Contents

- Open the color images and convert to grayscale
- Do some filtering
- Threshold the image
- Morphological filtering
- Segmentation
- should appear as gradiated thresholded image as pixel label value increases
- show the segments in grayscale
- display the final segmented image


```
%Calvin and Keene Robotics Takehome
```

Open the color images and convert to grayscale

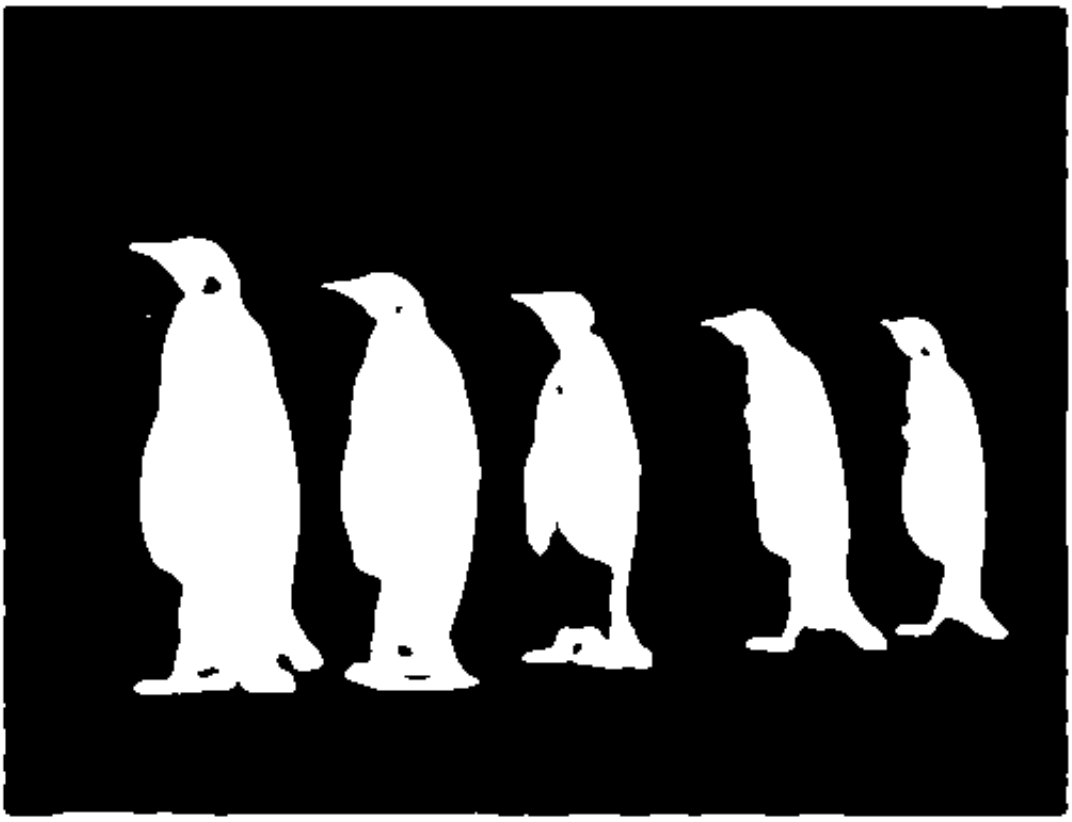
```
clear all
cpens=imread('penguins.jpg'); %read in a file, convert to matlab matrices
gpens=rgb2gray(cpens); %converts from color to grayscale
imshow(cpens) %displays the image in a window
figure
imshow(gpens)
```

Do some filtering

```
G = fspecial('gaussian',[10 10],2); %create 10x10 gaussian blur kernel
blurpens= imfilter(gpens,G,'same'); %filters image with gaussian blur(best to use before thre
hsolding
imshow(blurpens)
```

