

Professor_Bear_Image_Analysis_Watershed_Agorithm

March 14, 2017

1 Professor Bear :: Image Analysis :: Watershed Agorithm

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
```

```

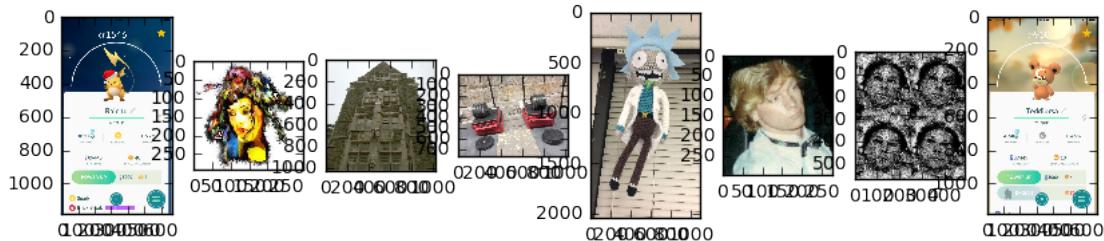
from scipy import ndimage as nd
from scipy.ndimage import convolve
from skimage import feature
import glob # for bulk file import

# Set defaults
plt.rcParams['image.cmap'] = 'gray' # Display grayscale images in... grayscale
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("images/*.jpg") + glob.glob("images/*.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 Watershed Algorithm

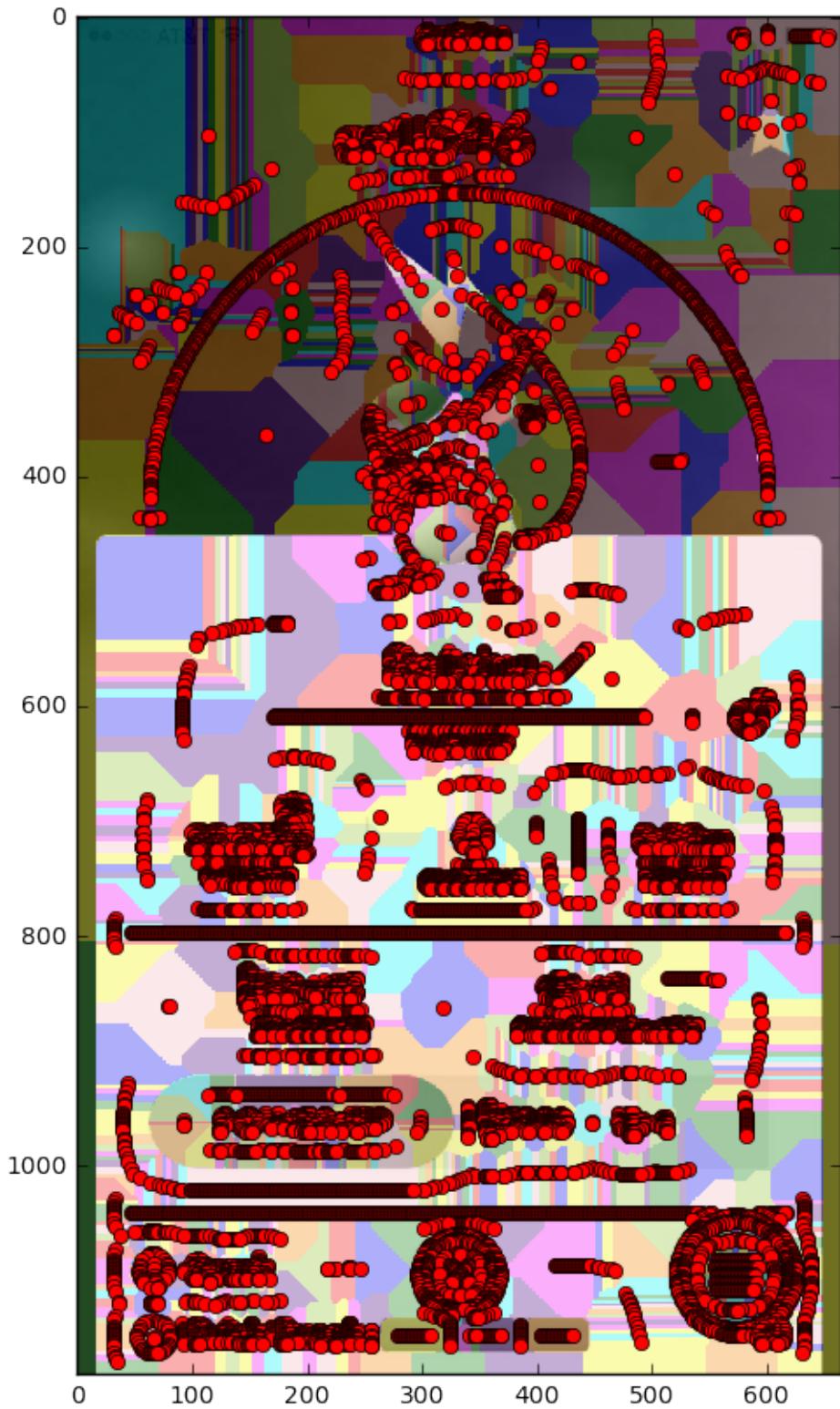
Watershed Algorithm

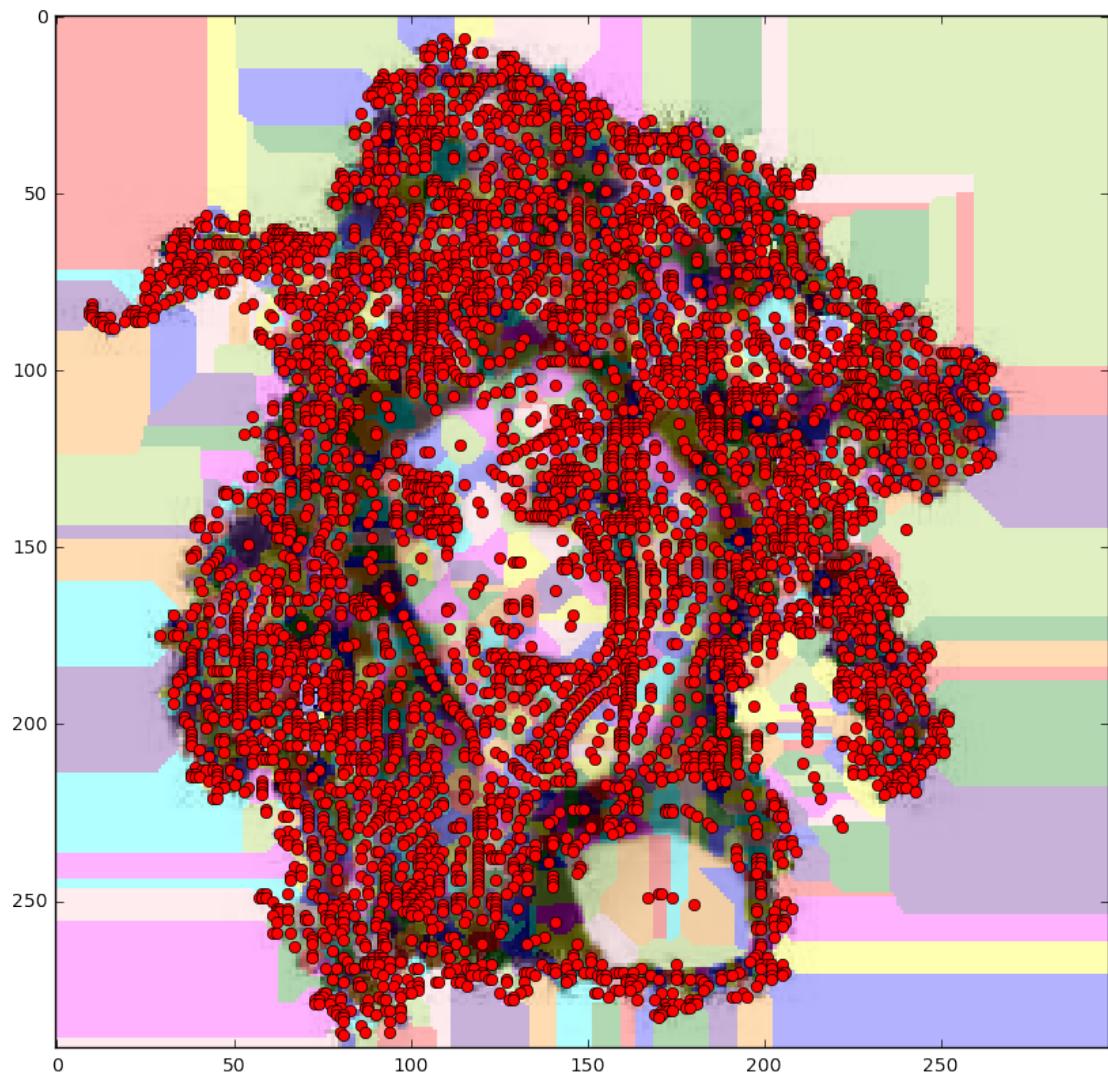
```

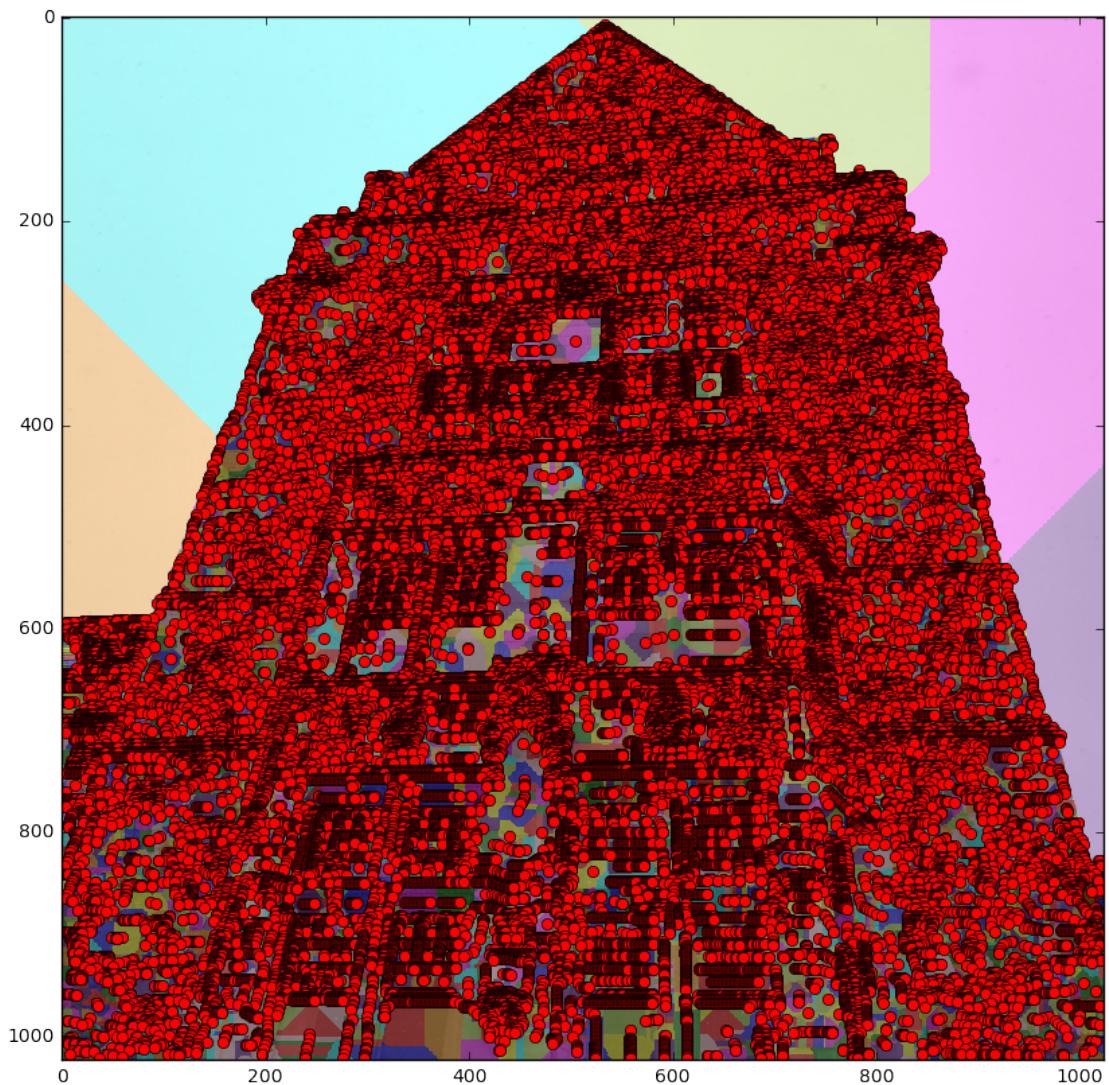
In [2]: # Show a watershed plot of an image
def plot_watershed(img, sigma):
    edges = feature.canny(img, sigma)
    distance_from_edge = nd.distance_transform_edt(~edges)
    peaks = peak_local_max(distance_from_edge)
    peaks_image = np.zeros(img.shape, np.bool)
    peaks_image[tuple(np.transpose(peaks))] = True
    seeds, num_seeds = nd.label(peaks_image)
    plt.plot(peaks[:, 1], peaks[:, 0], 'ro')
    ws = watershed(edges, seeds)
    plt.imshow(color.label2rgb(ws, img))

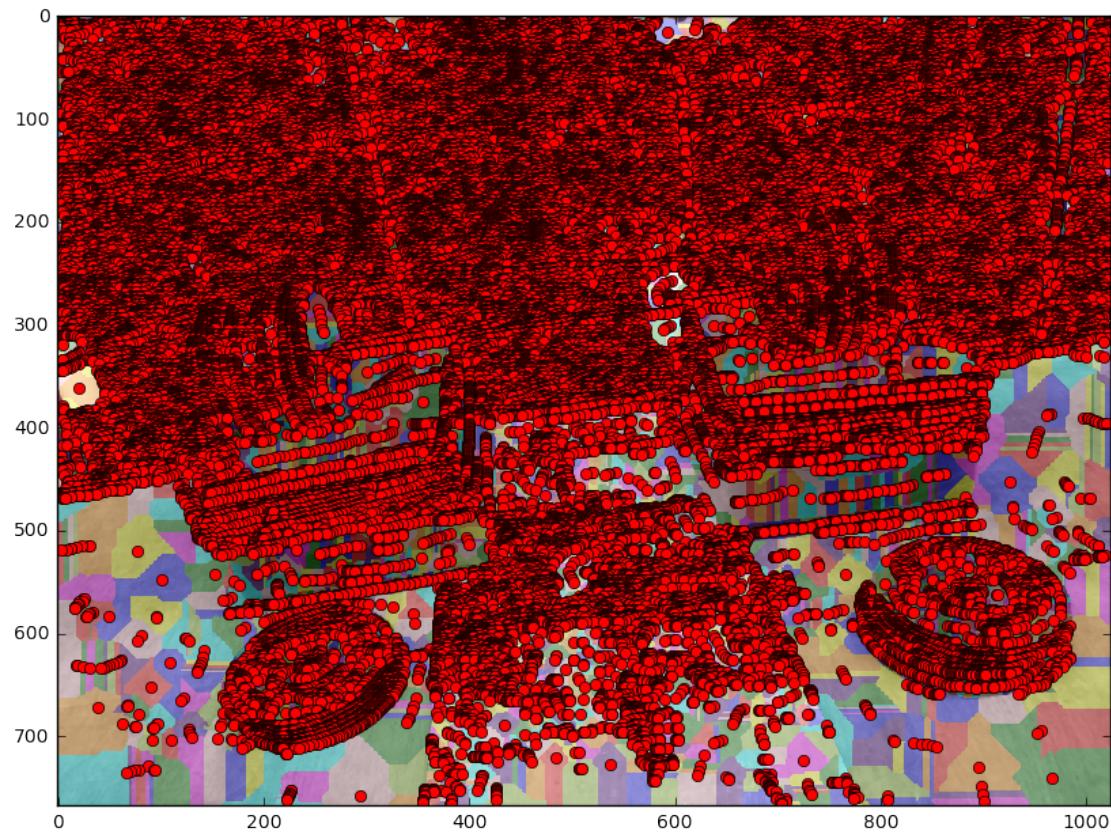
```

