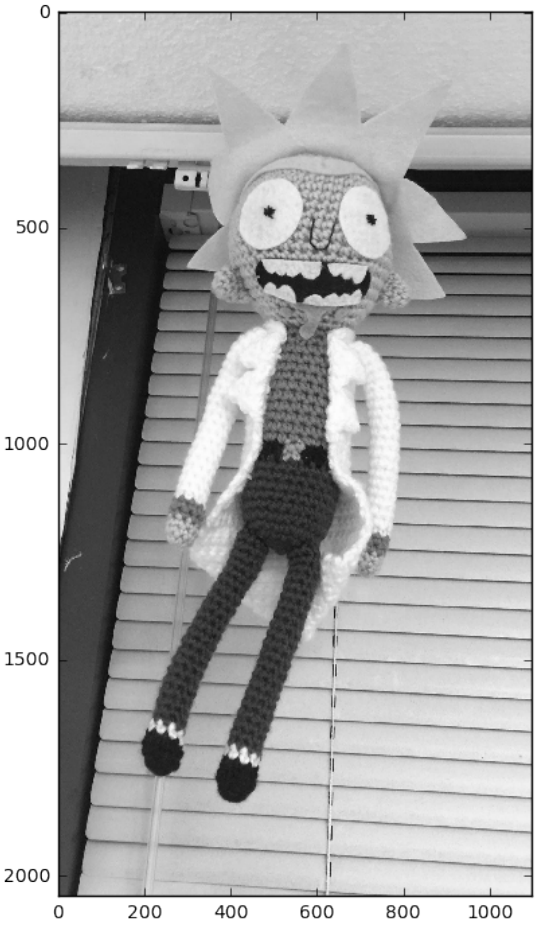
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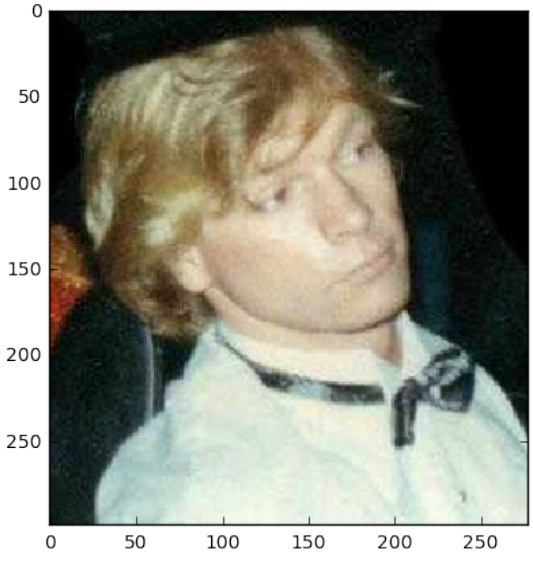
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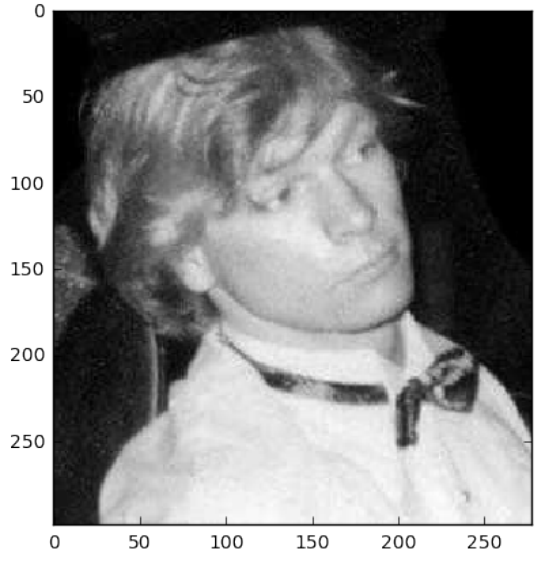
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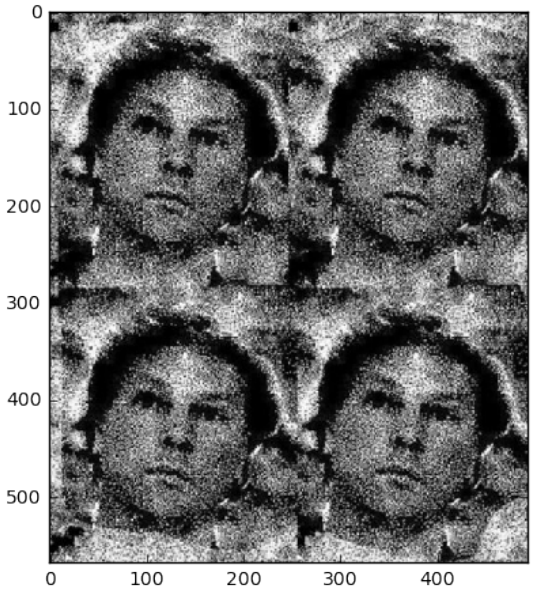

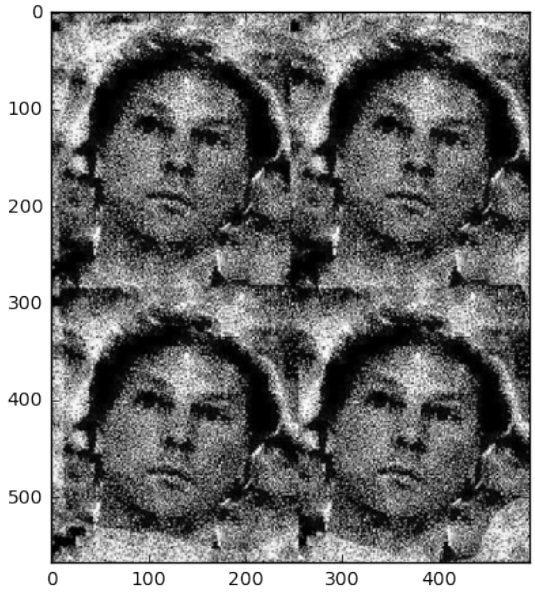


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93 / 93 HP
4.24kg
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STARDUST
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TEDDIURSA CANDY
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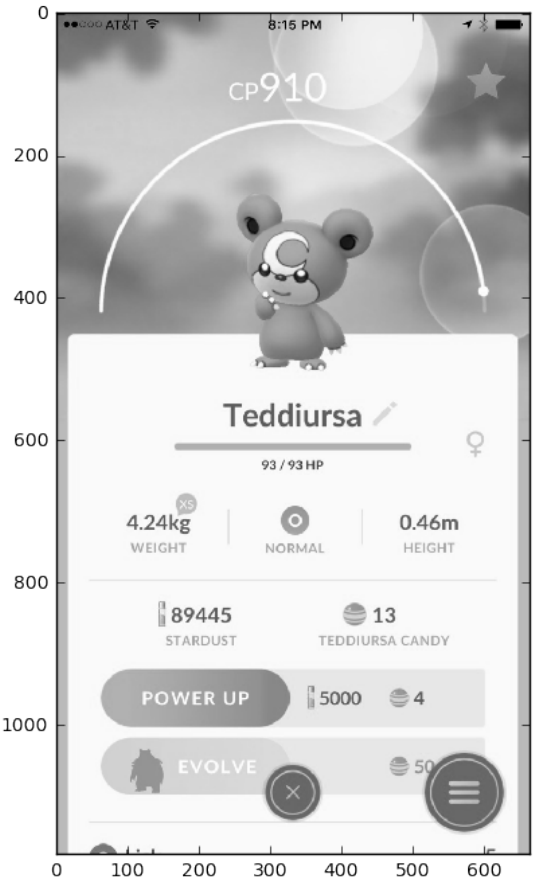
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TEDDIURSA CANDY
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```
In [7]: filter_b = np.array([[1.0, 1.0, 1.0],
                             [0.0, 0.0, 0.0],
                             [0.0, 0.0, 0.0]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,filter_b))
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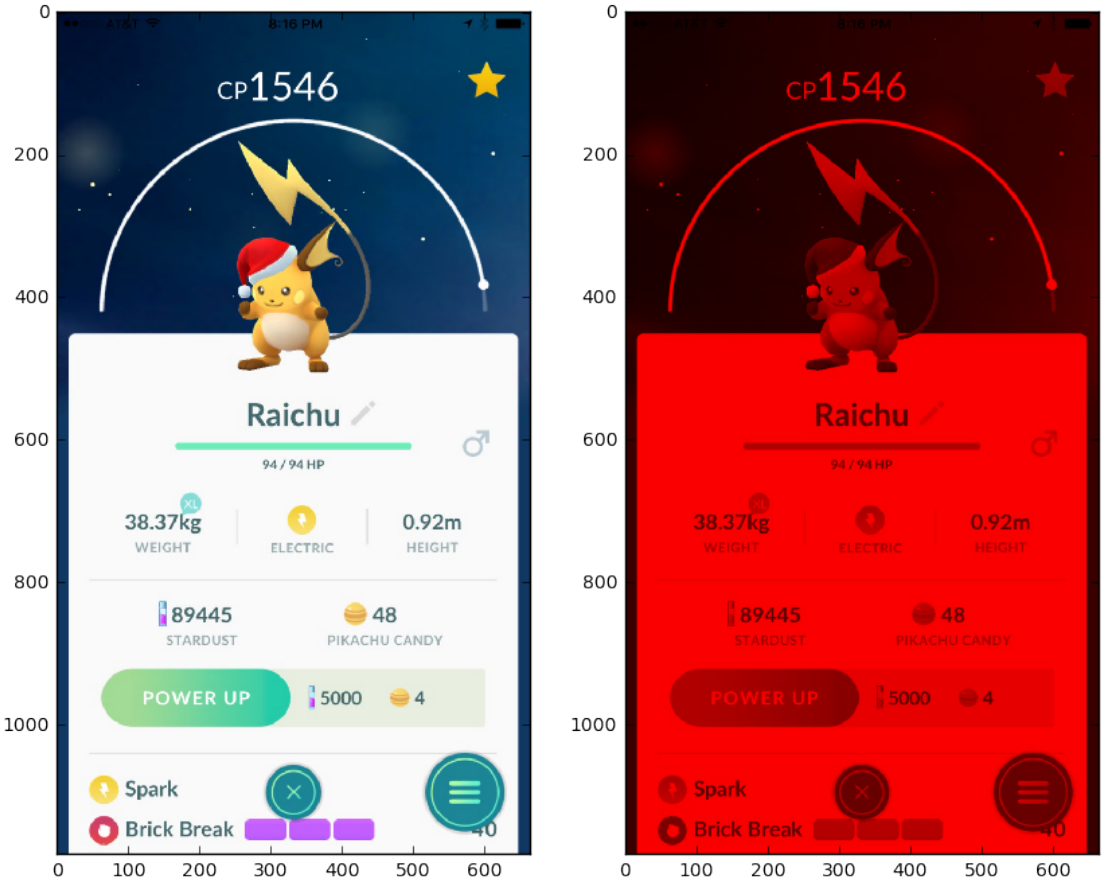

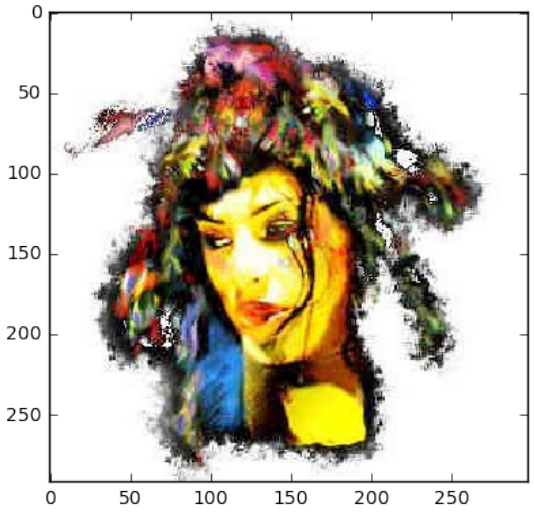
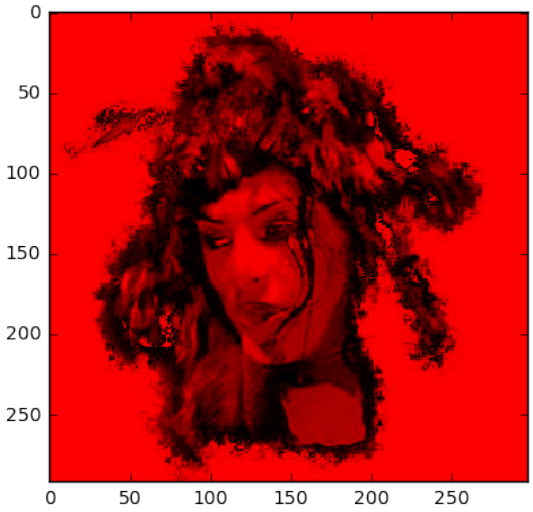
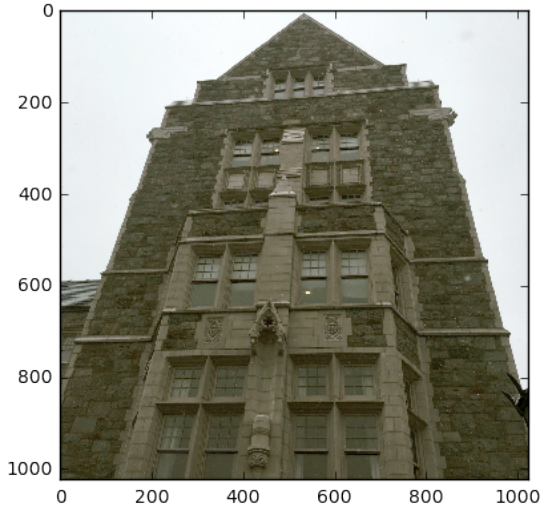
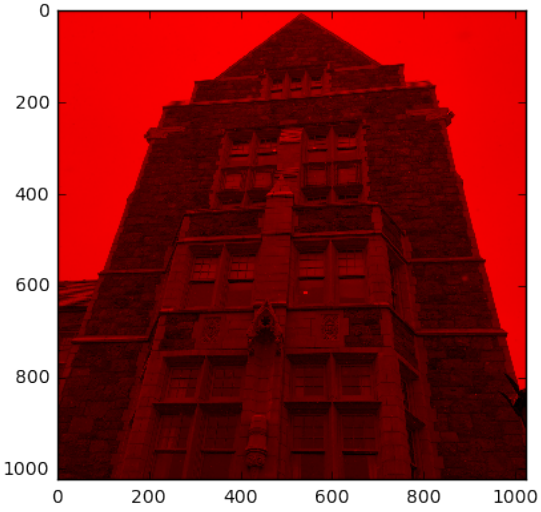

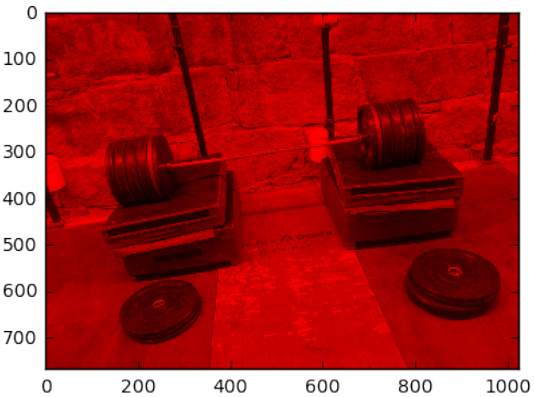

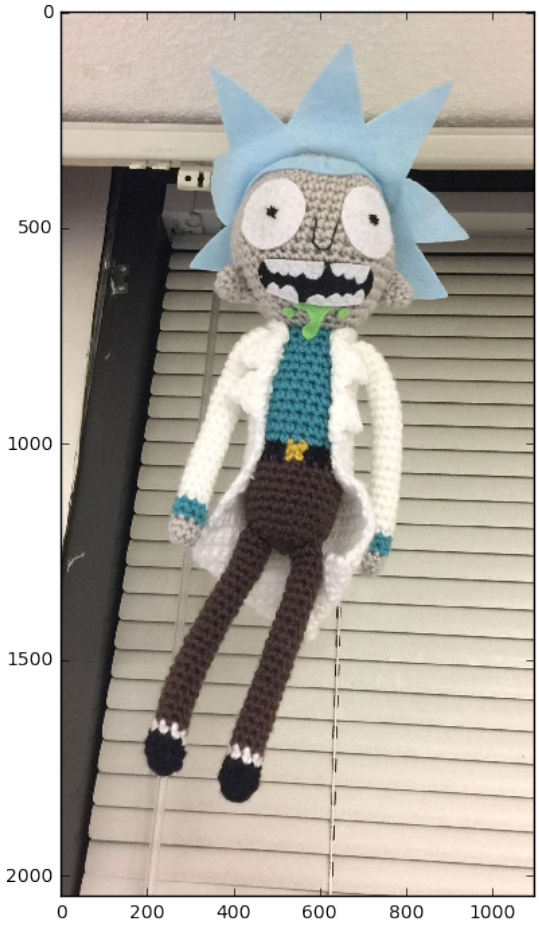