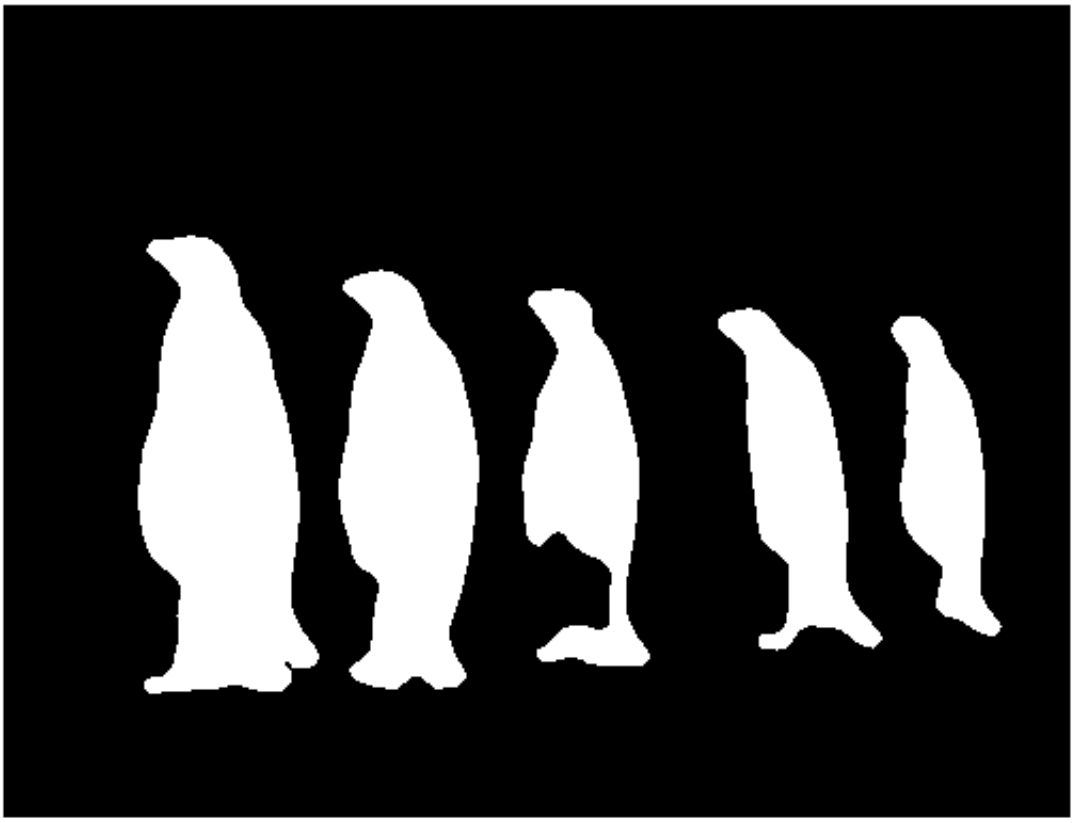
Threshold the image

```
threshpens = calvthresh(blurpens,120);
%display the thresholded image
figure
imshow(threshpens)
```



Morphological filtering

```
se = strel('square',6); %creates a 8x8 kernel for morph. filtering
erodedpens = imerode(threshpens,se); %erodes image (best to use afterthresholding)
dilatedpens = imdilate(erodedpens,se); %dilates image (best to use afterthresholding)
%displays the image. imscale(dilatedpens) will beuseful if you have images with pixel values
outside the standard range, suchas very large numbers after your semgmentation labeling.
medpens= medfilt2(dilatedpens, [10 10]); %median filters image (best to use afterthresholding
imshow(medpens)
%imsave %saves the current image
```