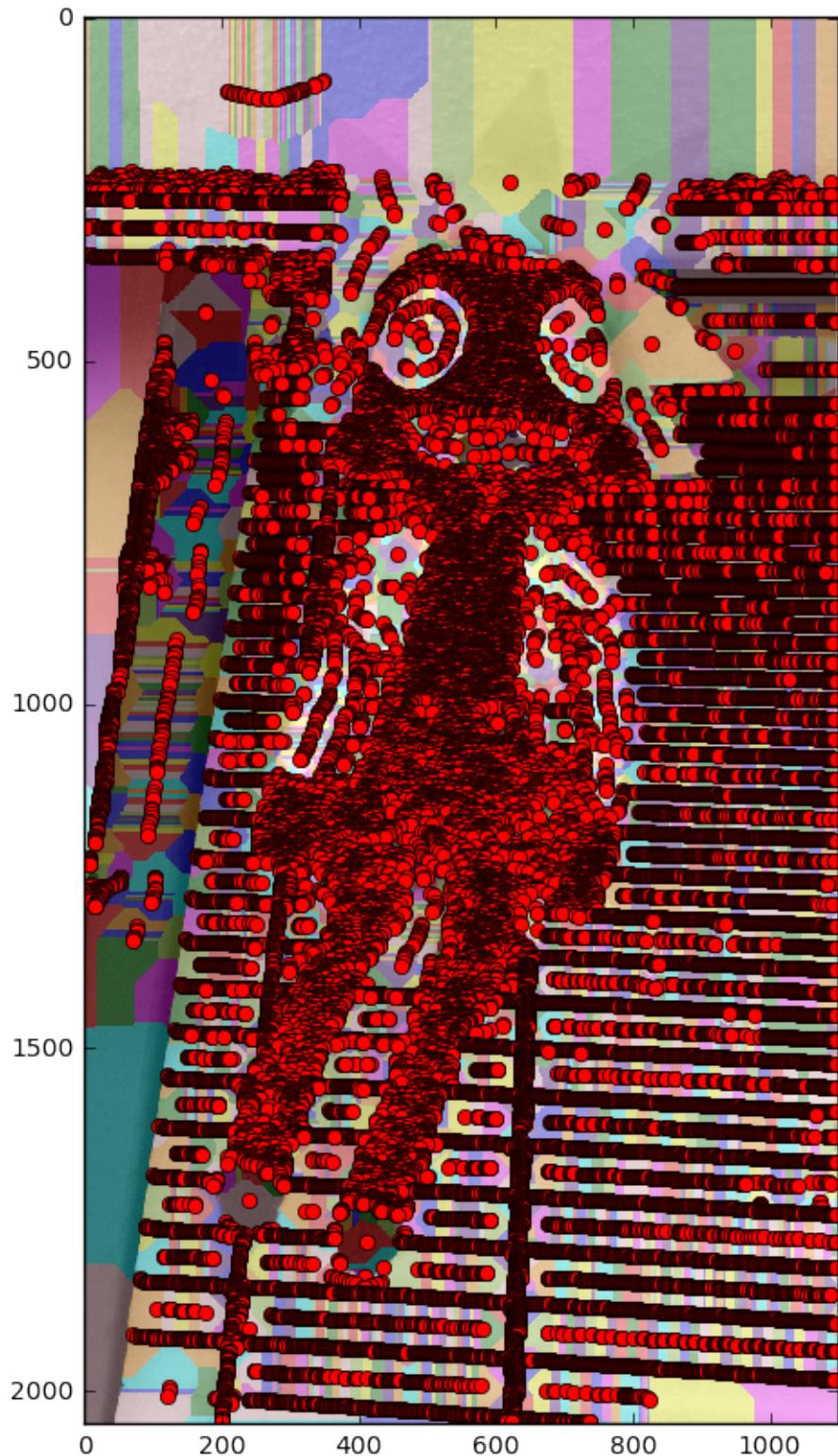
```
In [3]: sigma=1.0
      # Apply to the image set
      for i,img in enumerate(imgset):
          img_bw = (color.rgb2grey(img))
          plt.figure()
          plot_watershed(img_bw,sigma)
```