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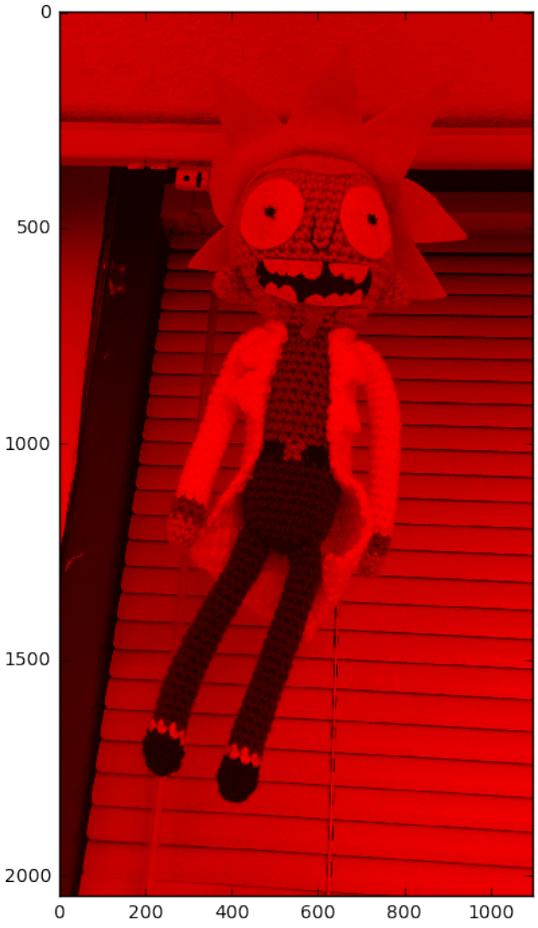
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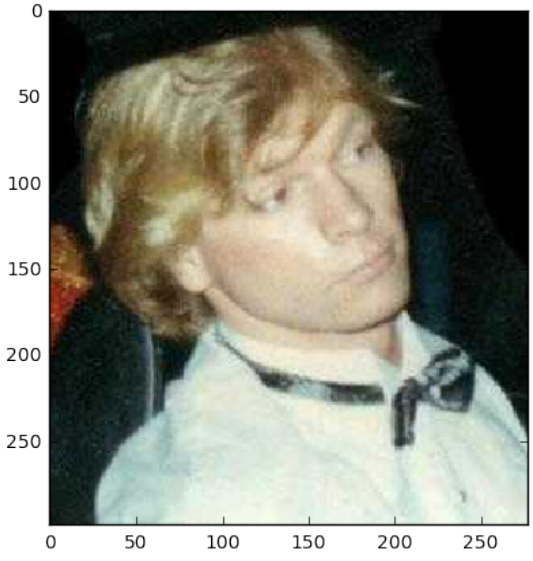
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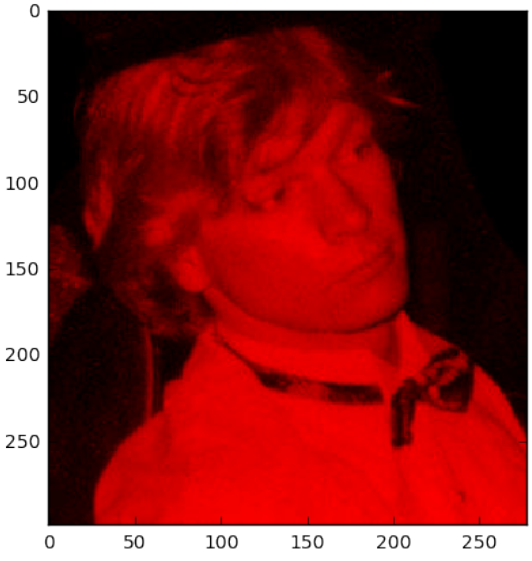
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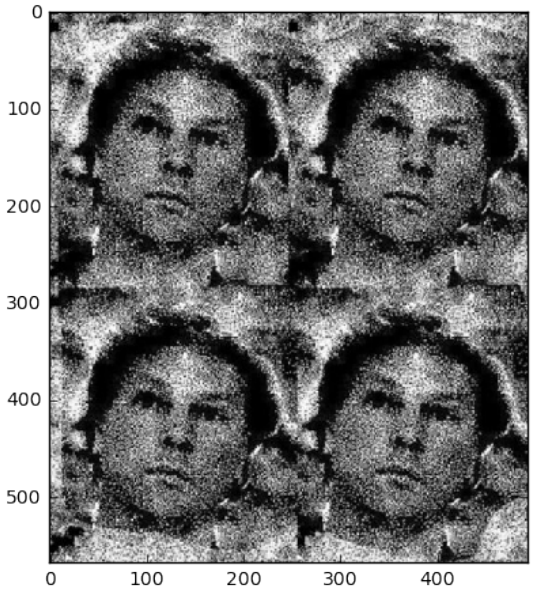

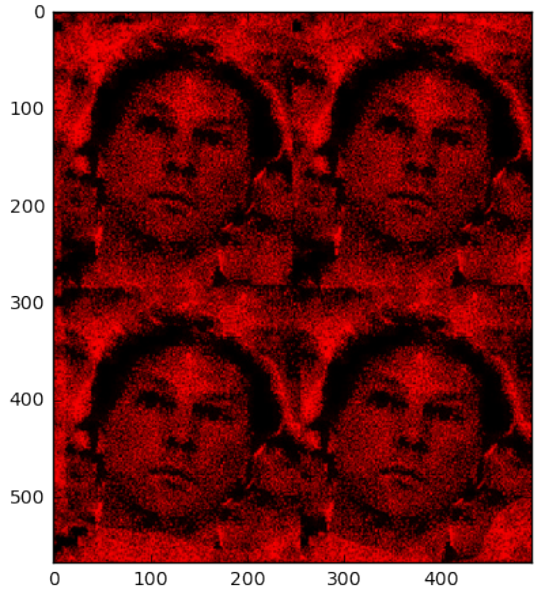


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Teddiursa
93 / 93 HP
4.24kg
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STARDUST
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TEDDIURSA CANDY
POWER UP
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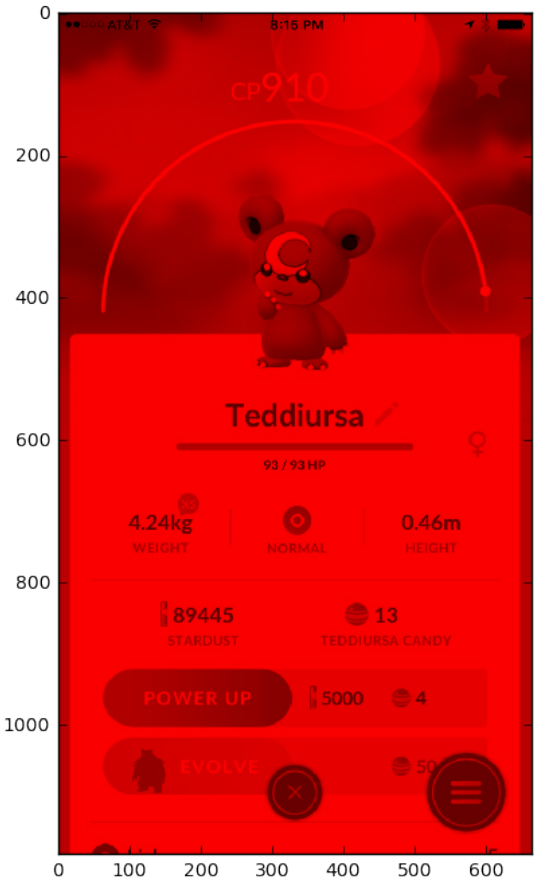
EVOLVE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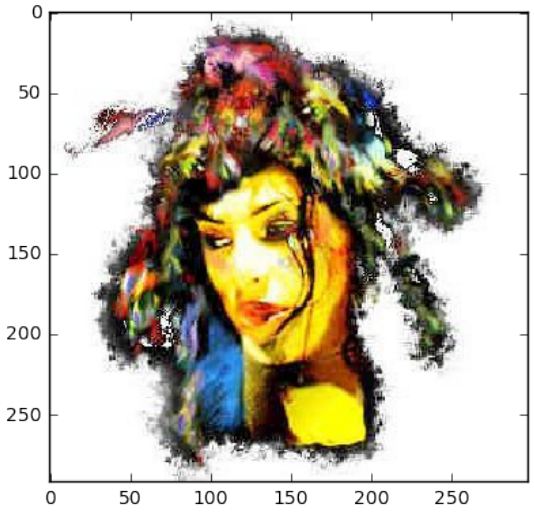
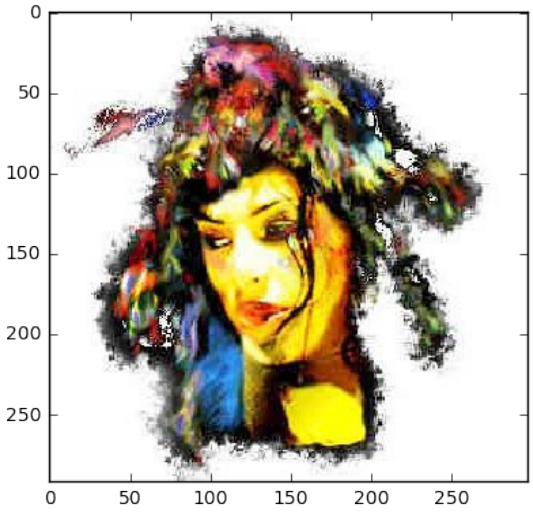
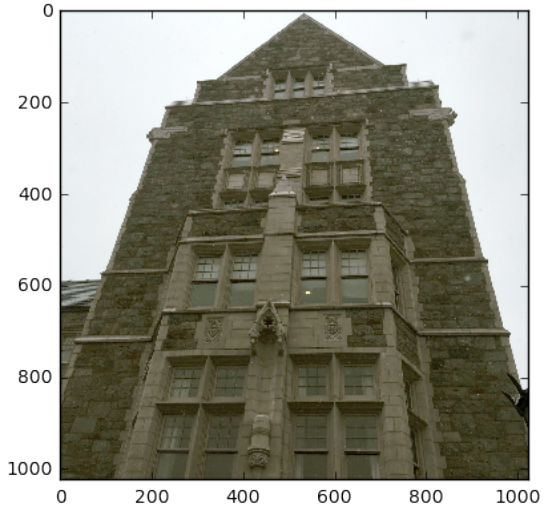
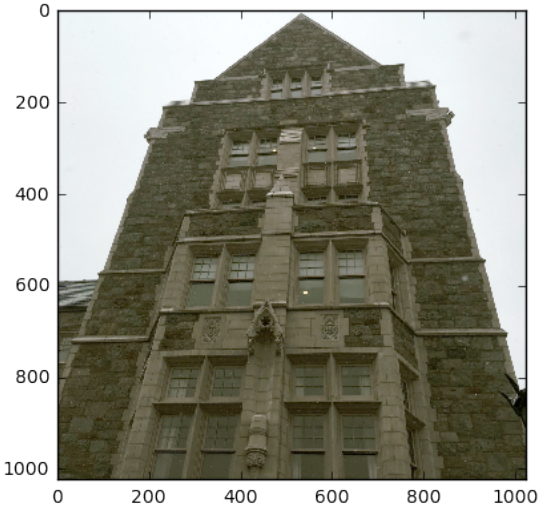
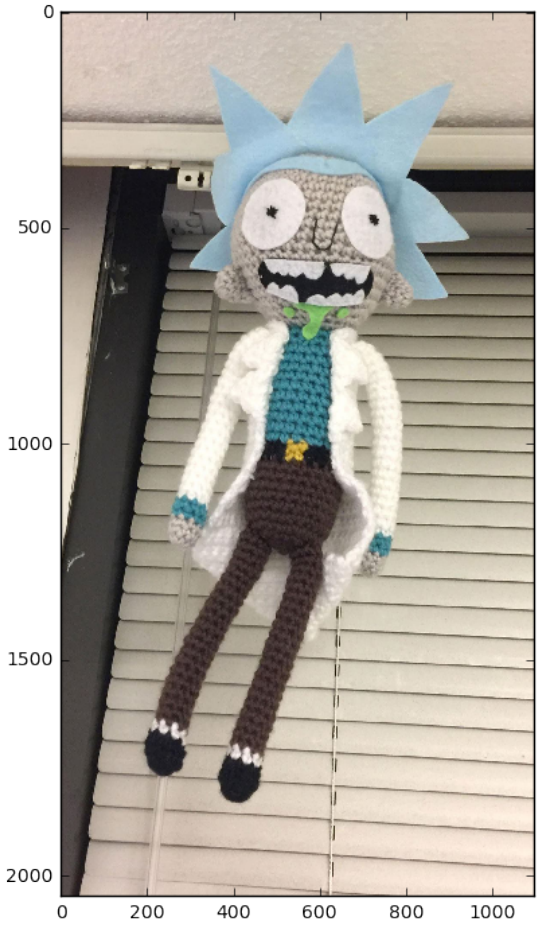
```
In [8]: filter_c = np.array([[1.0, 0.0, 0.0],
                             [0.0, 1.0, 0.0],
                             [0.0, 0.0, 1.0]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,filter_c))
```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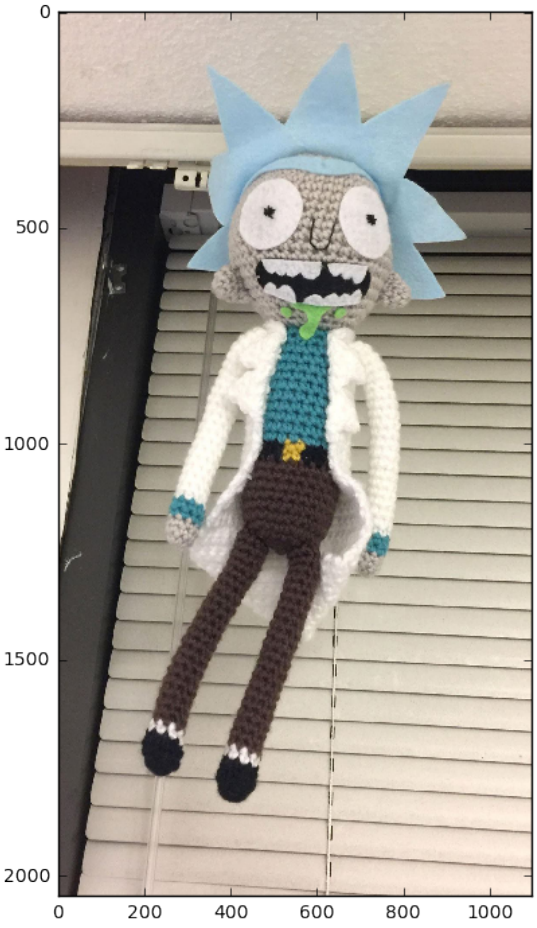
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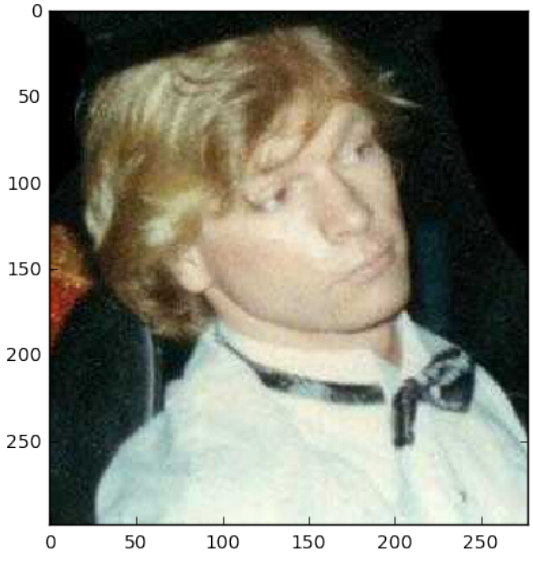
