

Problem

The new data set provided by Steven and Nan have different characteristics from our original data set. Originally, we were unable to find all beads and all sprouts. Our hypothesis was that it was due to the high parameters in the canny edge detector which was recognizing an insufficient number of edges.

Experiment

The changes for this experiment involve the reduction of the canny parameters in order to find more beads and more sprouts. In particular, for sprout segmentation, the following parameters were changed:

- canny_min parameter was reduced to 60 from 120
- canny_max was reduced to 160 from 240 which enables finding more edges.

Unexpected consequences may include detection of false positive beads and false positive sprouts. This may warrant discussion of what is truly "false positive" in the previous data set.

General Results

The data set was analyzed successfully with reasonably consistent results verified by eye.

```
In [8]: from SimpleCV import Image
import sproutogram

import matplotlib.pyplot as plt
import matplotlib.image as mimg

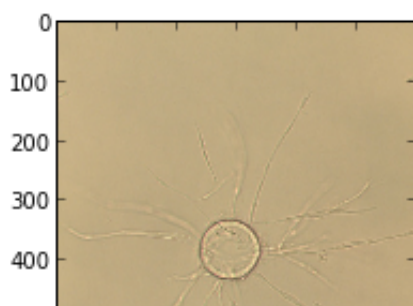
%matplotlib inline
```

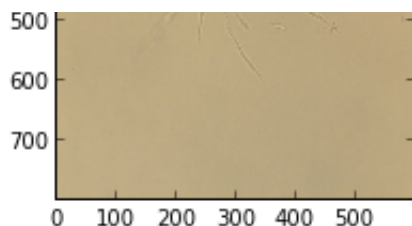
Original Image

We load a sample image with some branches to demonstrate an example from the database

```
In [9]: img = Image('vehiclectrl_5_raw.jpg').resize(w=800) # Load image with wi
plt.imshow(img.getNumpy())
```

```
Out[9]: <matplotlib.image.AxesImage at 0x5e0cf50>
```





Bead Extraction

The first step is bead extraction. The bead is found. In the original method, the bead could not be found.

```
In [13]: bead_ex = sproutogram.BeadExtractor(img)
        beads = bead_ex.extract()

        print(beads)

[sproutogram.features.Bead at (383,285)]
```

Sprout Extraction

The second step is sprouts extraction where the canny parameters change. Almost all sprouts are found unlike before.

```
In [11]: sprout_ex = sproutogram.SproutExtractor(img, beads, canny_min=60, canny
        sprouts = sprout_ex.extract()

        for sprout in sprouts:
            print(sprout)

[sproutogram.geometry.RadialSegment at (357,132),
sproutogram.geometry.RadialSegment at (355,41),
sproutogram.geometry.RadialSegment at (357,132)]
[sproutogram.geometry.RadialSegment at (478,296)]
[sproutogram.geometry.RadialSegment at (470,200)]
[sproutogram.geometry.RadialSegment at (290,296)]
[sproutogram.geometry.RadialSegment at (381,386),
sproutogram.geometry.RadialSegment at (409,434),
sproutogram.geometry.RadialSegment at (388,426),
sproutogram.geometry.RadialSegment at (392,439),
sproutogram.geometry.RadialSegment at (382,406),
sproutogram.geometry.RadialSegment at (383,455),
sproutogram.geometry.RadialSegment at (381,386),
sproutogram.geometry.RadialSegment at (423,431),
sproutogram.geometry.RadialSegment at (400,400),
sproutogram.geometry.RadialSegment at (366,533)]
[sproutogram.geometry.RadialSegment at (552,308)]
[sproutogram.geometry.RadialSegment at (289,251),
sproutogram.geometry.RadialSegment at (228,246)]
[sproutogram.geometry.RadialSegment at (462,259)]
```

```

[repr. ... geometry.RadialSegment at (102,400),
 sproutogram.geometry.RadialSegment at (502,238)]
[sproutogram.geometry.RadialSegment at (509,365)]
[sproutogram.geometry.RadialSegment at (333,372),
 sproutogram.geometry.RadialSegment at (272,512),
 sproutogram.geometry.RadialSegment at (344,390),
 sproutogram.geometry.RadialSegment at (315,494),
 sproutogram.geometry.RadialSegment at (333,372),
 sproutogram.geometry.RadialSegment at (289,496),
 sproutogram.geometry.RadialSegment at (323,435)]
[sproutogram.geometry.RadialSegment at (227,365),
 sproutogram.geometry.RadialSegment at (134,411),
 sproutogram.geometry.RadialSegment at (227,365)]
[sproutogram.geometry.RadialSegment at (500,446),
 sproutogram.geometry.RadialSegment at (448,363),
 sproutogram.geometry.RadialSegment at (448,363),
 sproutogram.geometry.RadialSegment at (471,402)]

```

The skeleton produced for analysis is shown below.

```

In [12]: sprouts_img = sprouts[-1].image
plt.imshow(sprouts_img.getNumpy())

```

```

Out[12]: <matplotlib.image.AxesImage at 0x674d490>

```