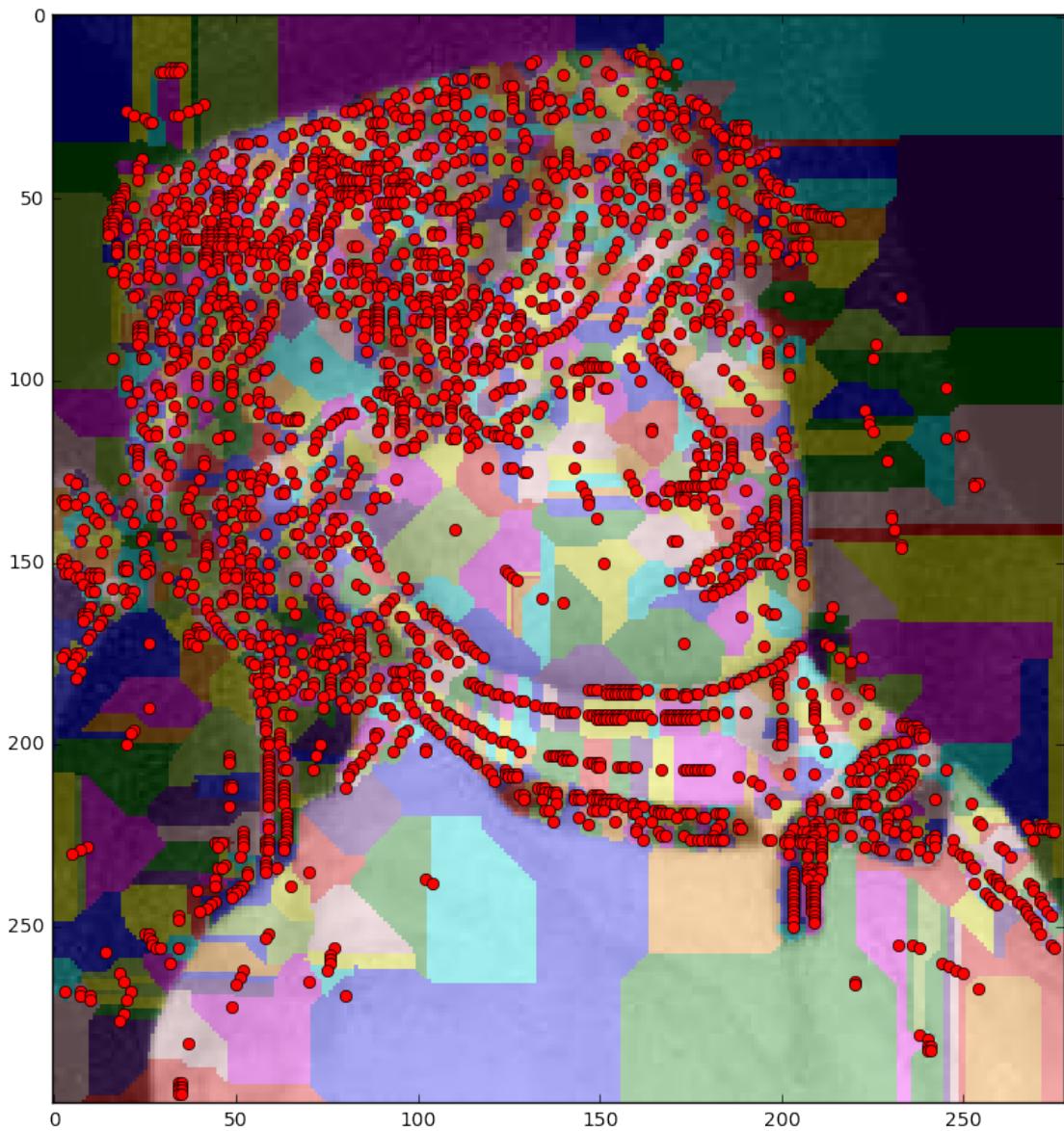


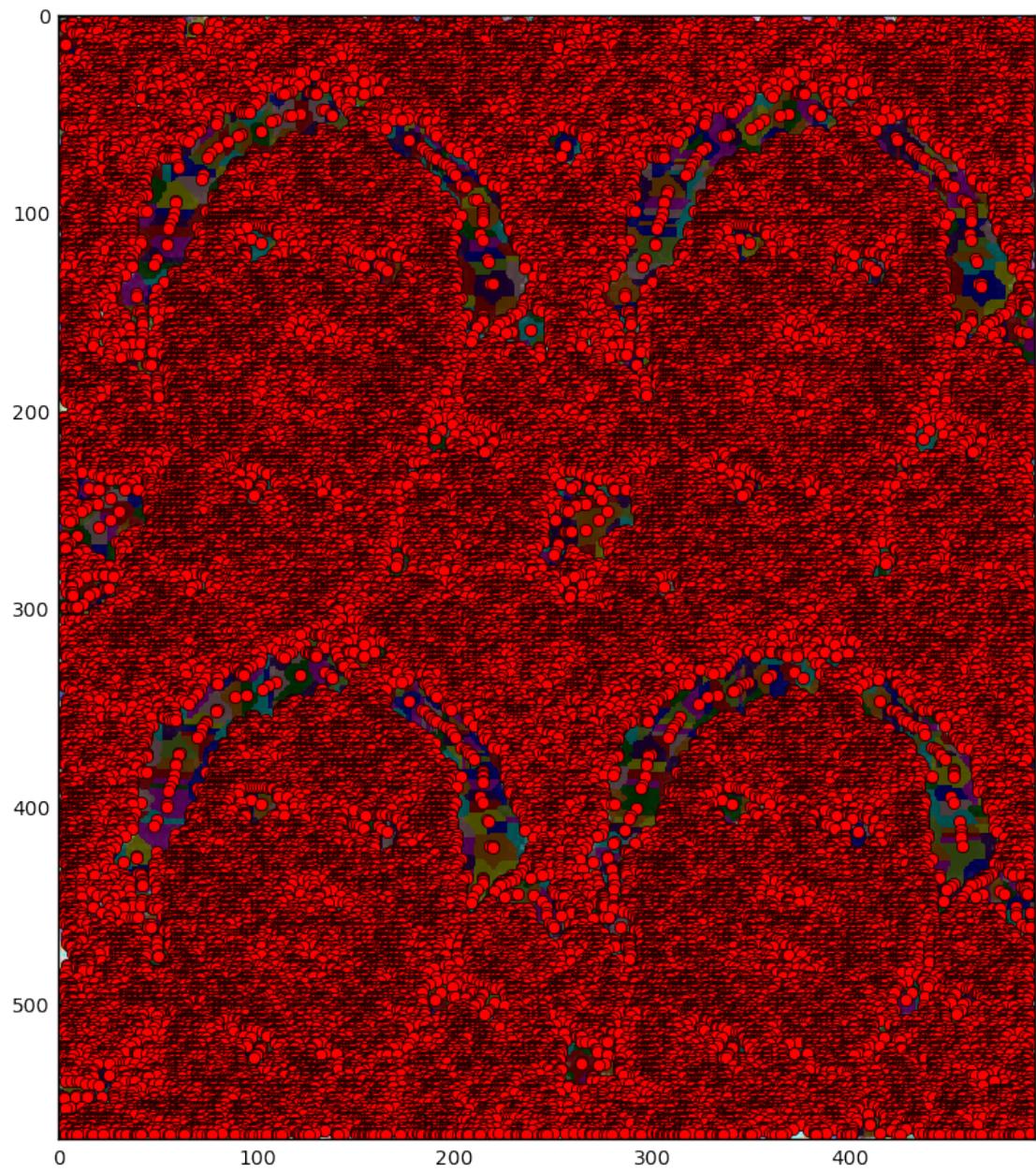


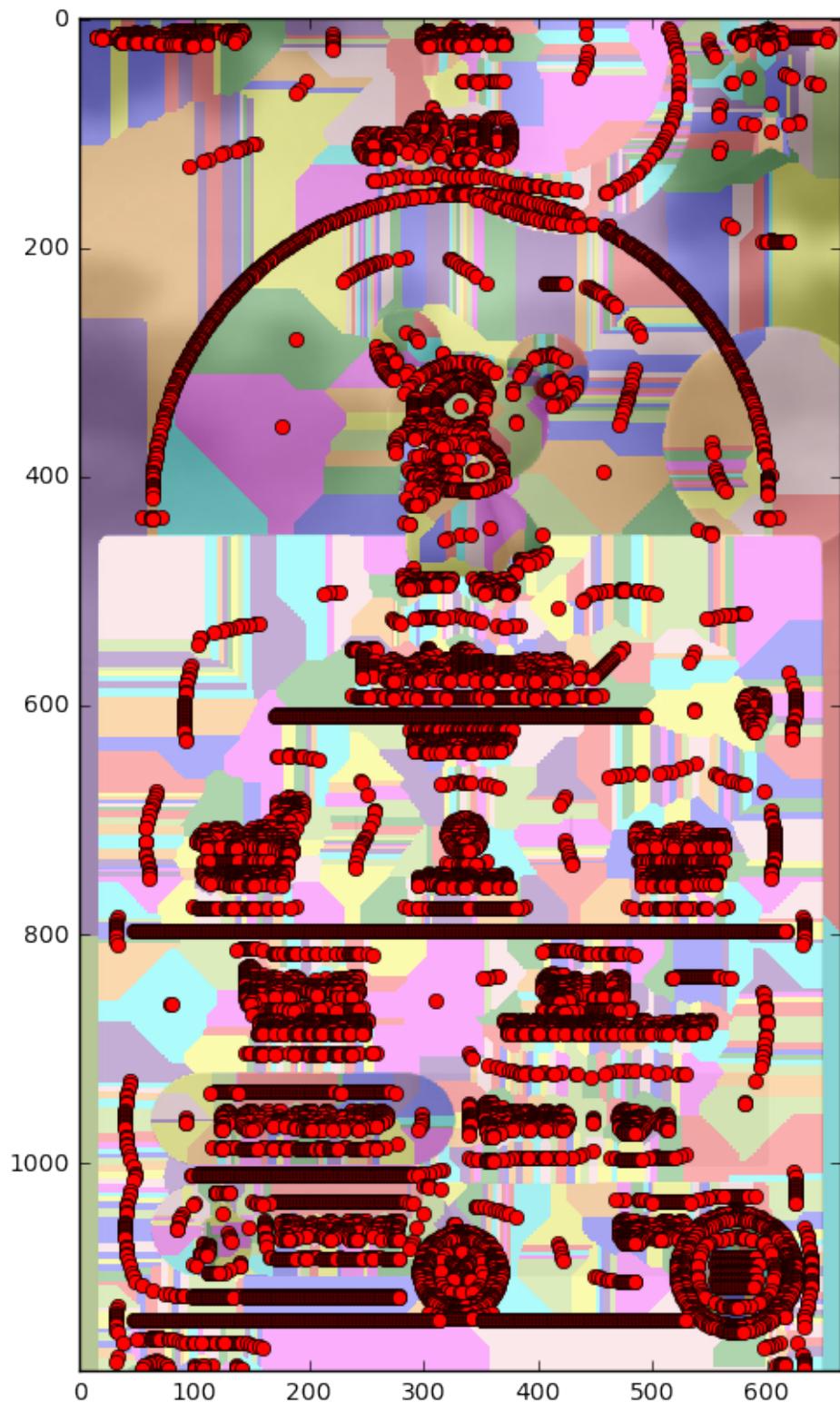






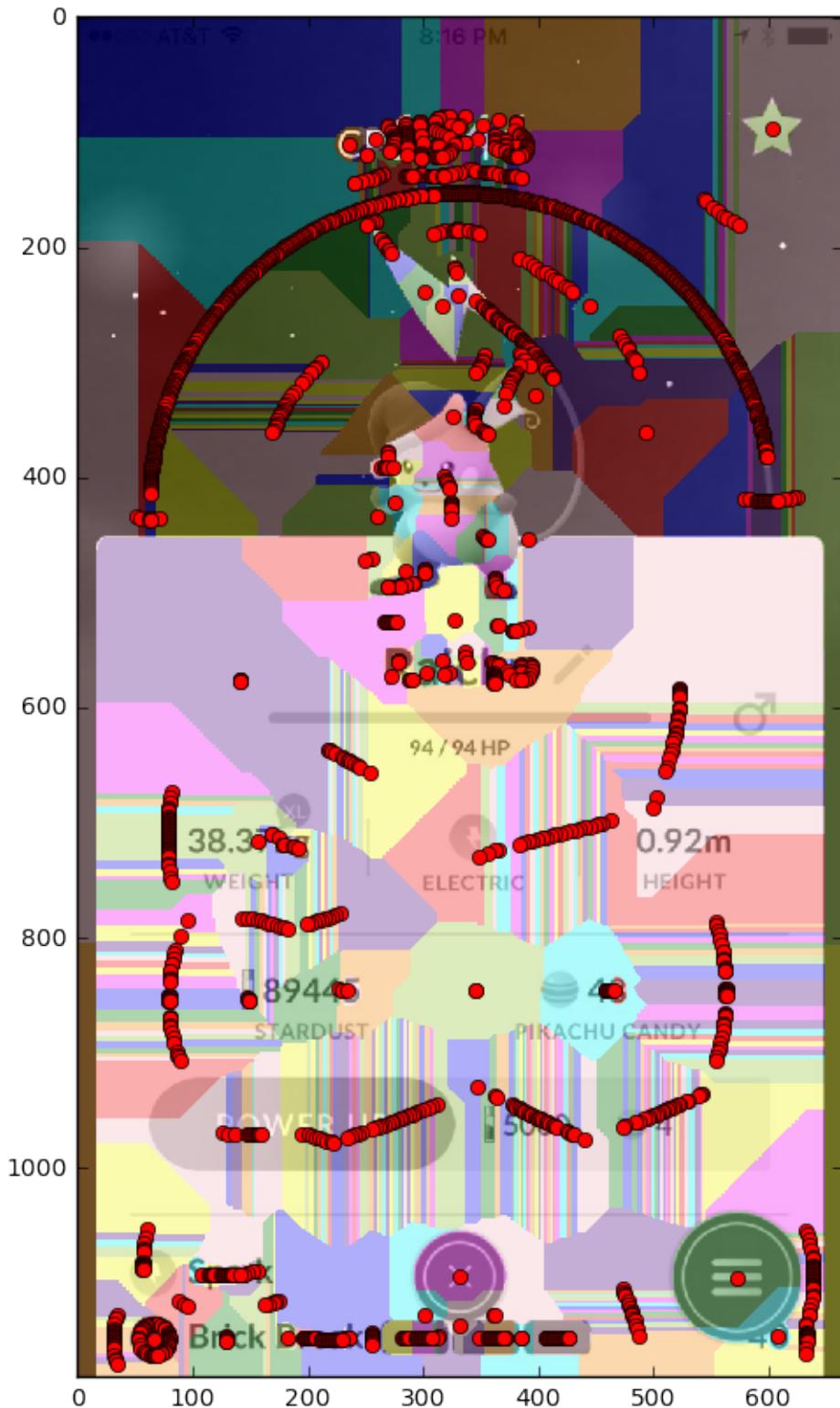


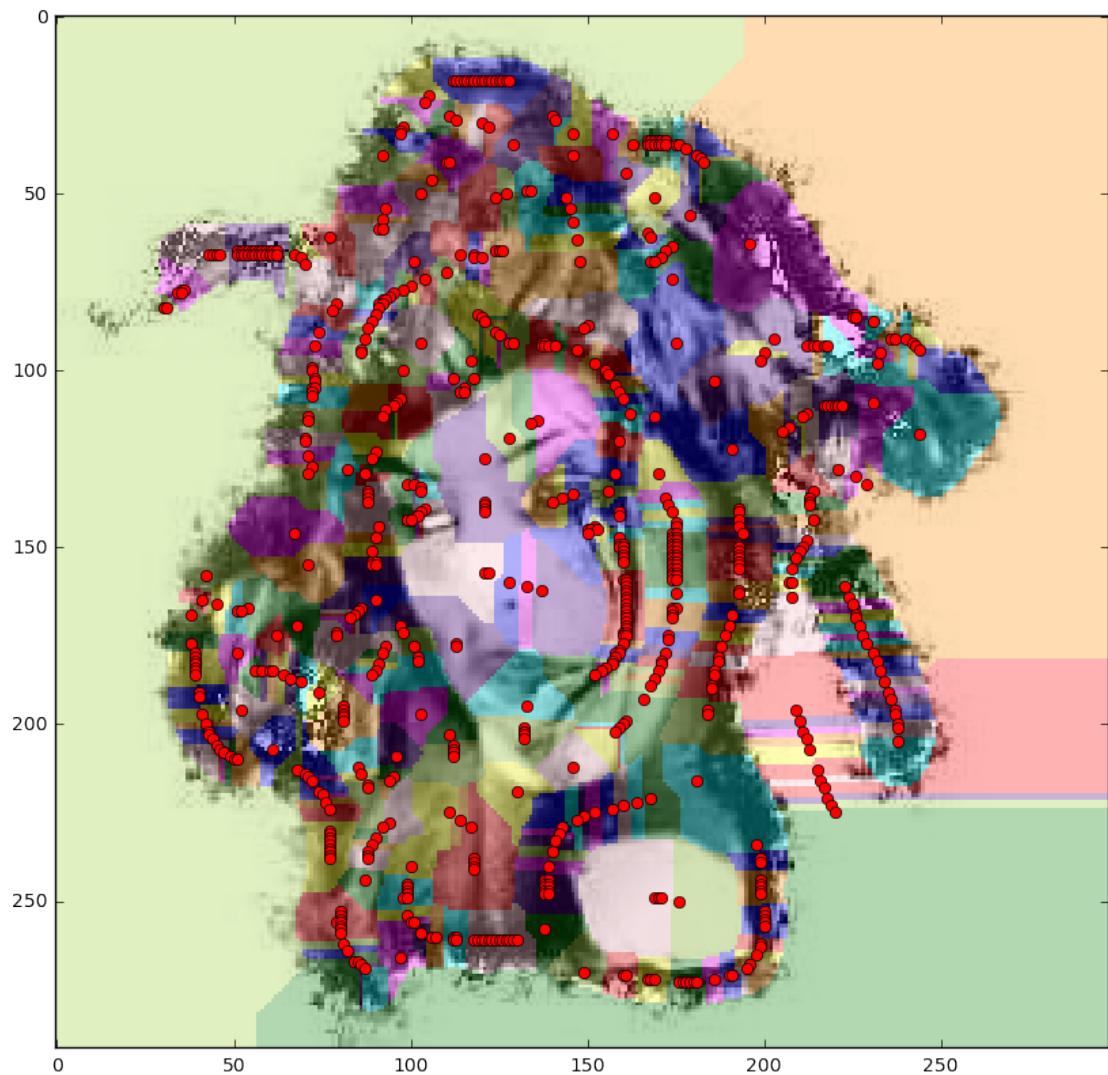


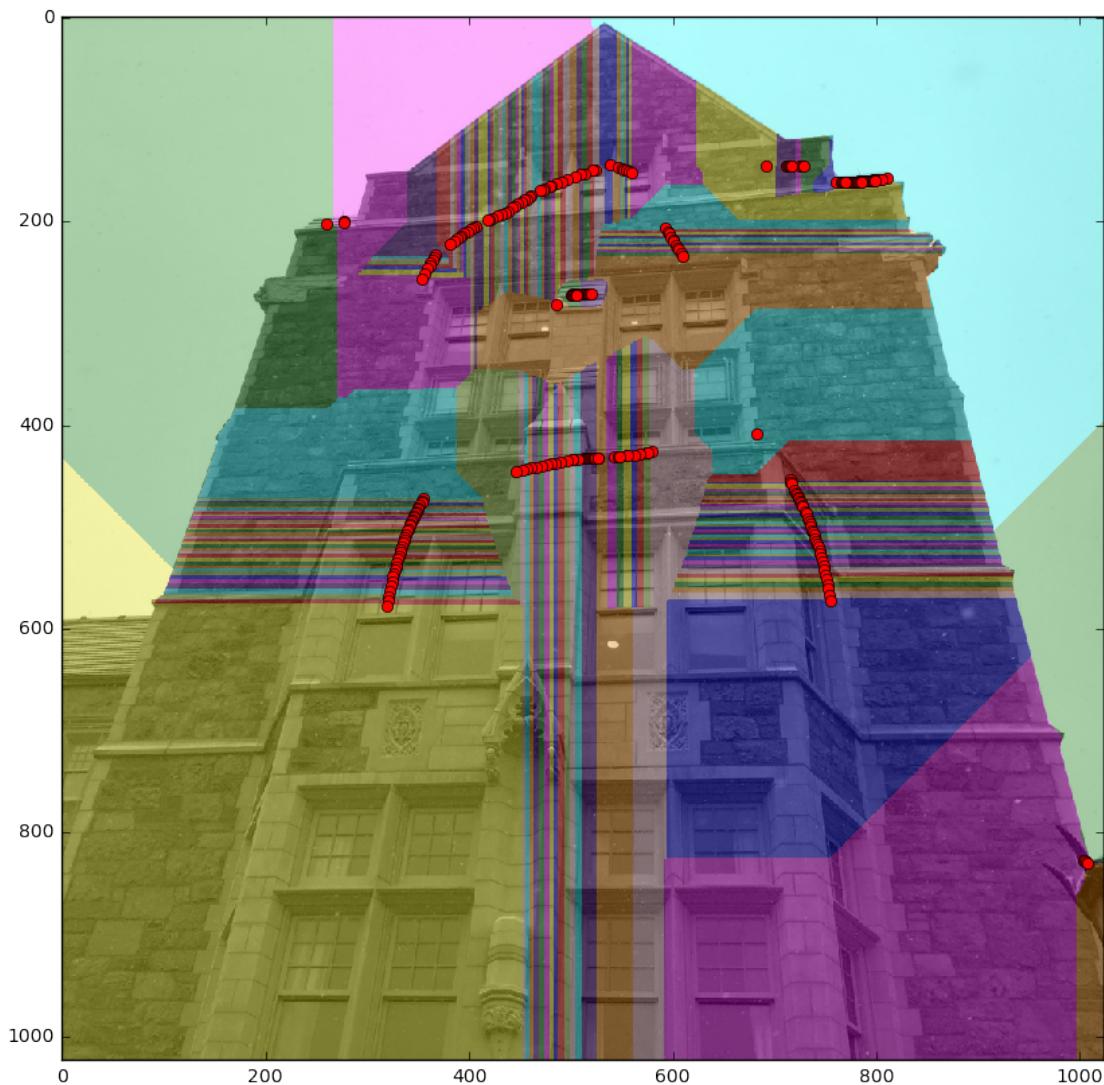