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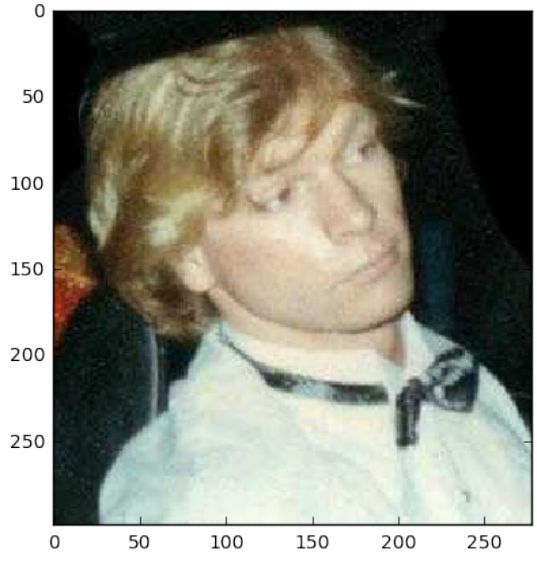
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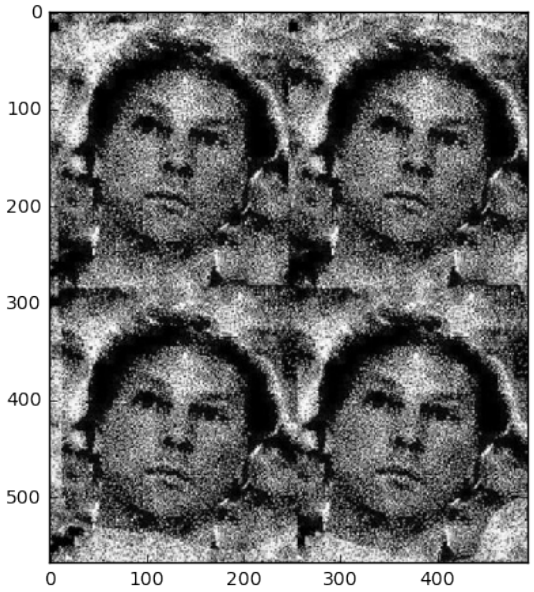

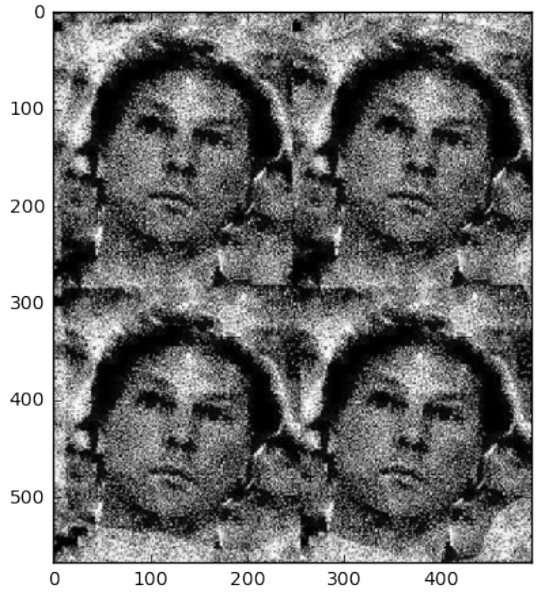


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93 / 93 HP
4.24kg
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TEDDIURSA CANDY
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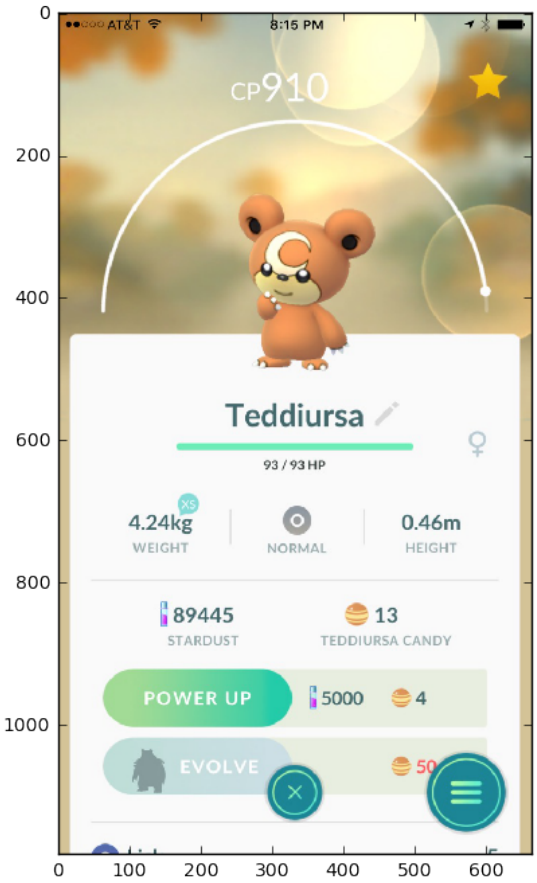
EVOLVE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STARDUST
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TEDDIURSA CANDY
POWER UP
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EVOLVE

```
In [9]: filter_d = np.array([[0.5, 0.5, 0.5],
                             [0.5, 0.5, 0.5],
                             [0.5, 0.5, 0.5]])
        # Apply to image set
        for i,img in enumerate(imgset):
            plt.figure()
            plt.subplot(1, 2, 1)
            plt.imshow(img)
            plt.subplot(1, 2, 2)
            plt.imshow(sepia(img,filter_d))
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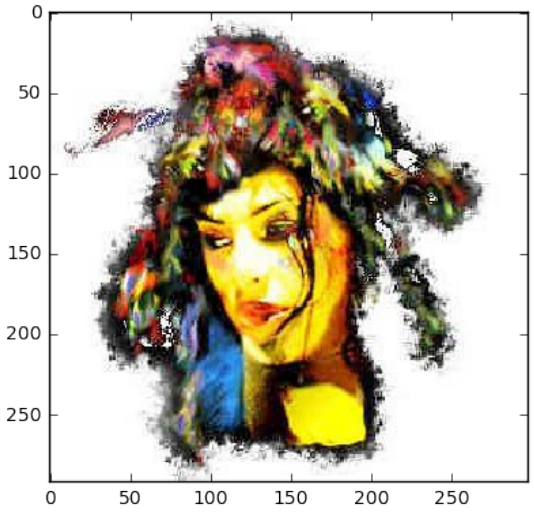
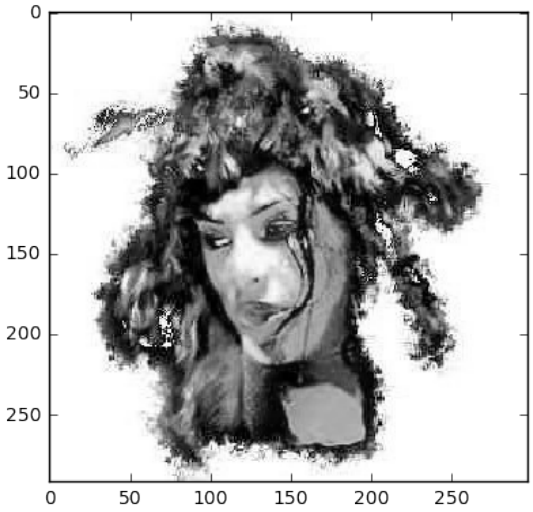
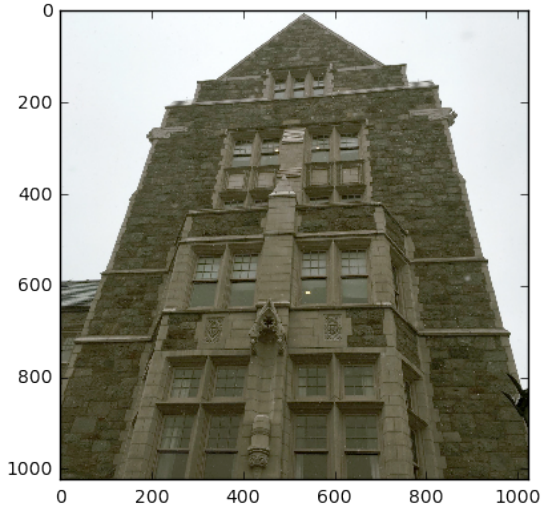
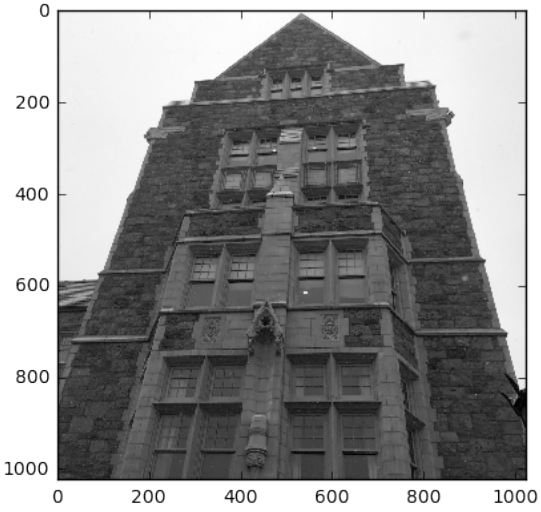
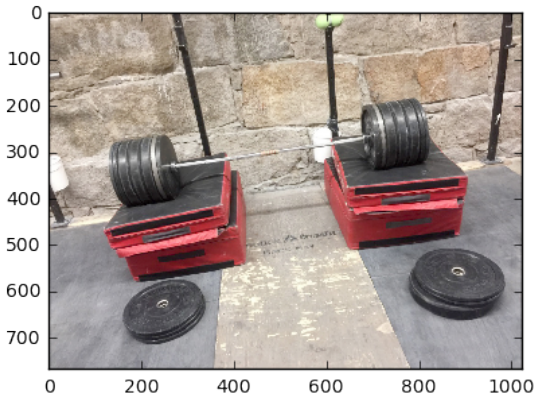


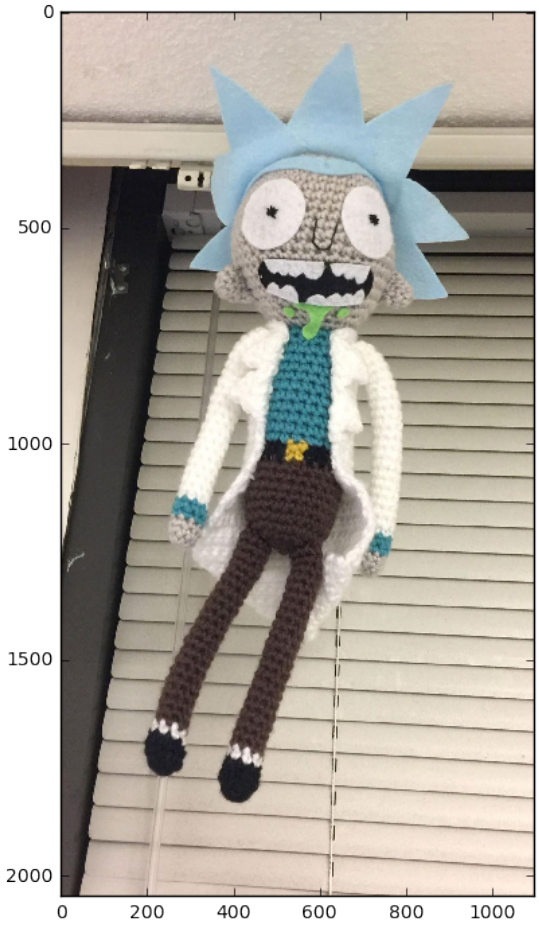
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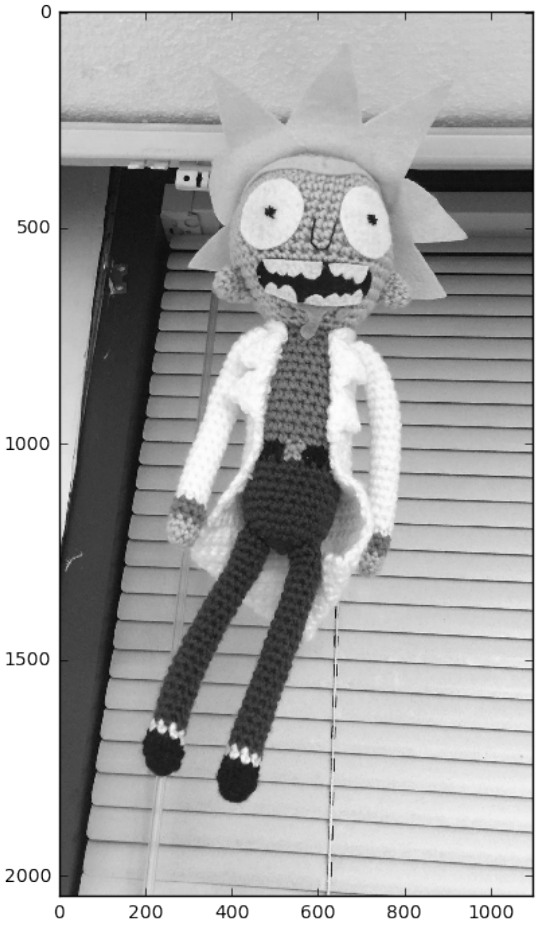
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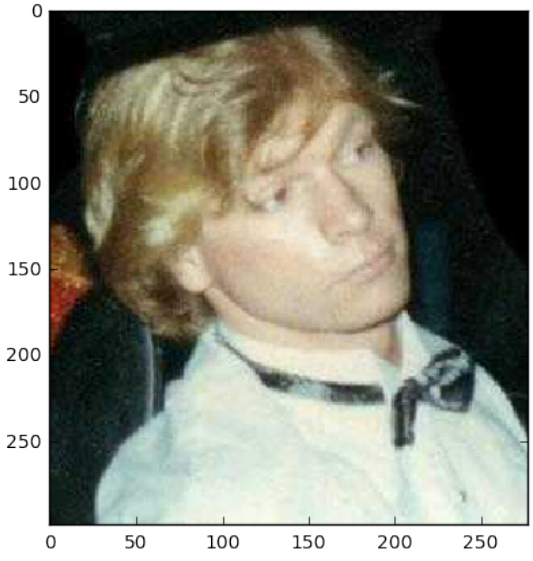
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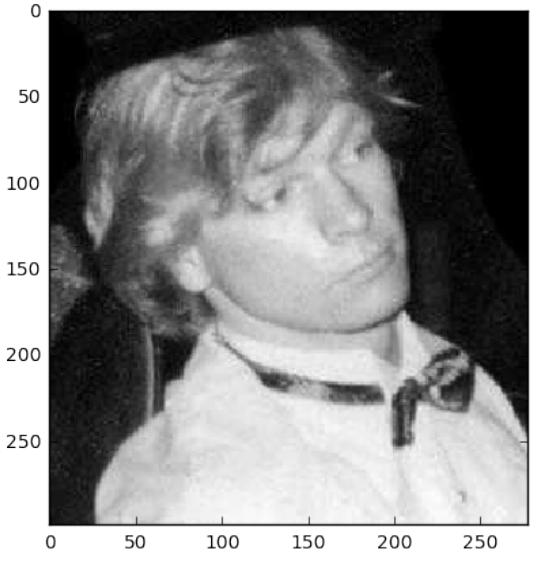
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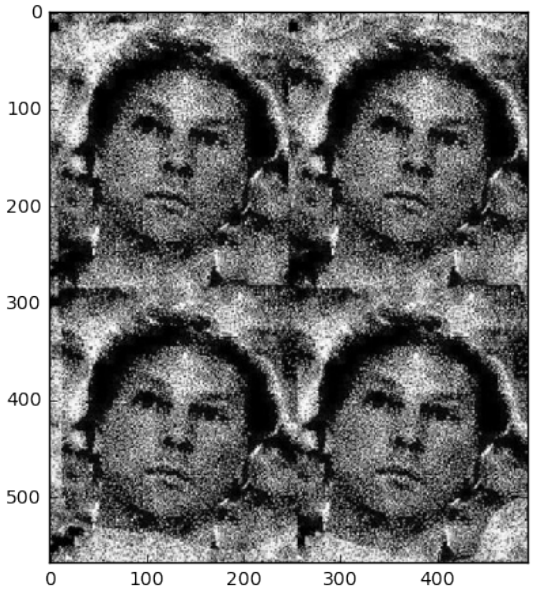
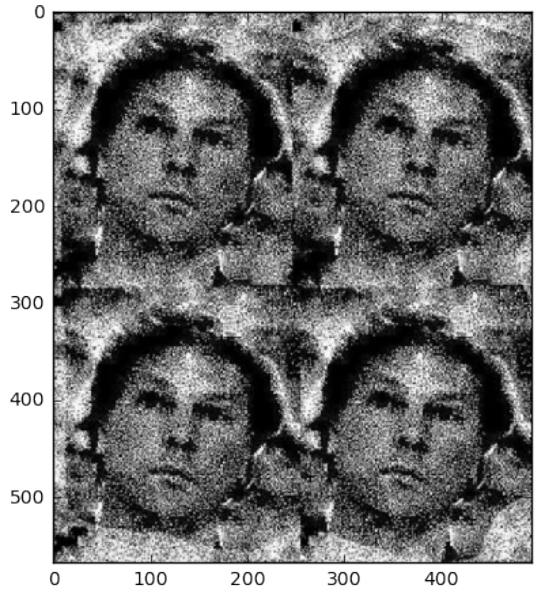
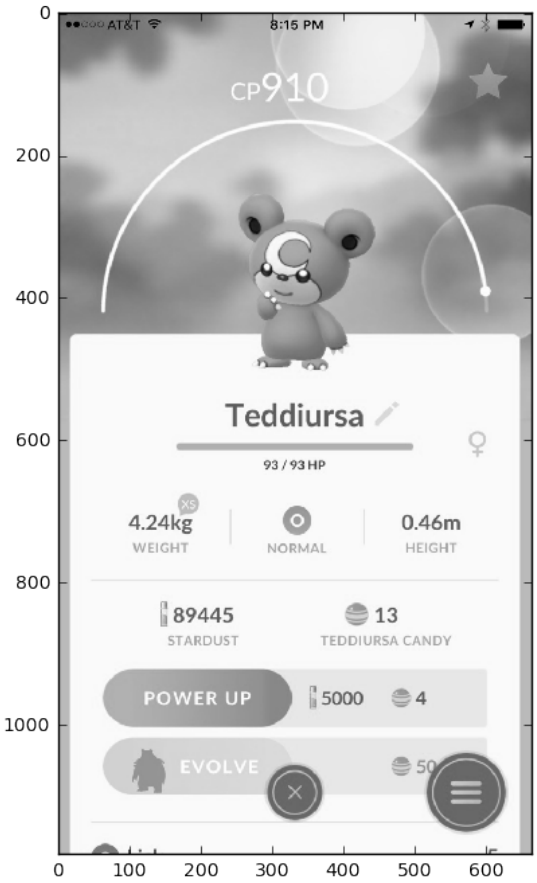
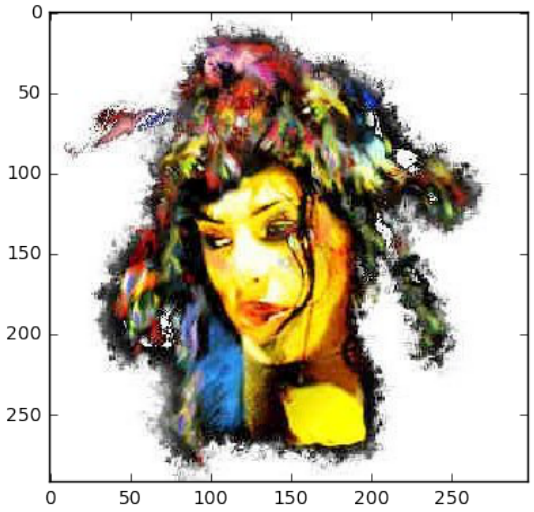
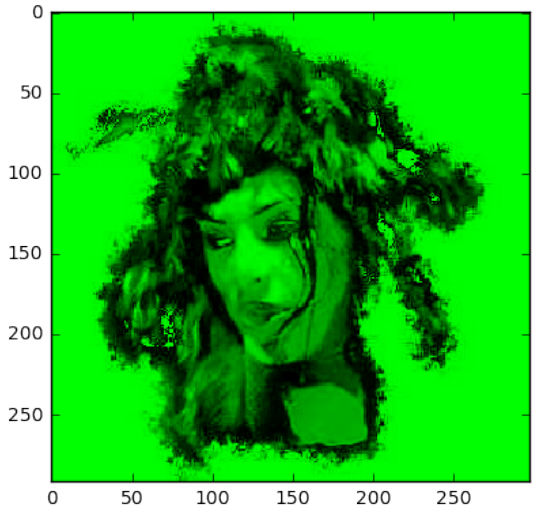
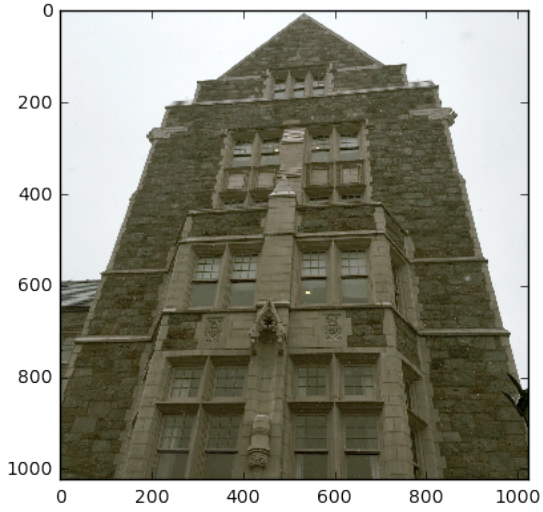
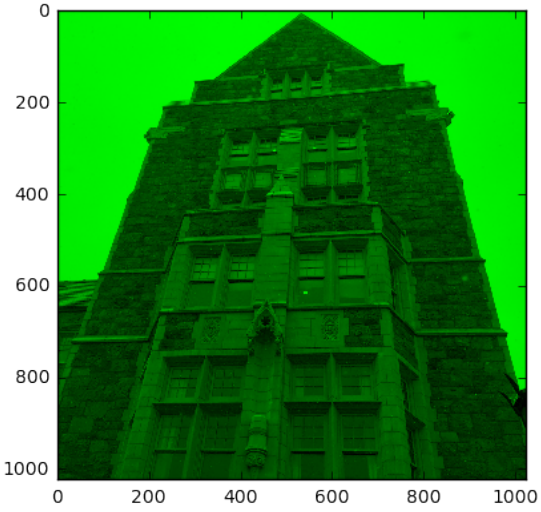
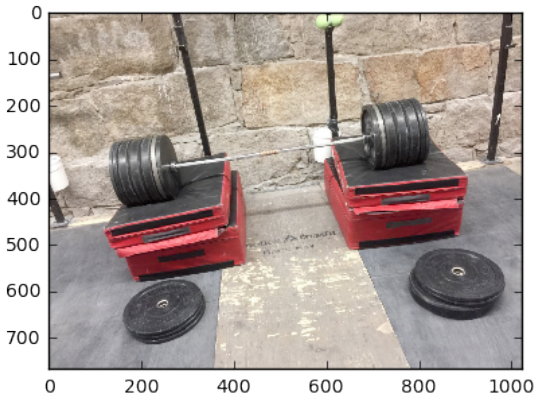
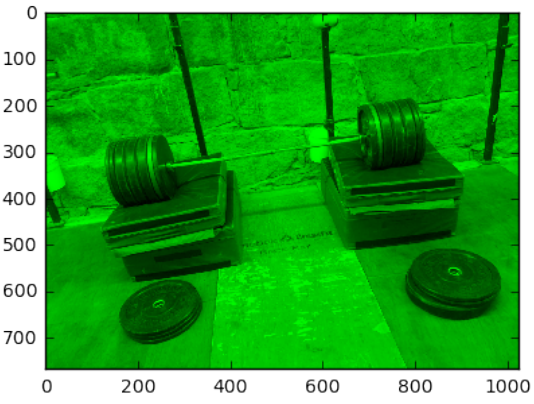


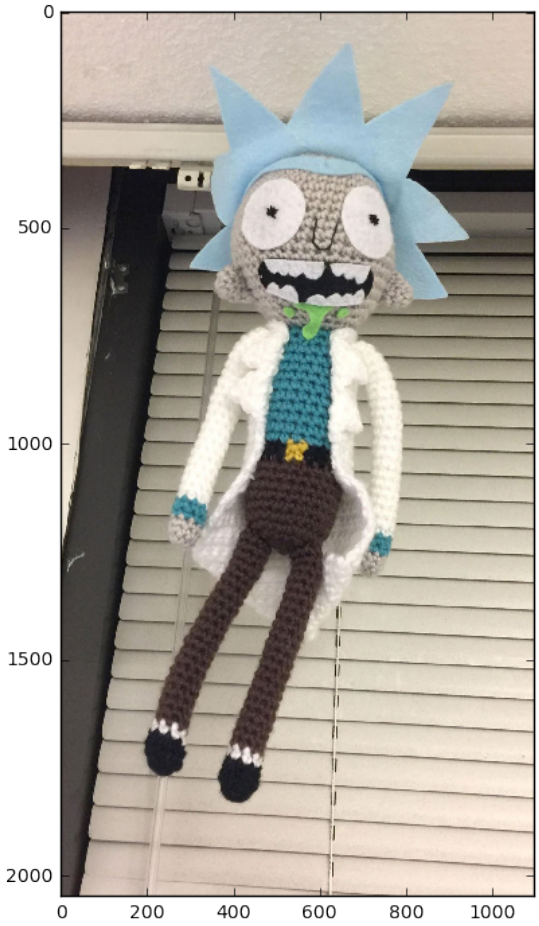



AT&T
8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE


AT&T
8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE

```
In [10]: filter_e = np.array([[0.0, 0.0, 0.0],
                              [1.0, 1.0, 1.0],
                              [0.0, 0.0, 0.0]])
         # Apply to image set
         for i,img in enumerate(imgset):
             plt.figure()
             plt.subplot(1, 2, 1)
             plt.imshow(img)
             plt.subplot(1, 2, 2)
             plt.imshow(sepia(img,filter_e))
```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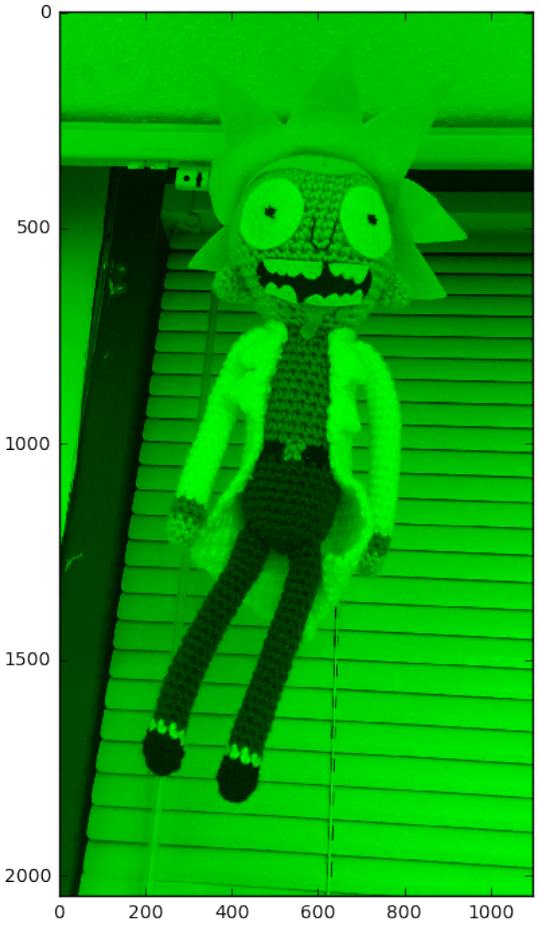