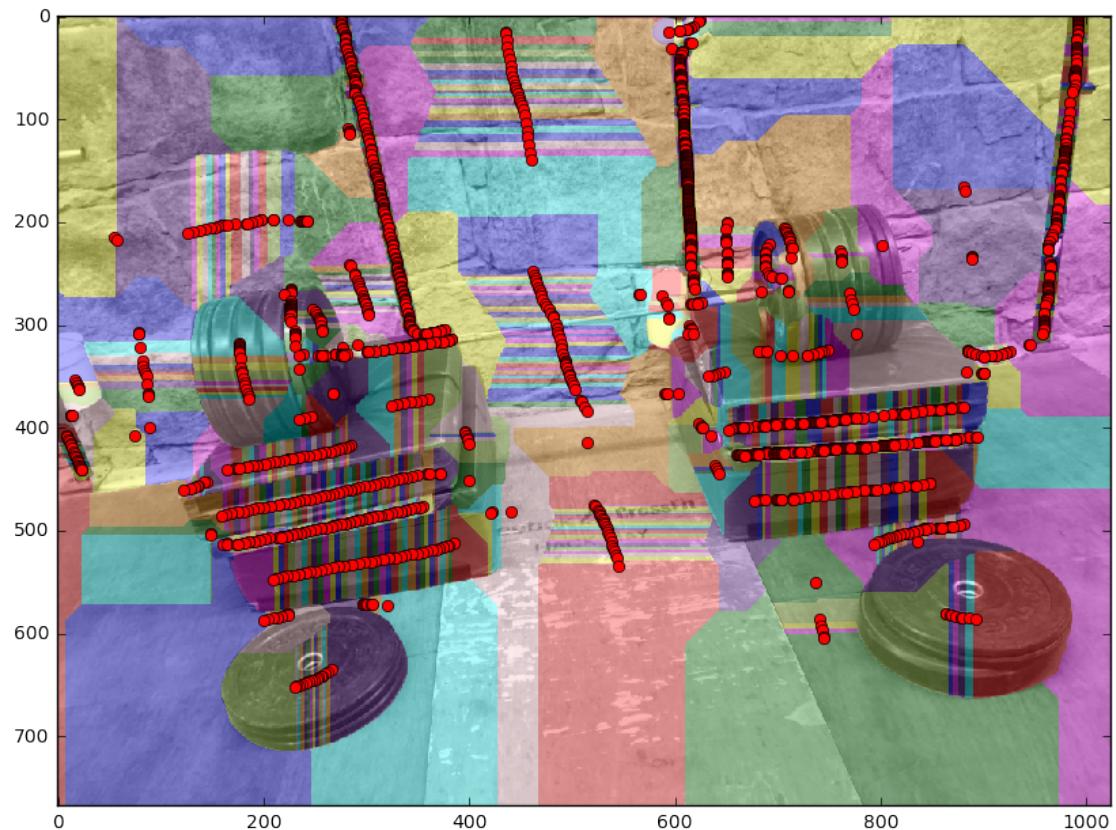
In [4]: sigma=5.0

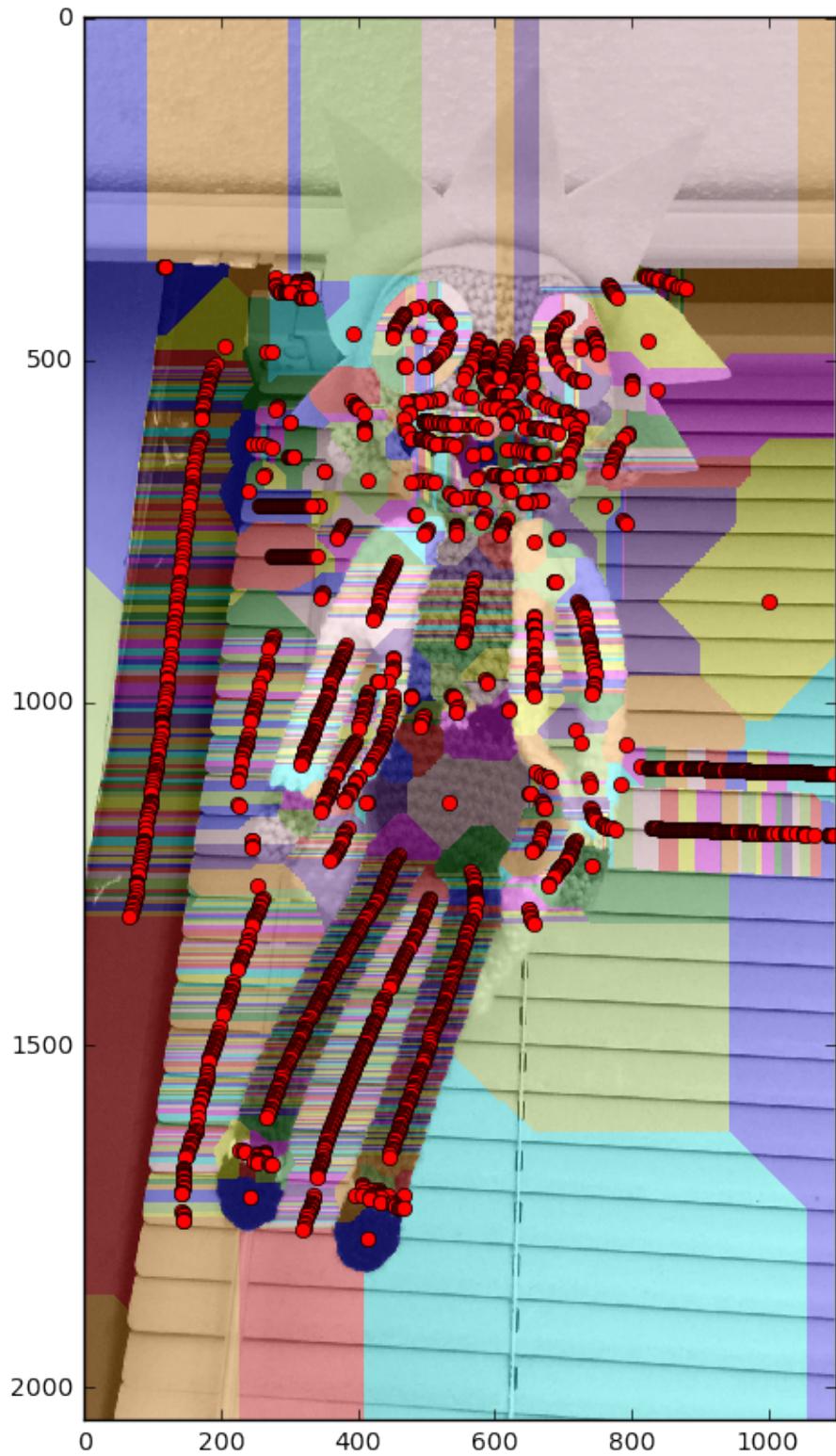
```
# Apply to the image set
for i,img in enumerate(imgset):
    img_bw = (color.rgb2grey(img))
    plt.figure()
    plot_watershed(img_bw,sigma)
```