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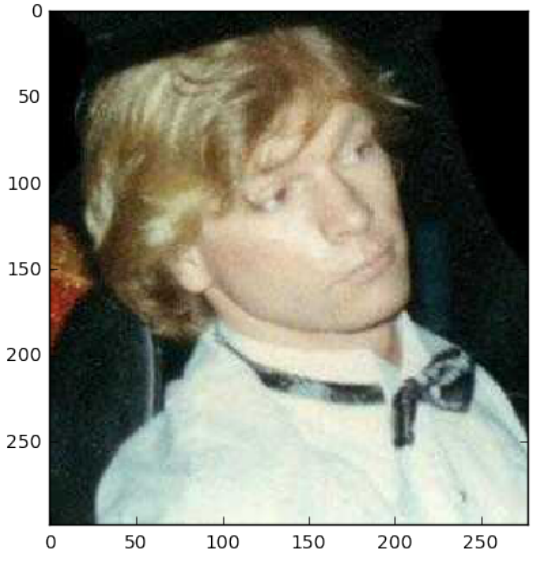
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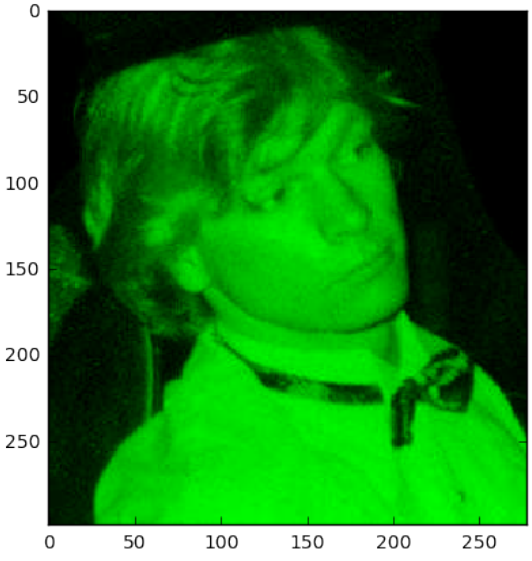
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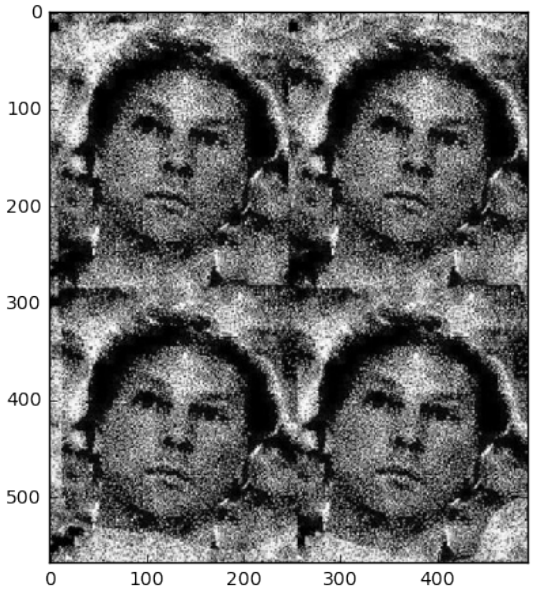
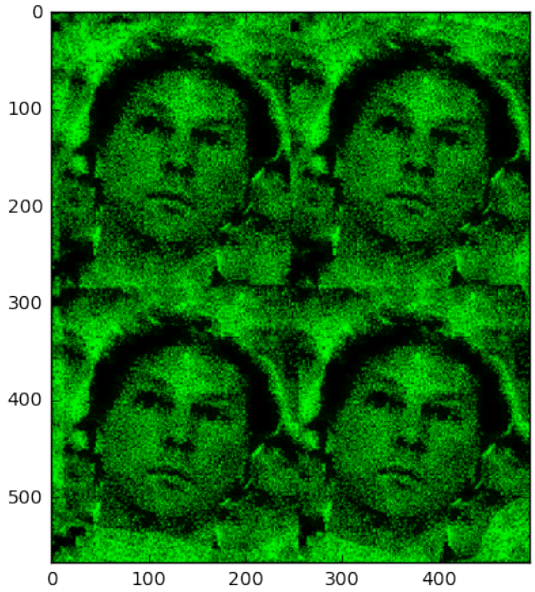
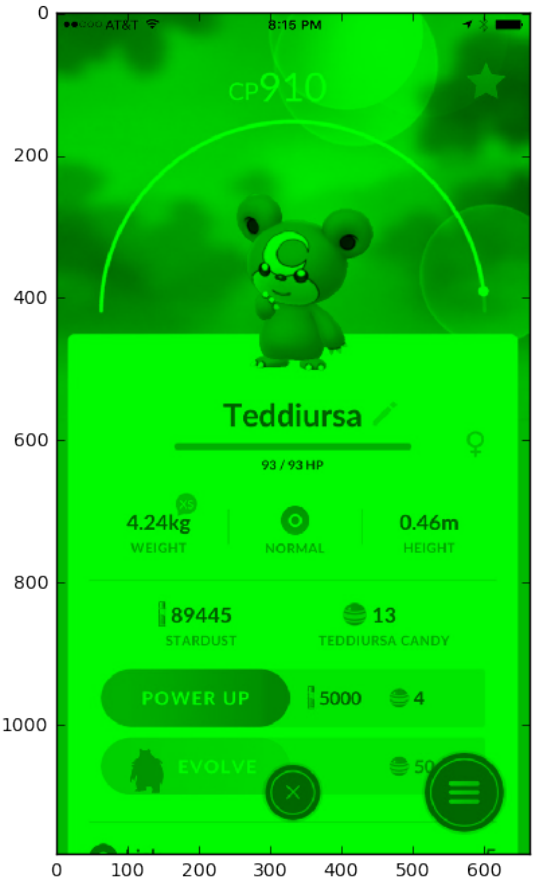
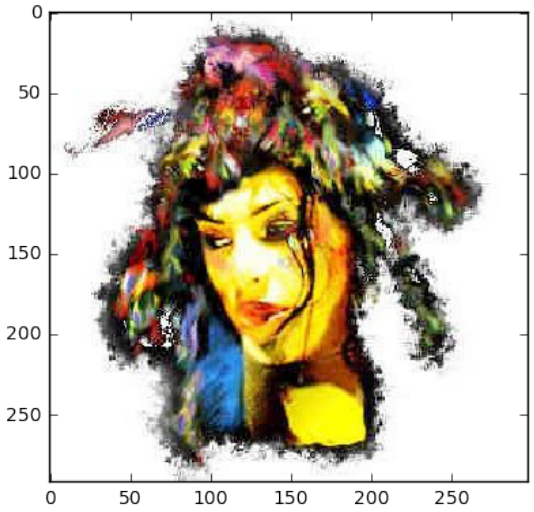
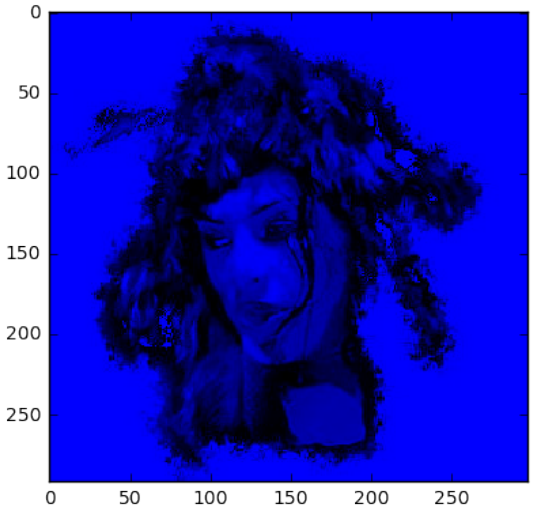
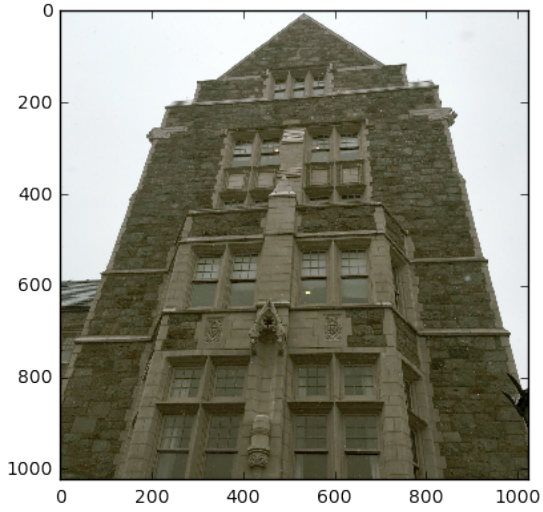
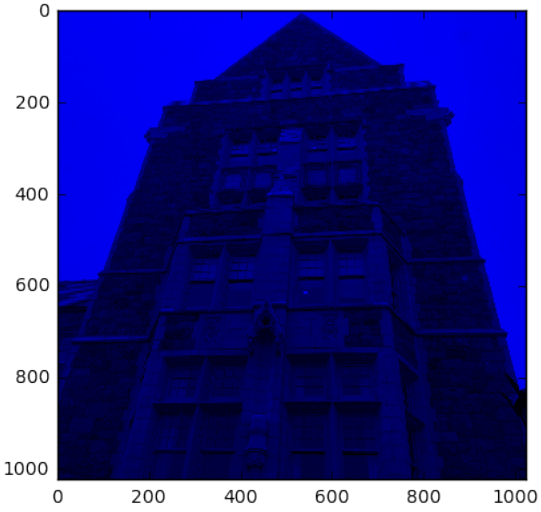
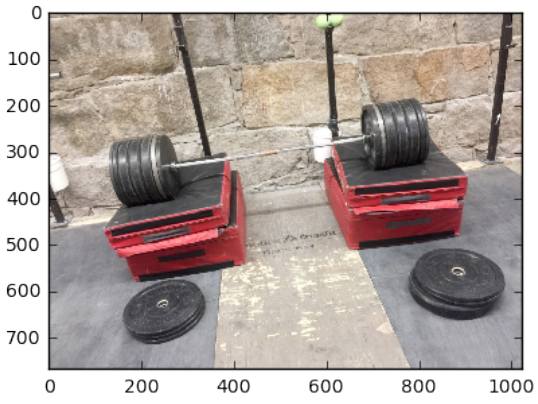
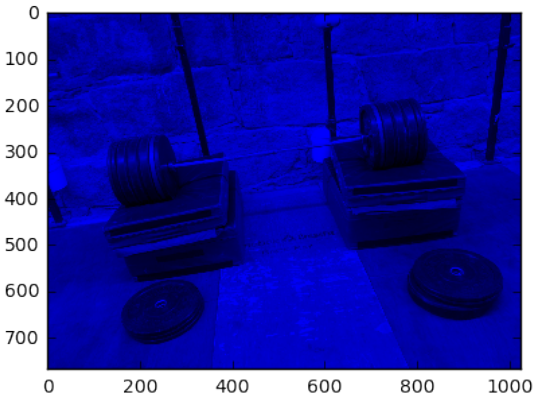


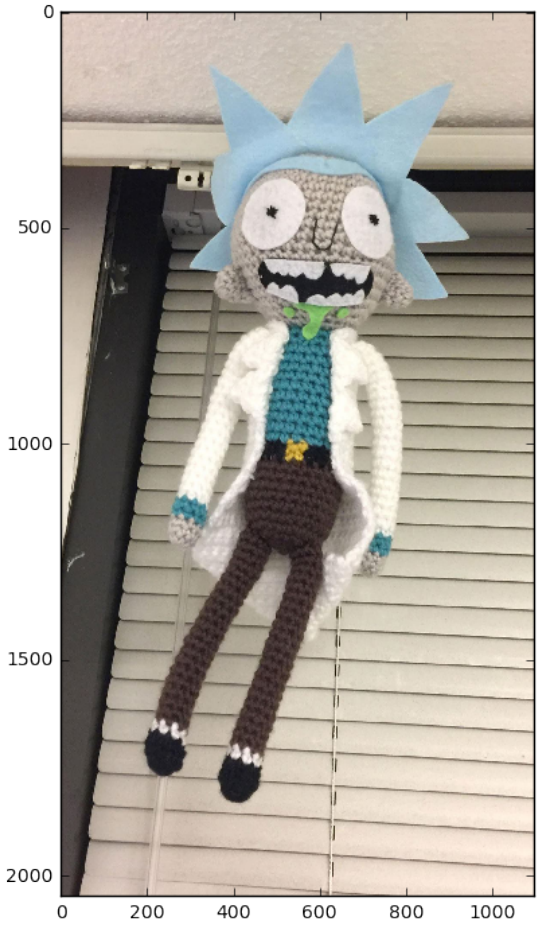



8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE


8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE

```
In [11]: filter_f = np.array([[0.0, 0.0, 0.0],
                              [0.0, 0.0, 0.0],
                              [1.0, 1.0, 1.0]])
         # Apply to image set
         for i,img in enumerate(imgset):
             plt.figure()
             plt.subplot(1, 2, 1)
             plt.imshow(img)
             plt.subplot(1, 2, 2)
             plt.imshow(sepia(img,filter_f))
```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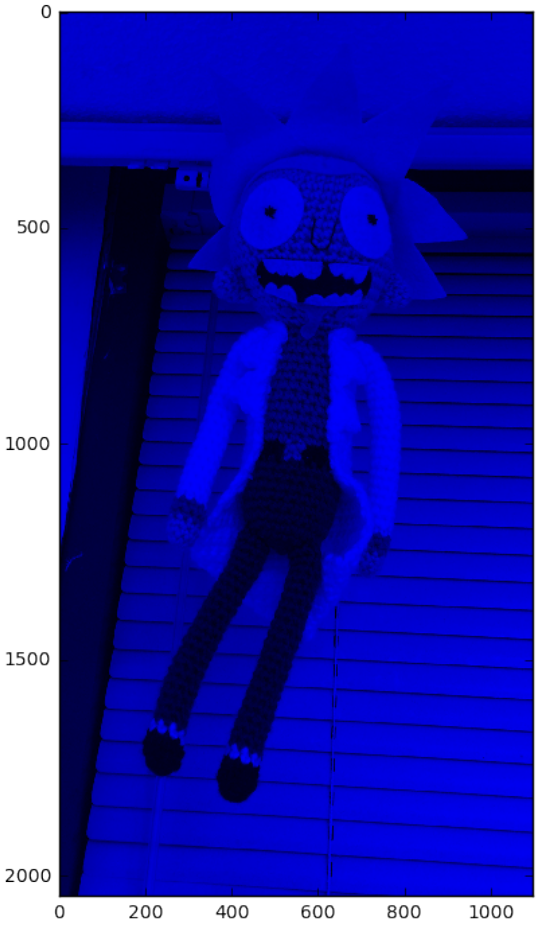
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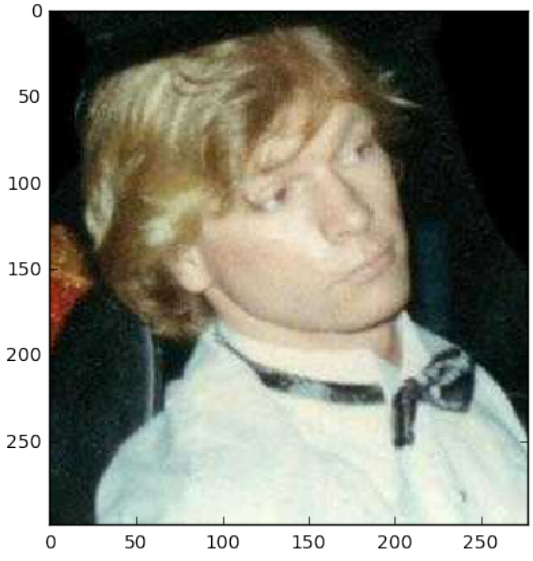