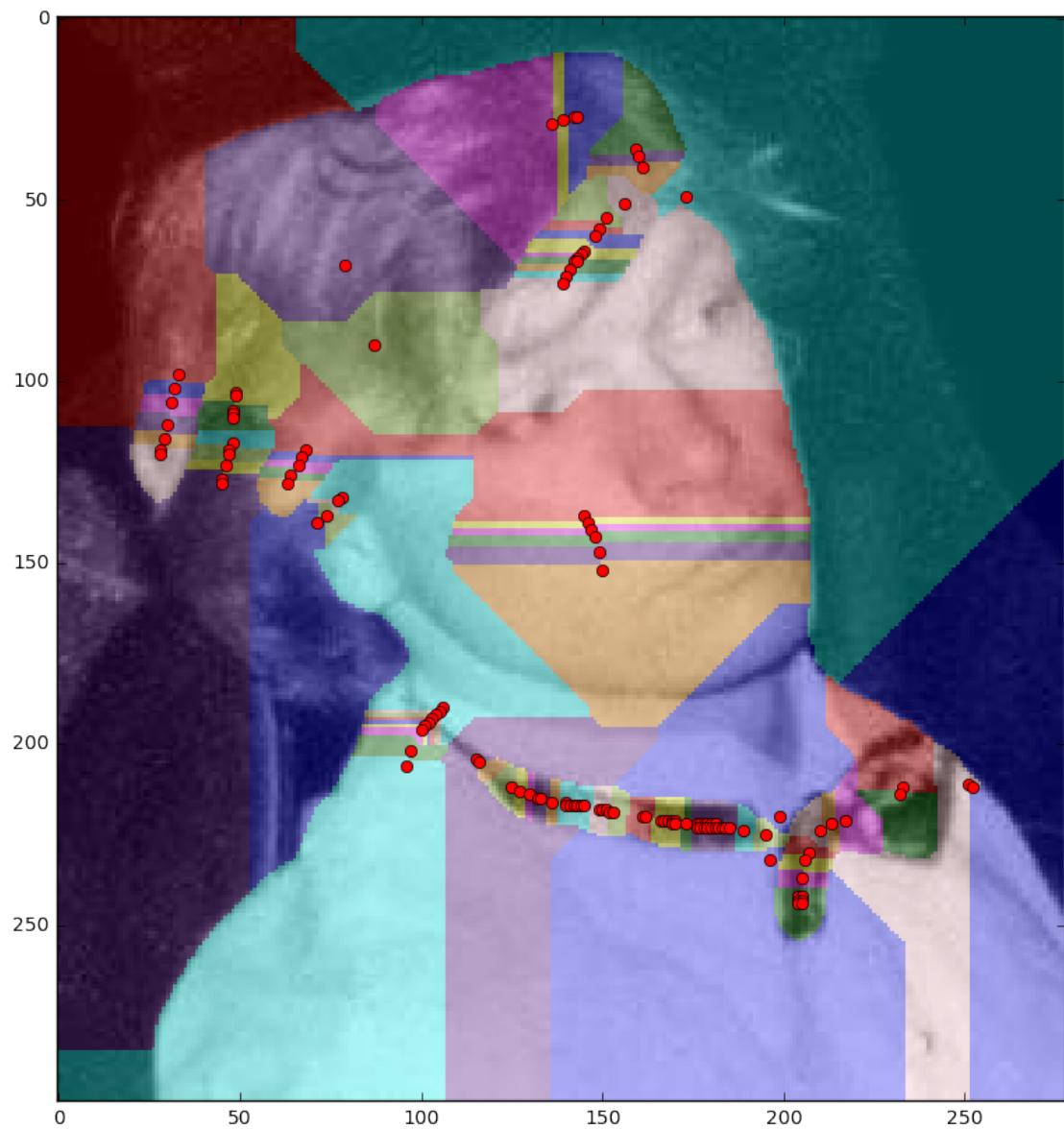


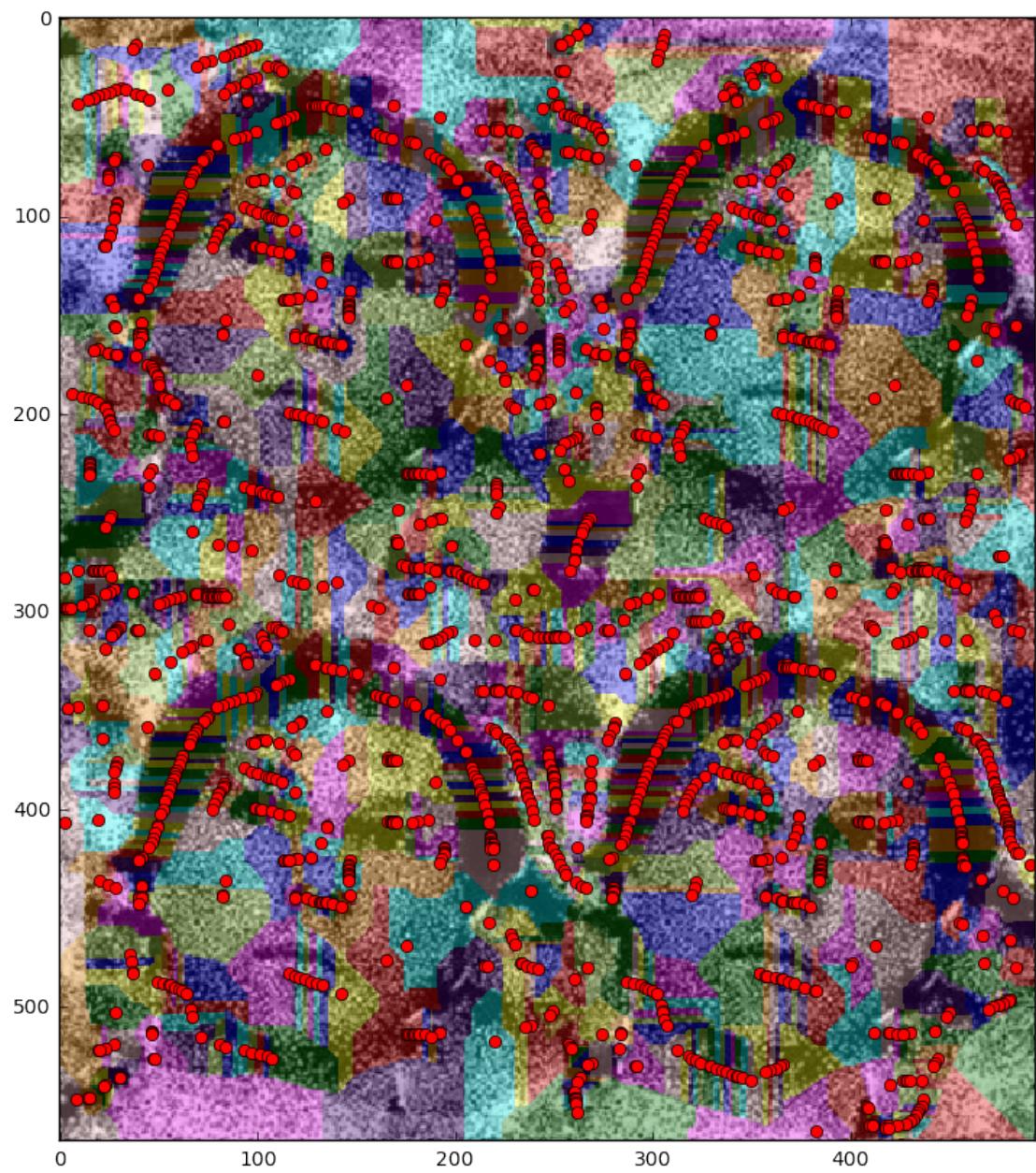


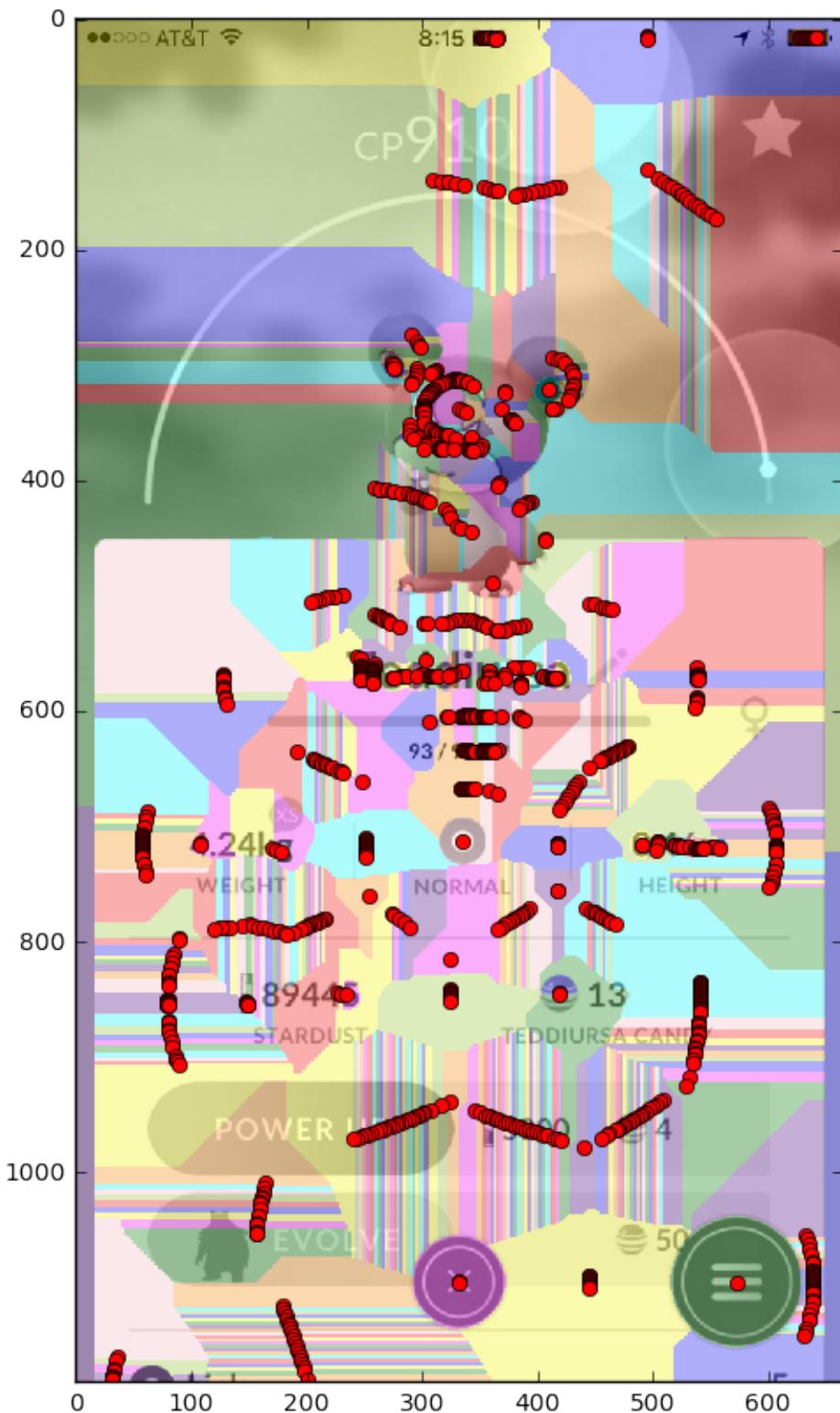






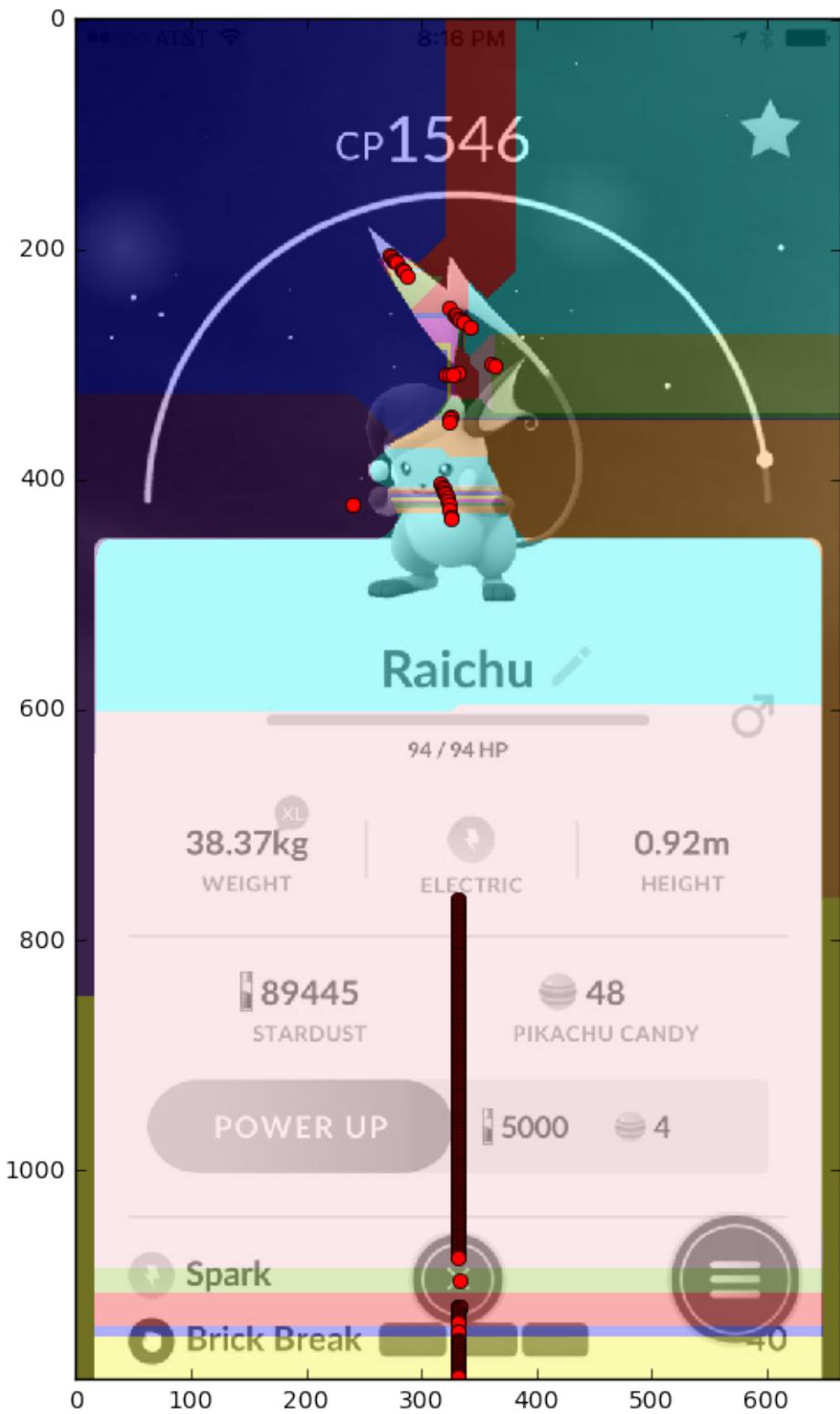


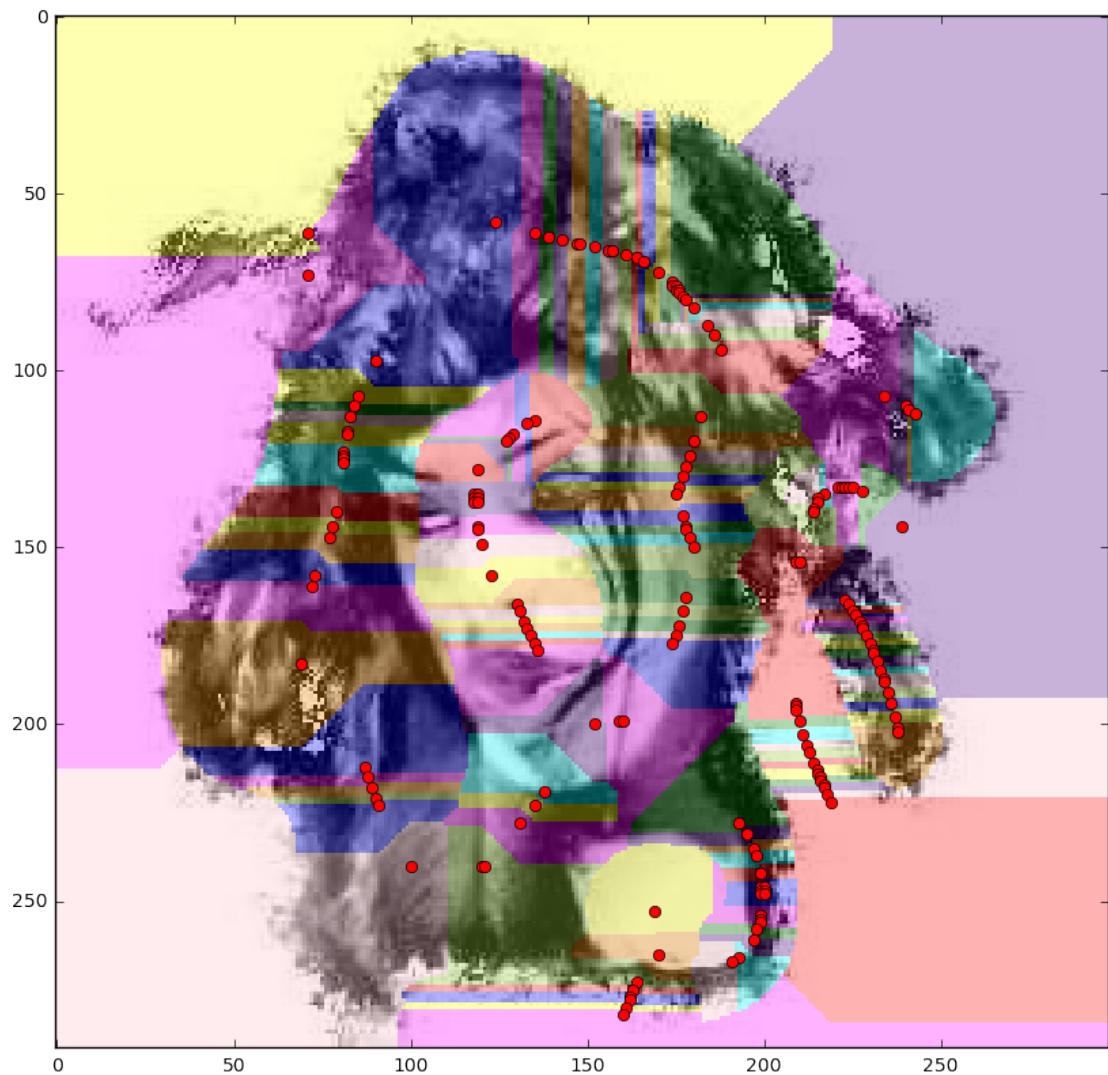




In [5]: sigma=10.0

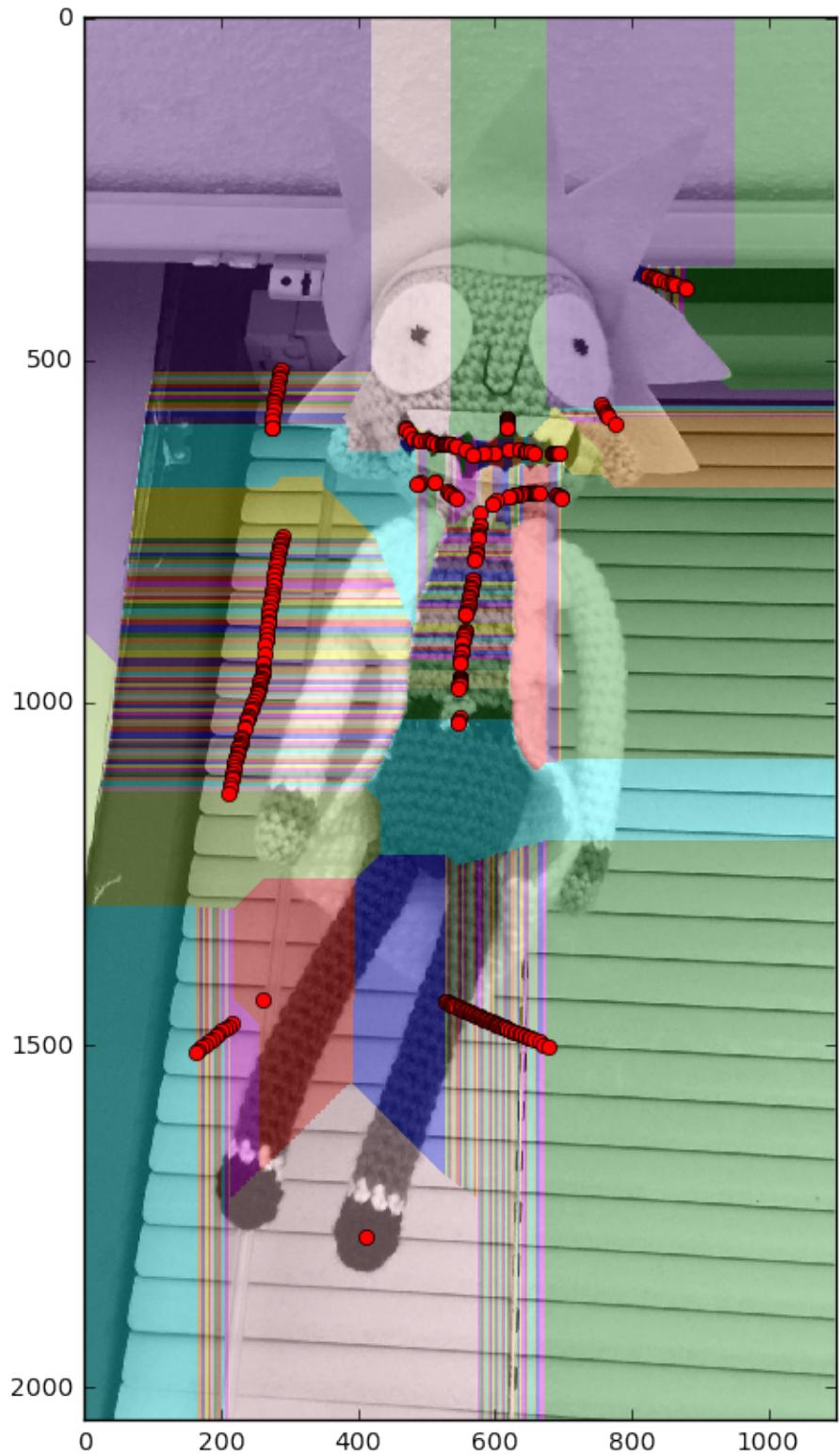
```
# Apply to the image set
for i,img in enumerate(imgset):
    img_bw = (color.rgb2grey(img))
    plt.figure()
    plot_watershed(img_bw,sigma)
```