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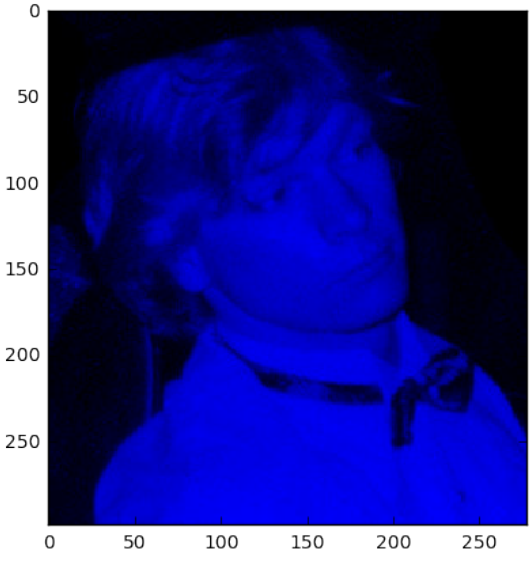
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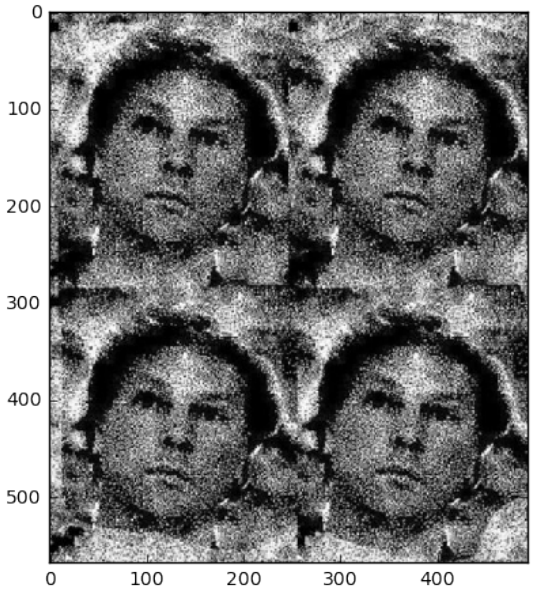
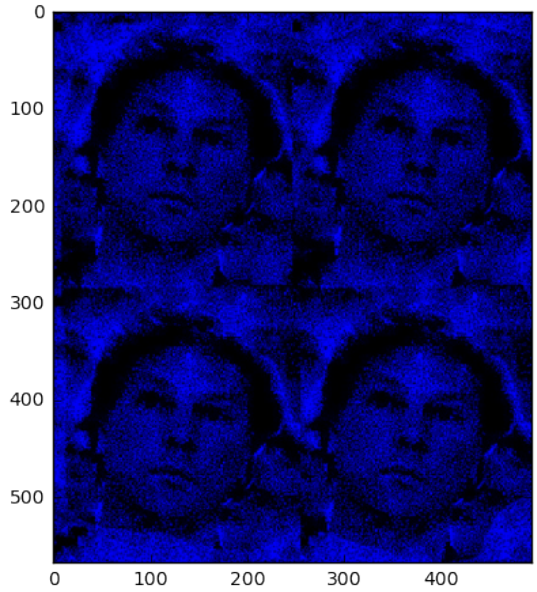
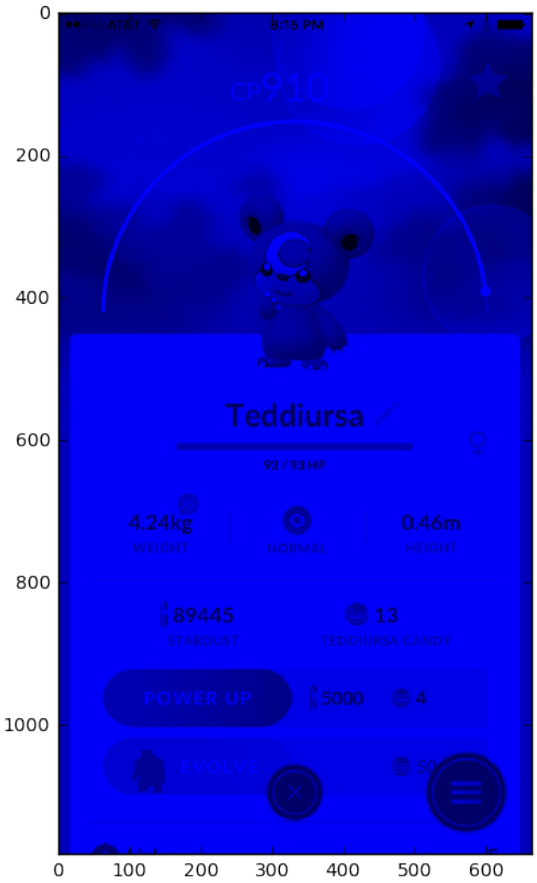
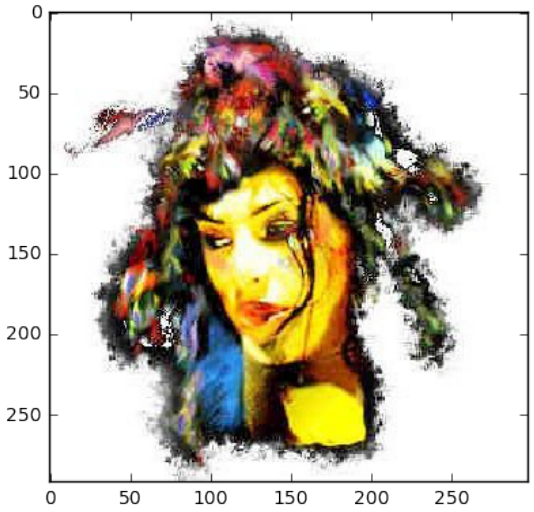
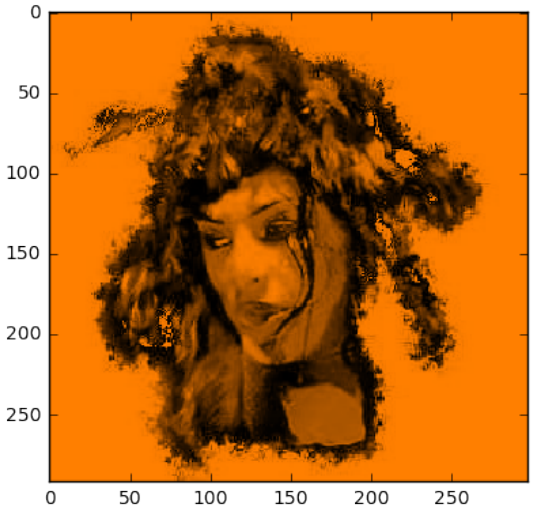
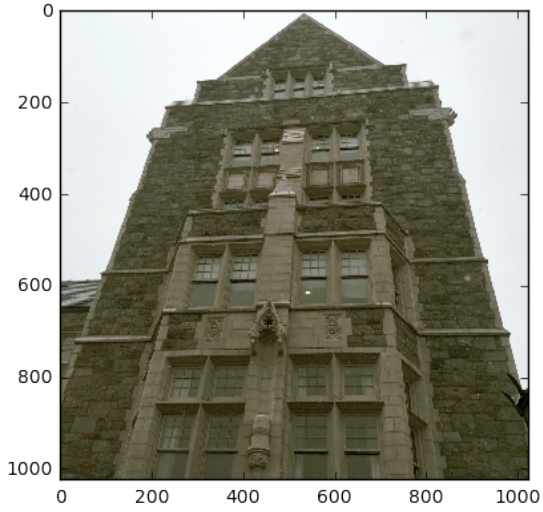
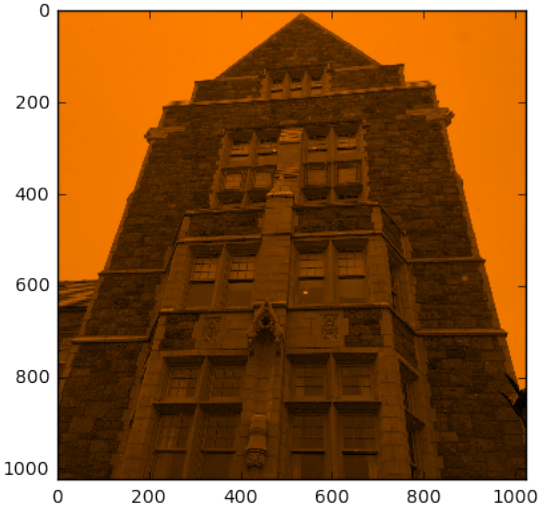
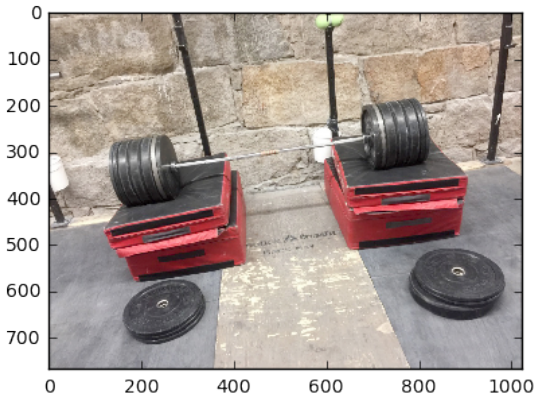


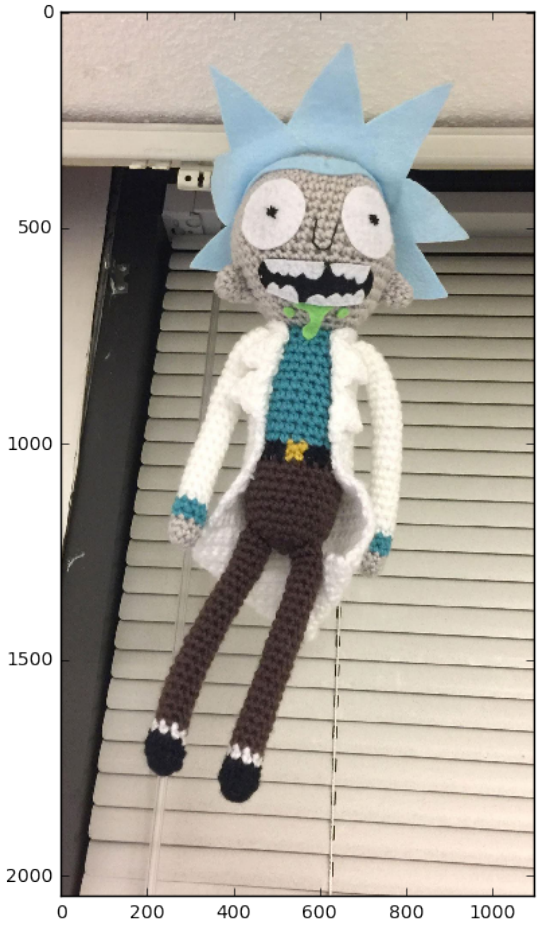



8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE



```
In [12]: filter_g = np.array([[1.0, 1.0, 1.0],
                              [0.5, 0.5, 0.5],
                              [0.0, 0.0, 0.0]])
         # Apply to image set
         for i,img in enumerate(imgset):
             plt.figure()
             plt.subplot(1, 2, 1)
             plt.imshow(img)
             plt.subplot(1, 2, 2)
             plt.imshow(sepia(img,filter_g))
```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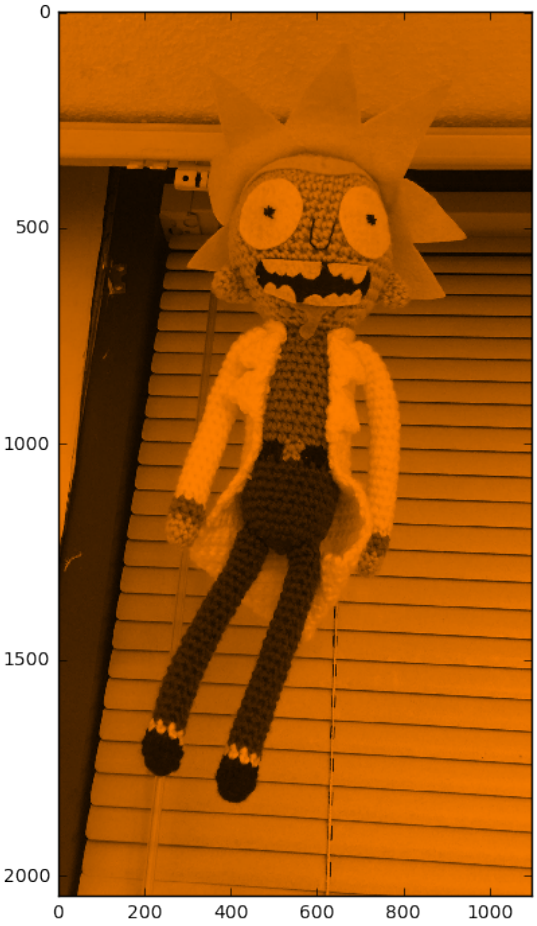
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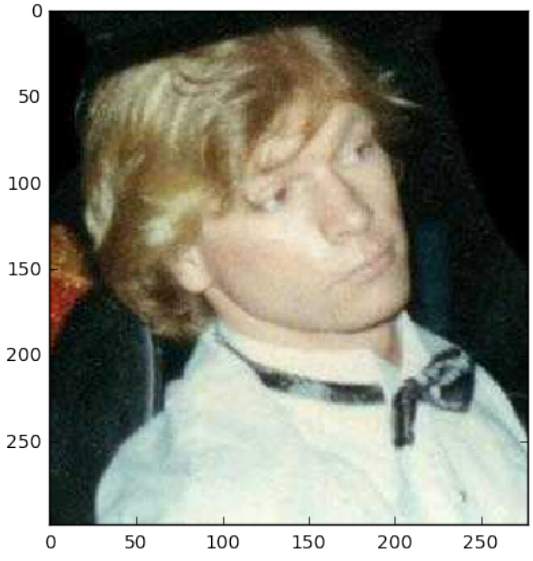
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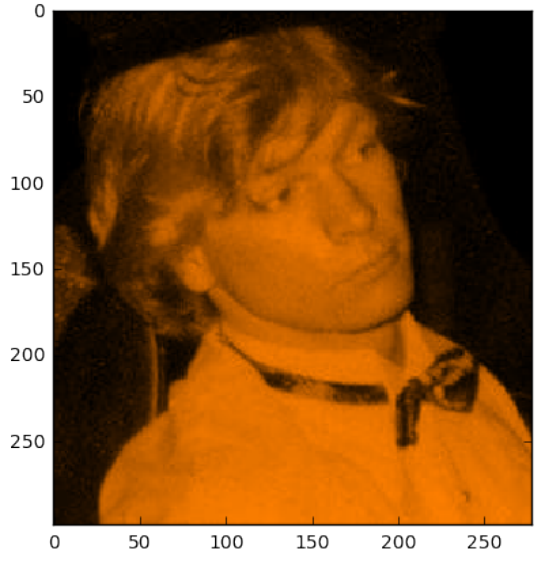
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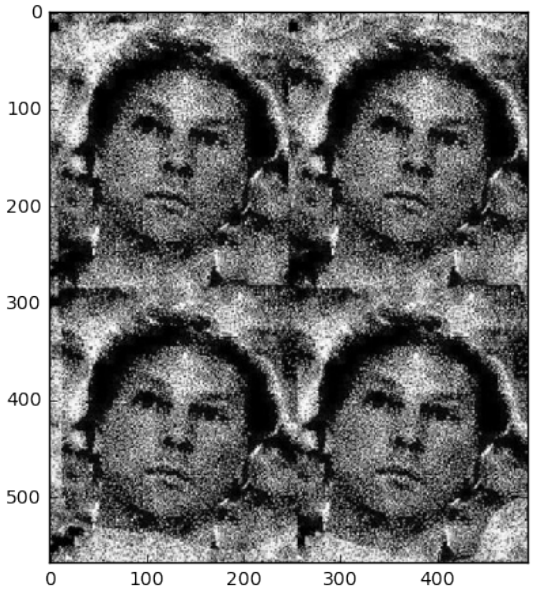

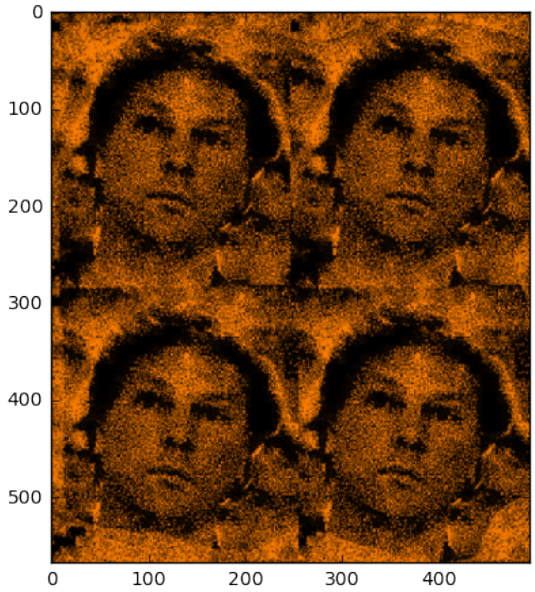