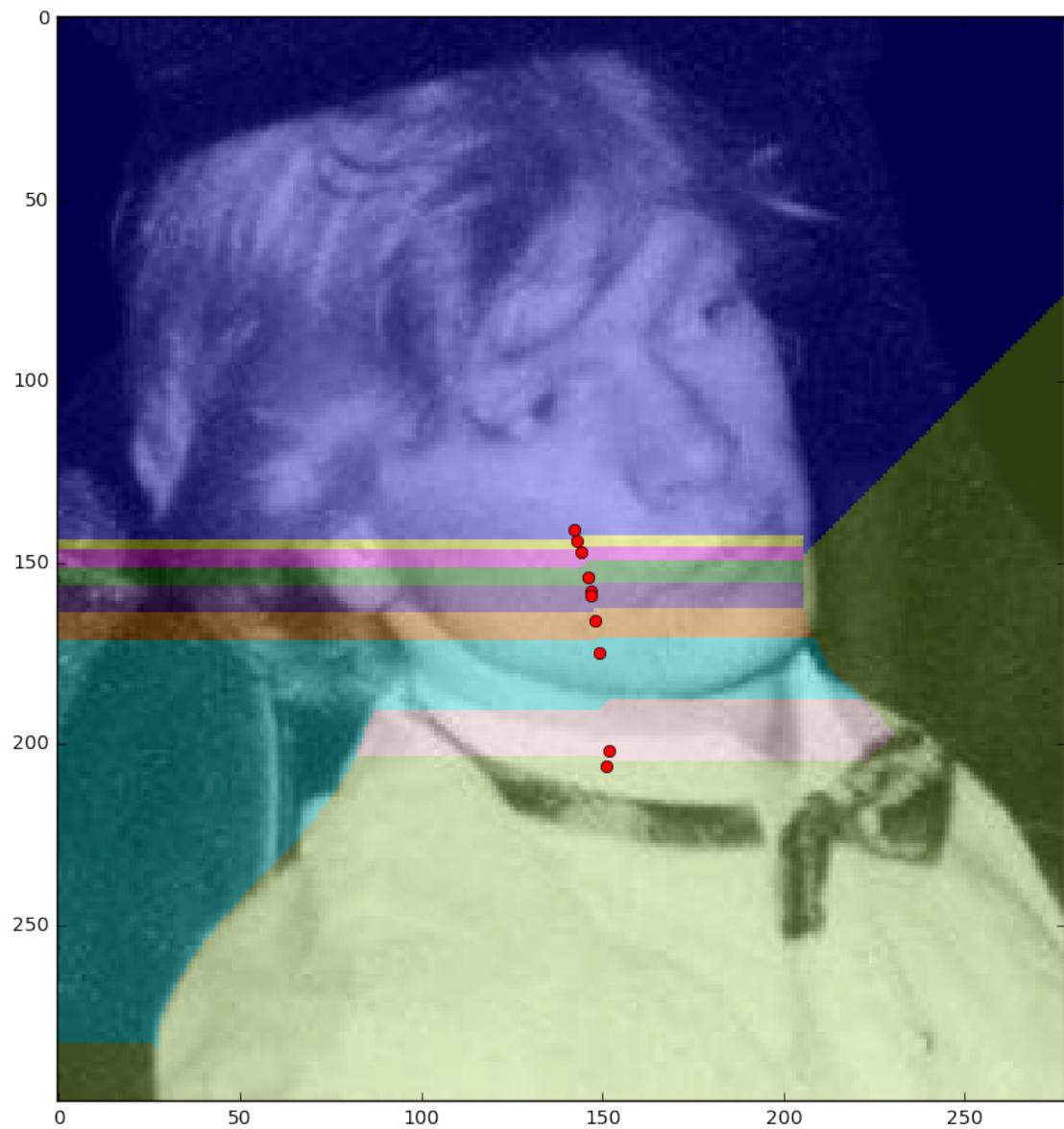




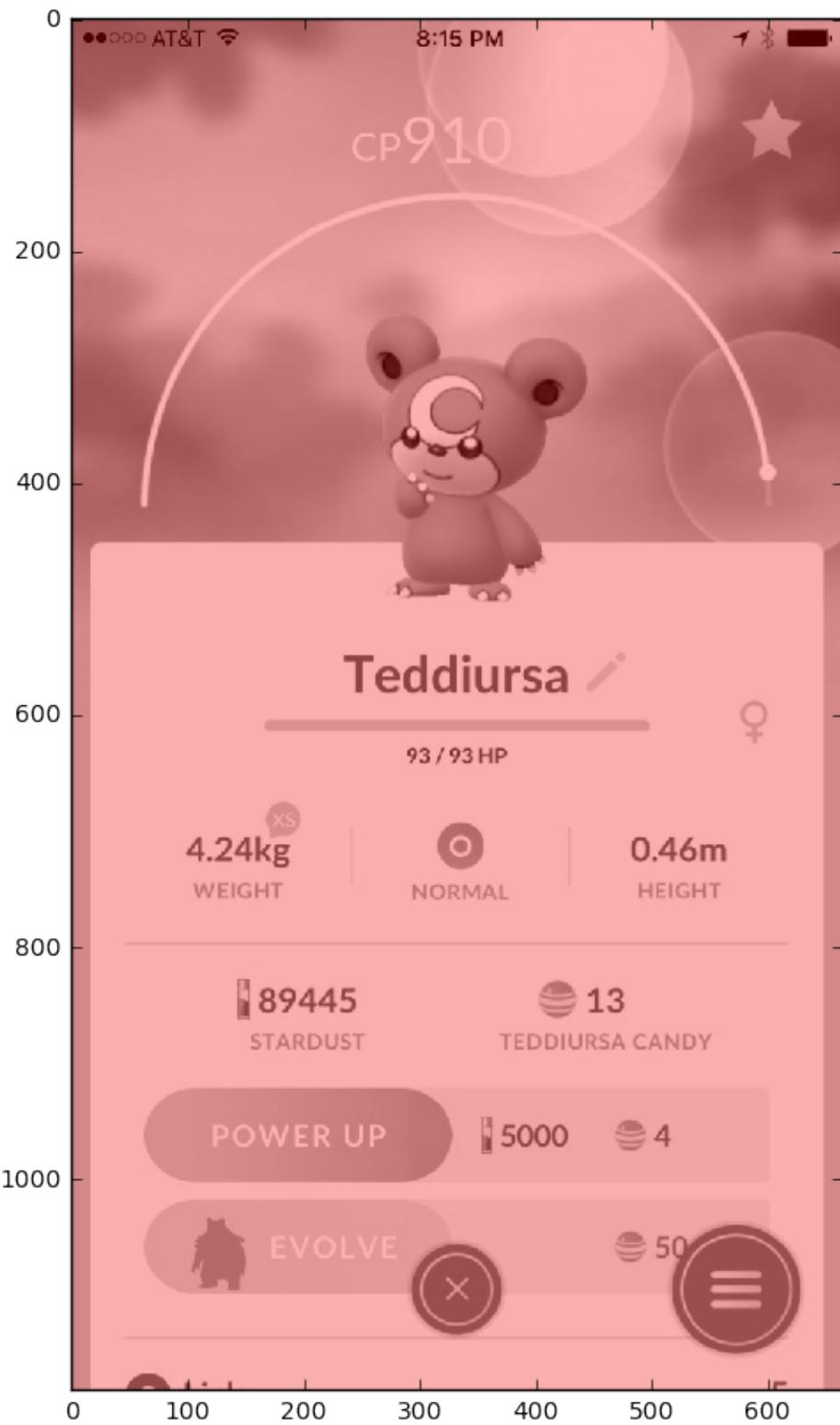






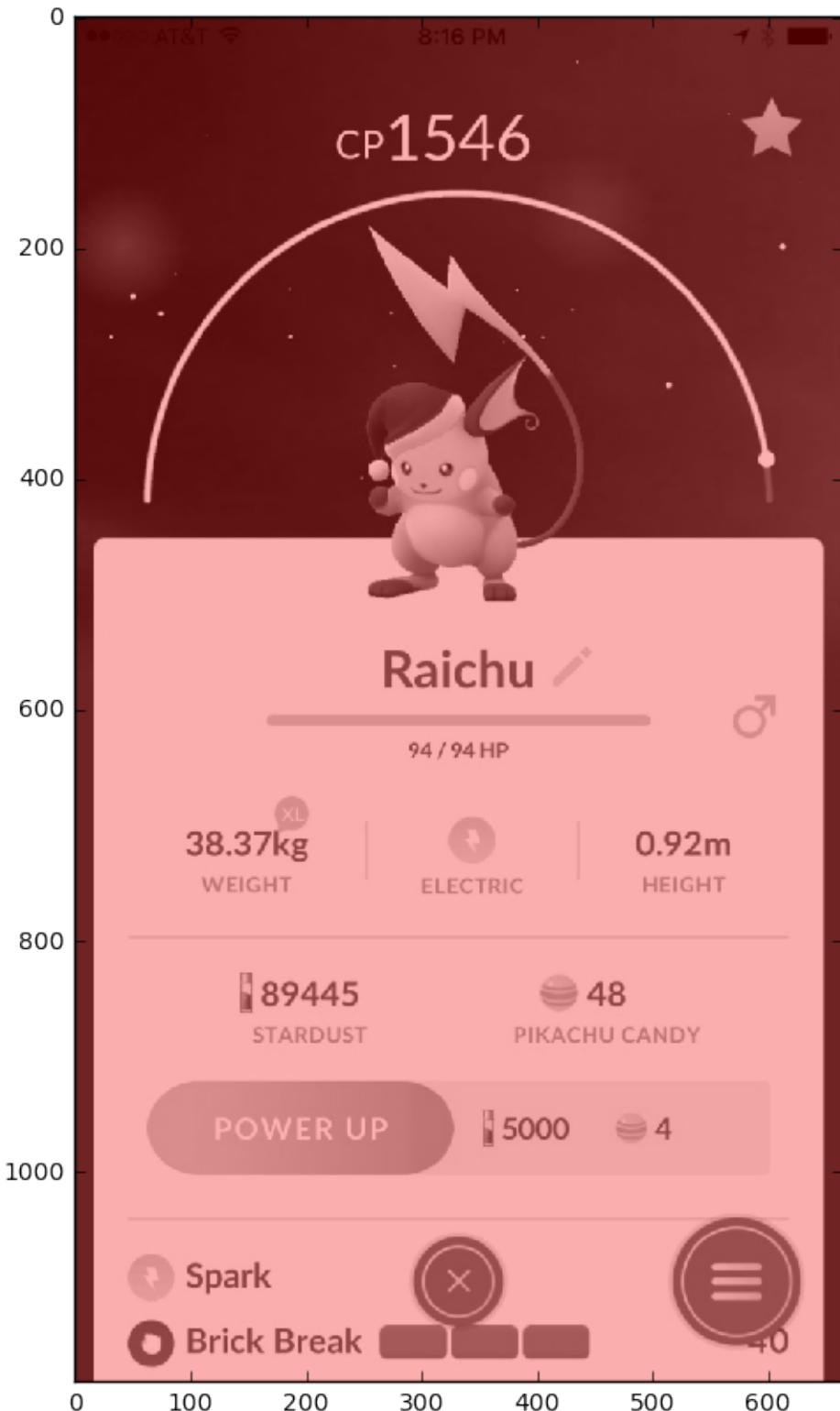






In [6]: sigma=15.0

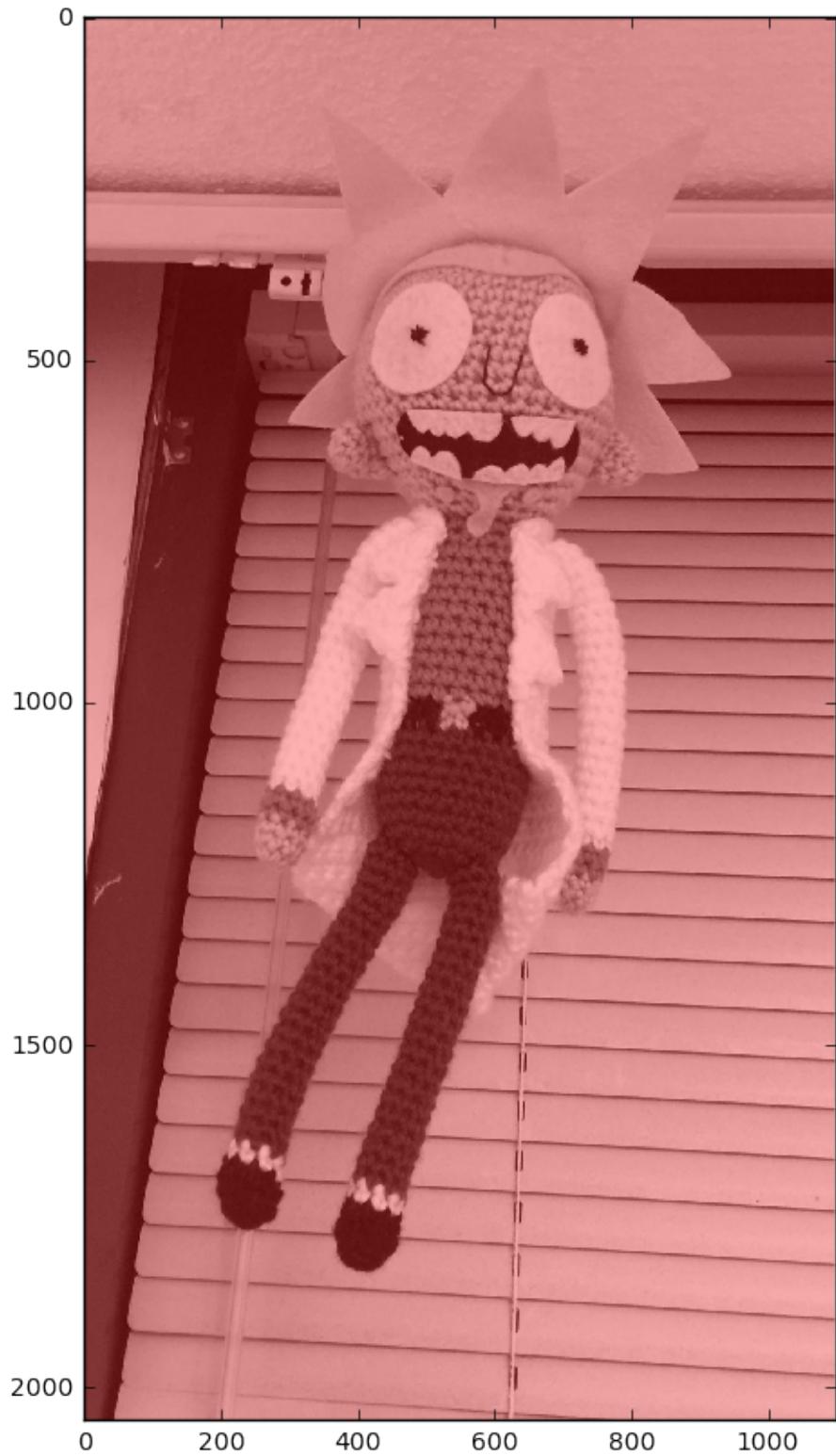
```
# Apply to the image set
for i,img in enumerate(imgset):
    img_bw = (color.rgb2grey(img))