8:15 PM
CP910
Teddiursa
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WEIGHT
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0.46m
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STARDUST
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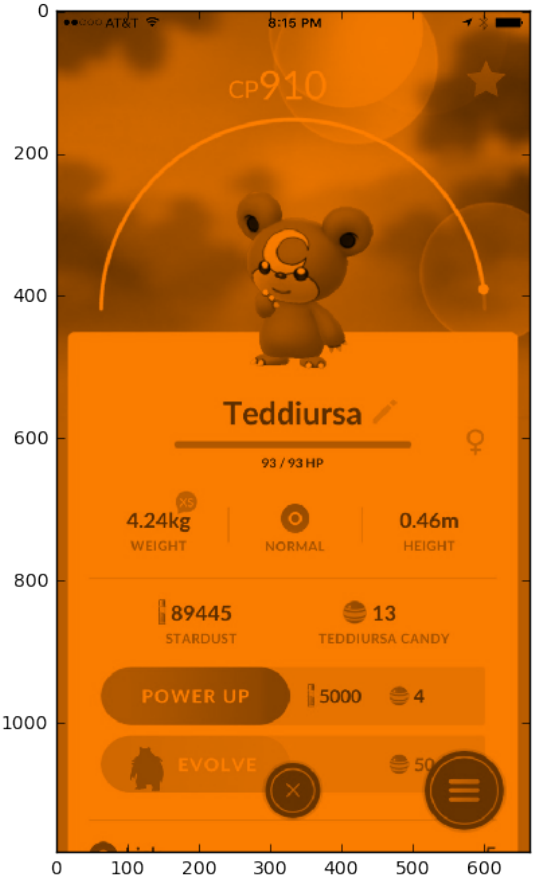
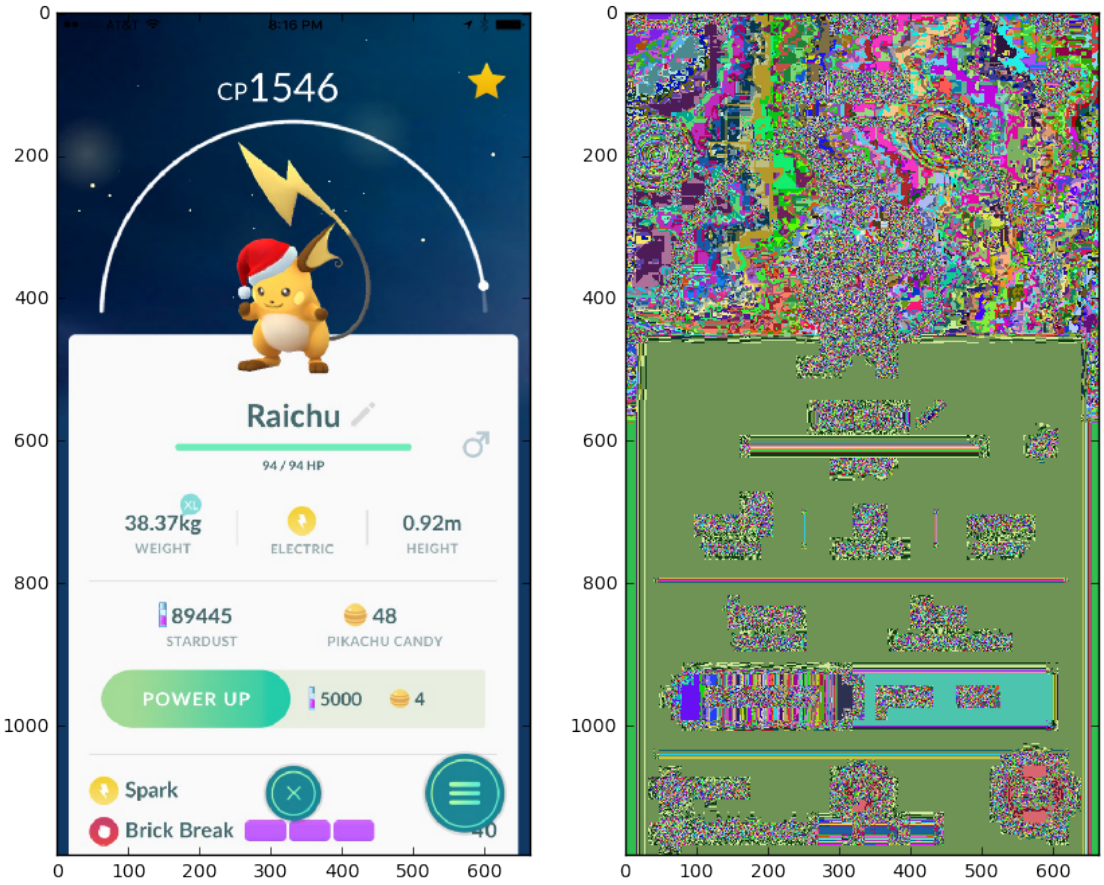
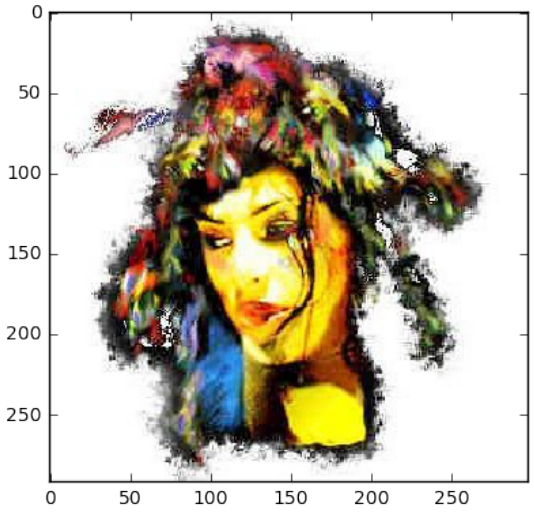
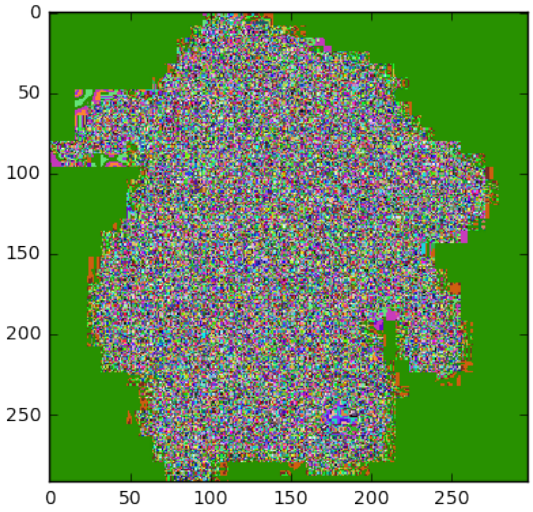
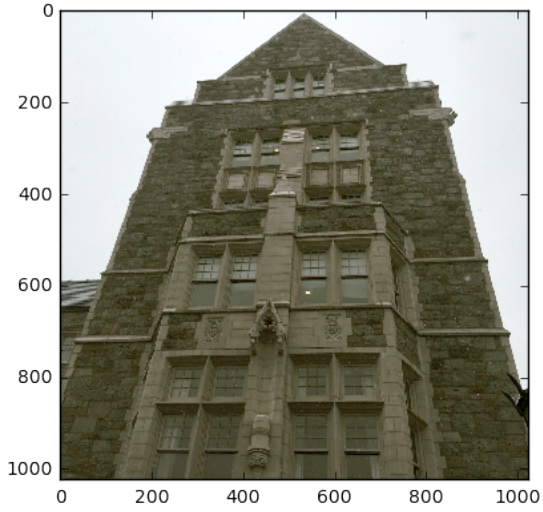
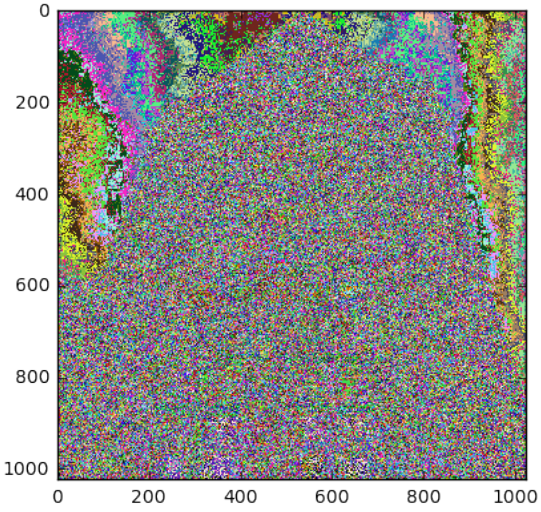
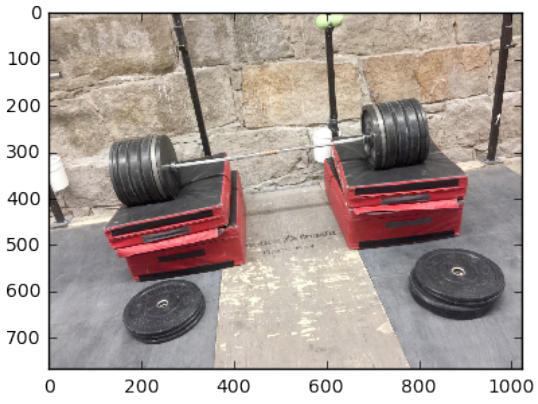
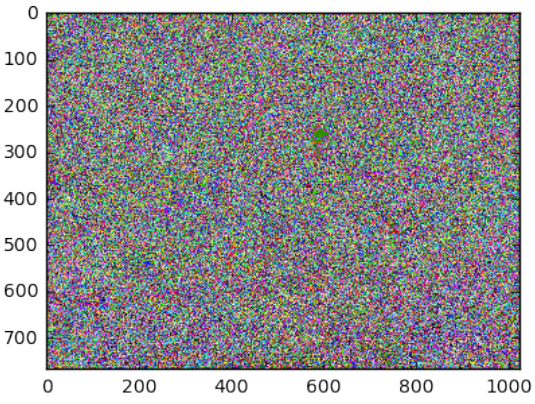
POWER UP
5000
4
EVOLVE

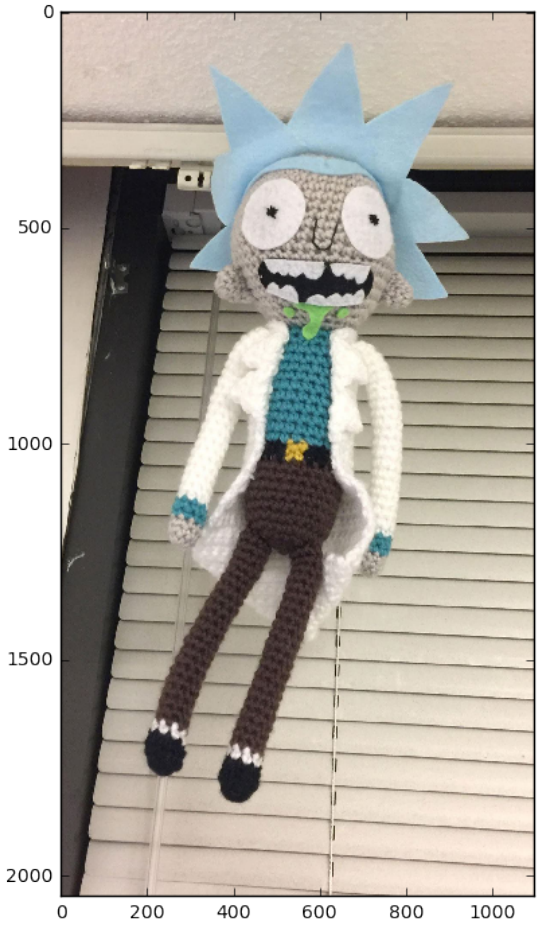

8:15 PM
CP910
Teddiursa
93 / 93 HP
4.24kg
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE

```
In [13]: def sepia_bad(image, filter):
             sepia_img = image.dot(filter.T) #Dot product the image and array
             #T is the transpose of the array.
             #Since our filter lines do not have unit sum, so we need to rescale
             # sepia_img /= sepia_img.max()
             return sepia_img

In [14]: # Apply to image set
         for i,img in enumerate(imgset):
             plt.figure()
             plt.subplot(1, 2, 1)
             plt.imshow(img)
             plt.subplot(1, 2, 2)
             plt.imshow(sepia_bad(img,sepia_filter))
```

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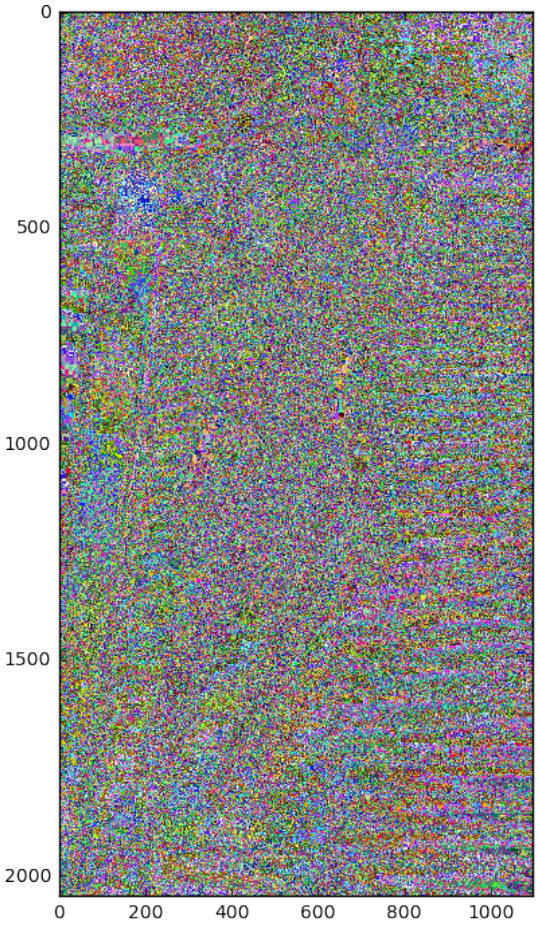
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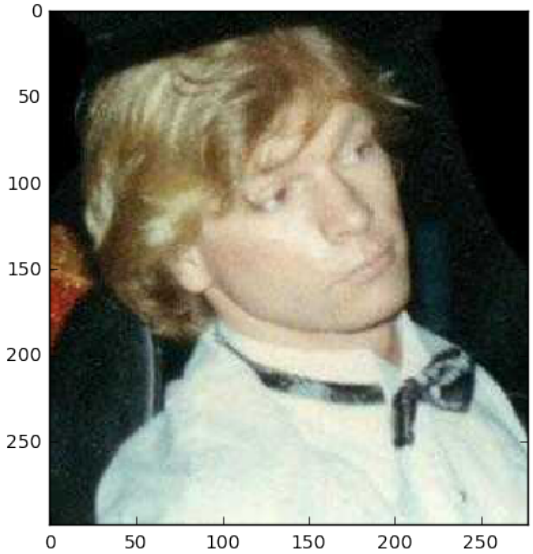
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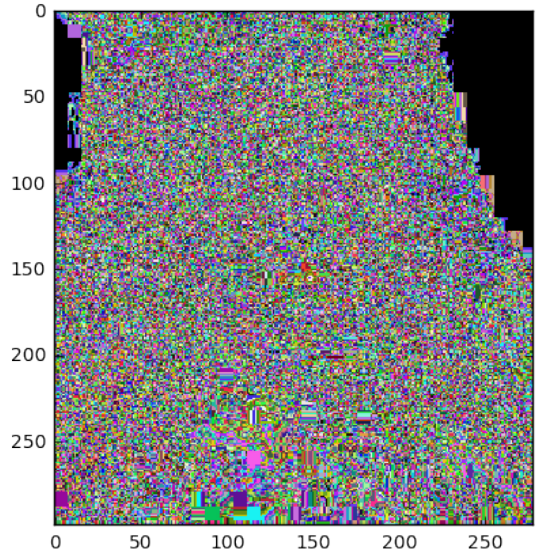
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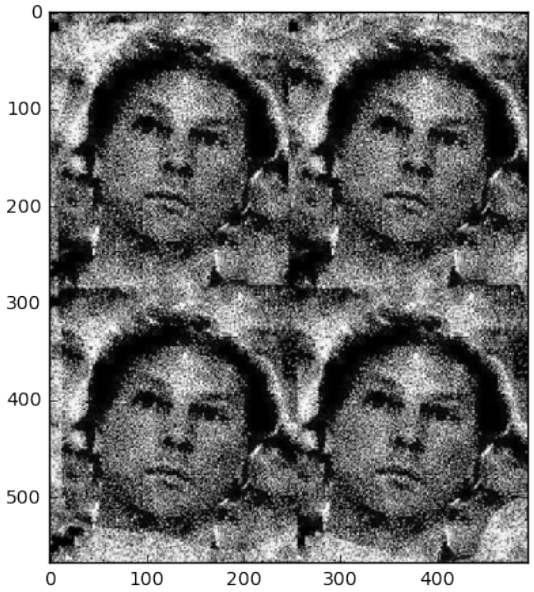

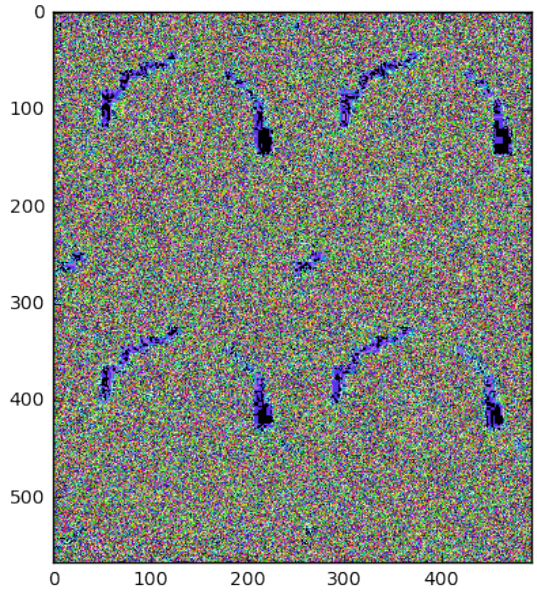


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CP910
Teddiursa
93 / 93 HP
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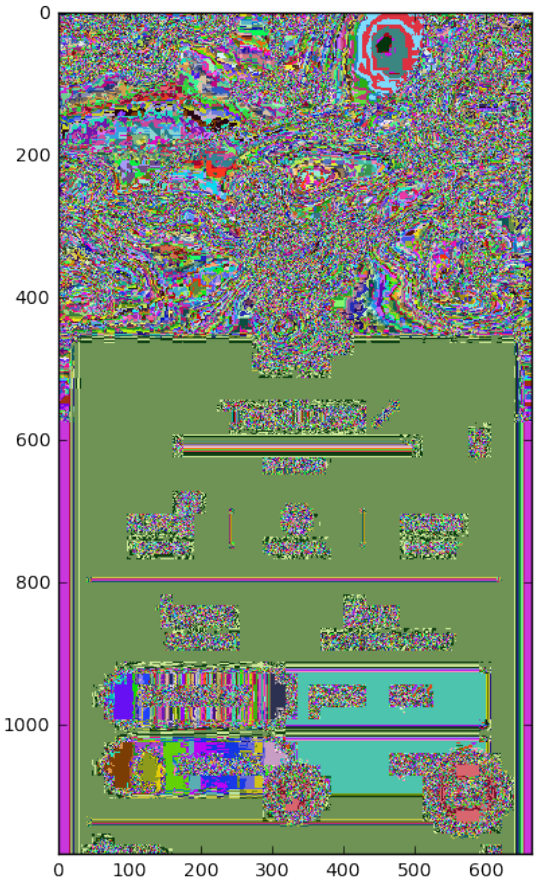
WEIGHT
NORMAL
0.46m
HEIGHT
89445
STARDUST
13
TEDDIURSA CANDY
POWER UP
5000
4
EVOLVE



2 Python Tutorials

Python 101 Beginning Python http://www.rexx.com/~dkuhlman/python_101/python_101.html
The Official Python Tutorial - [http://www.python.org/doc/current/tut/tut.html](http://www.python.org/
The Python Quick Reference -http://rgruet.free.fr/PQR2.3.html
YouTube Python Tutorials
Google Python Class - http://www.youtube.com/watch?v=tKTZoB2Vjuk
Python Fundamentals Training – Classes http://www.youtube.com/watch?v=rKzZEtxIX14
Python 2.7 Tutorial Derek Banas - http://www.youtube.com/watch?v=UQi-L-_chcc
Python Programming Tutorial thenewboston - http://www.youtube.com/watch?v=4Mf0h3HphEA

3 Evaluation

Install Anaconda 4 for Python 2.7 and get this notebook to run with a set of your images.