    plt.figure()
    plot_watershed(img_bw,sigma)
```



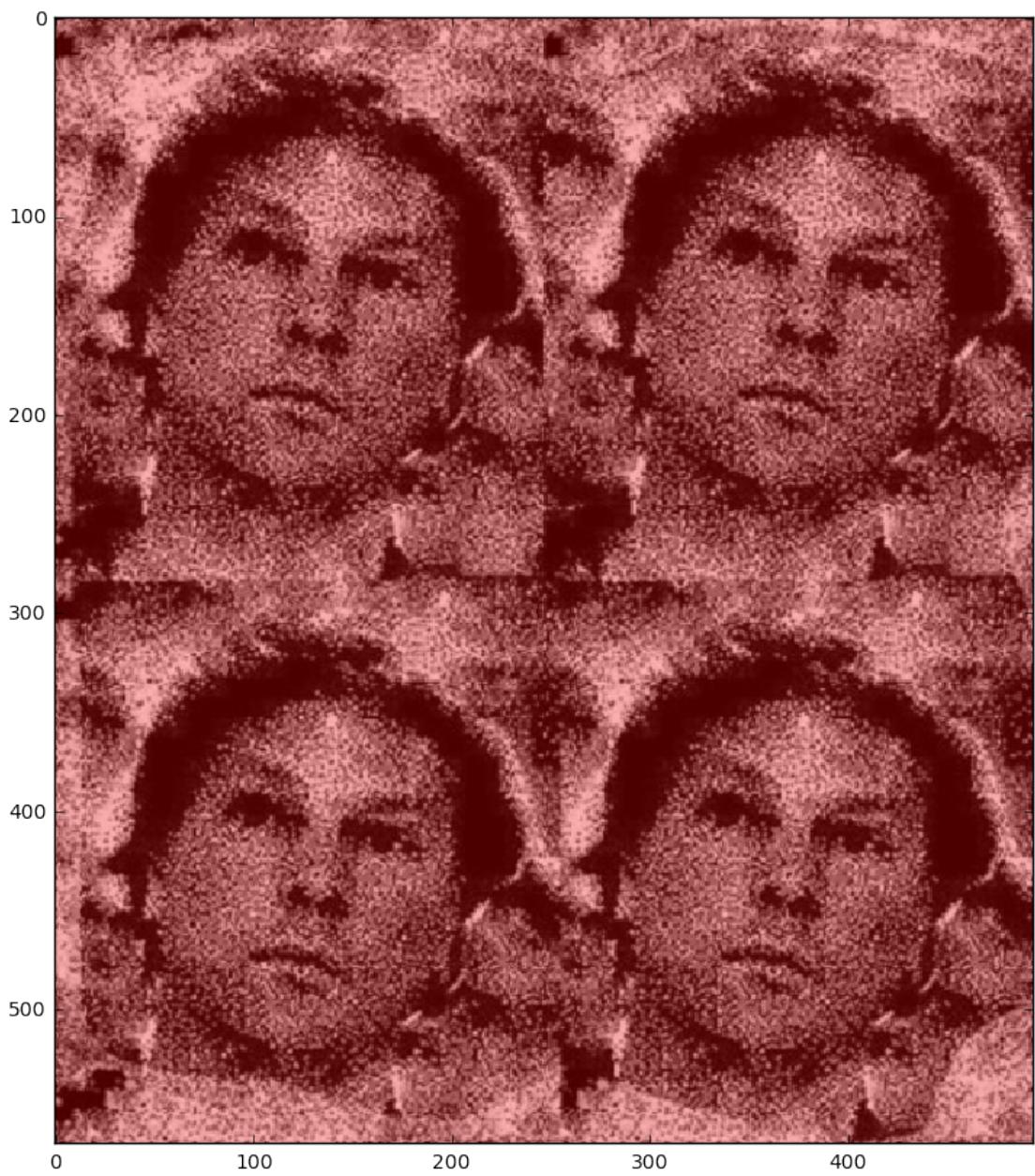


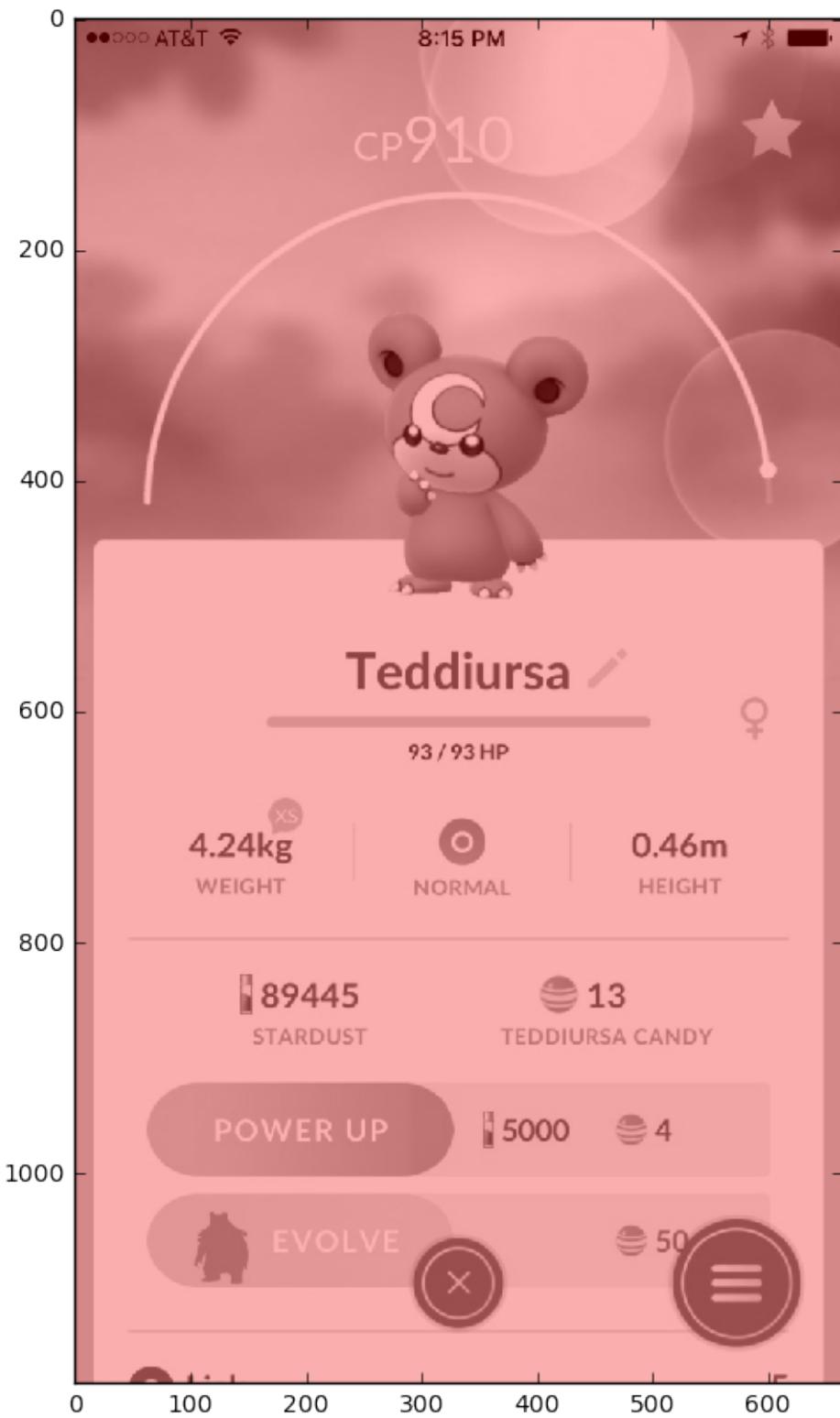












2 Python Tutorials

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>

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.