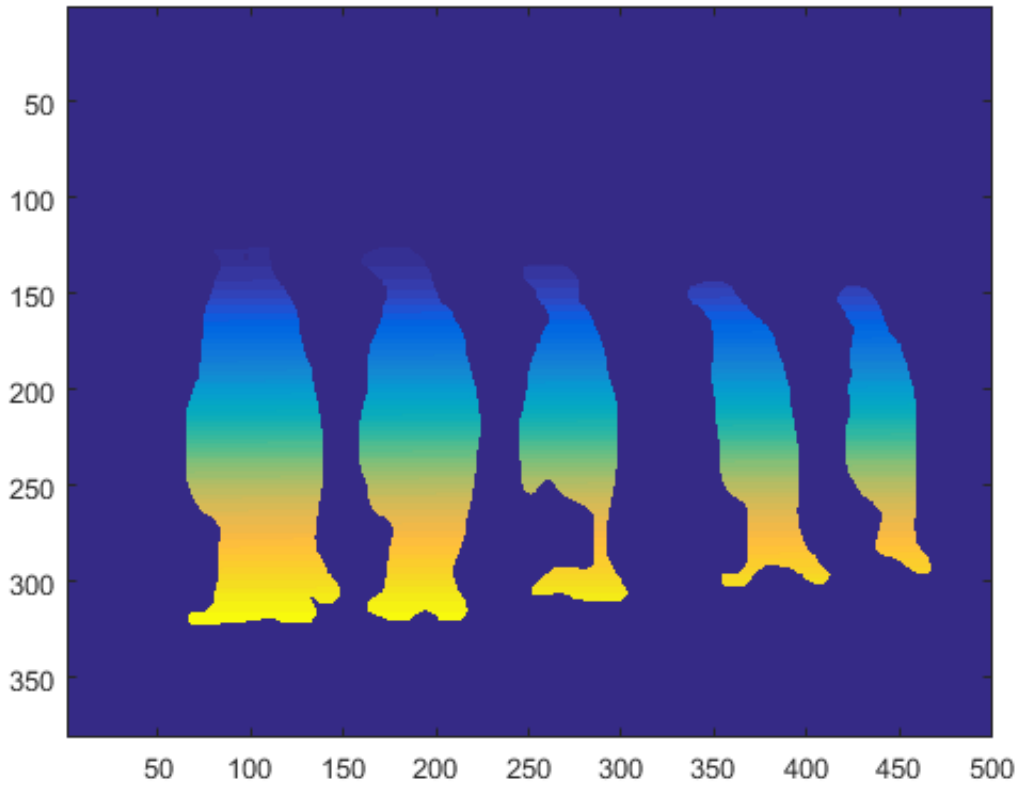


Segmentation

```
%assign a unique value to each white pixel in the image
seg1 = calvseg(medpens);
```

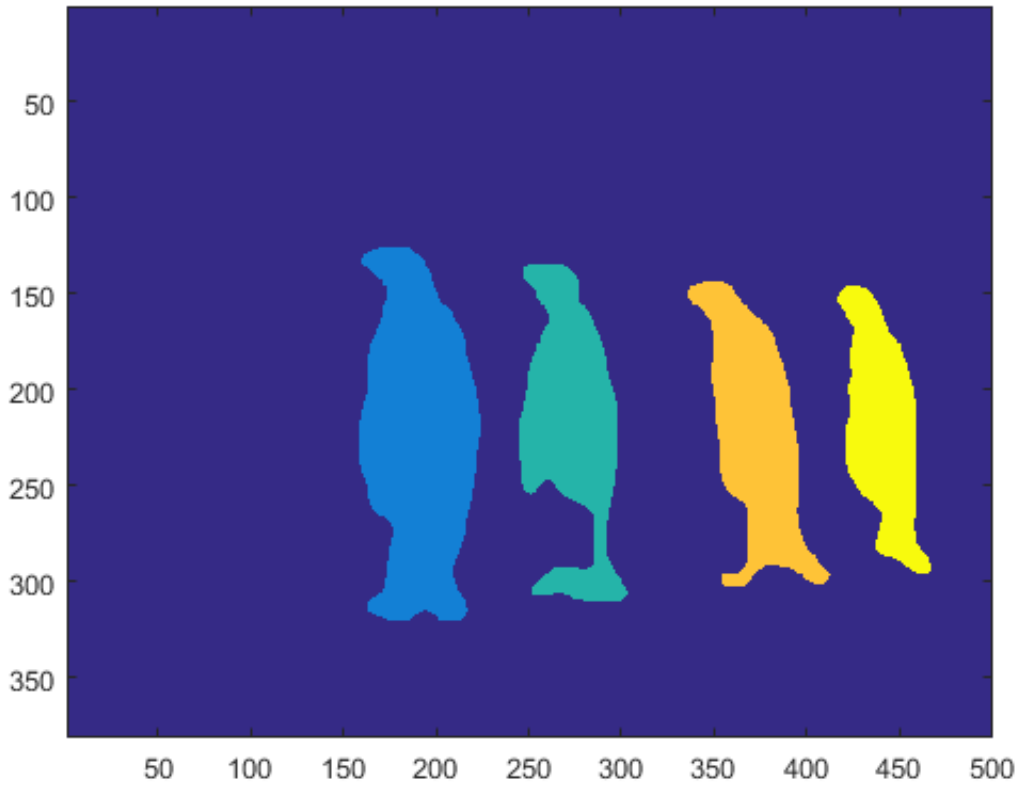
should appear as gradiated thresholded image as pixel label value increases

```
figure
imagesc(seg1)
%segment the image, each segment has a unique value
seg2 = segim2(seg1);
```



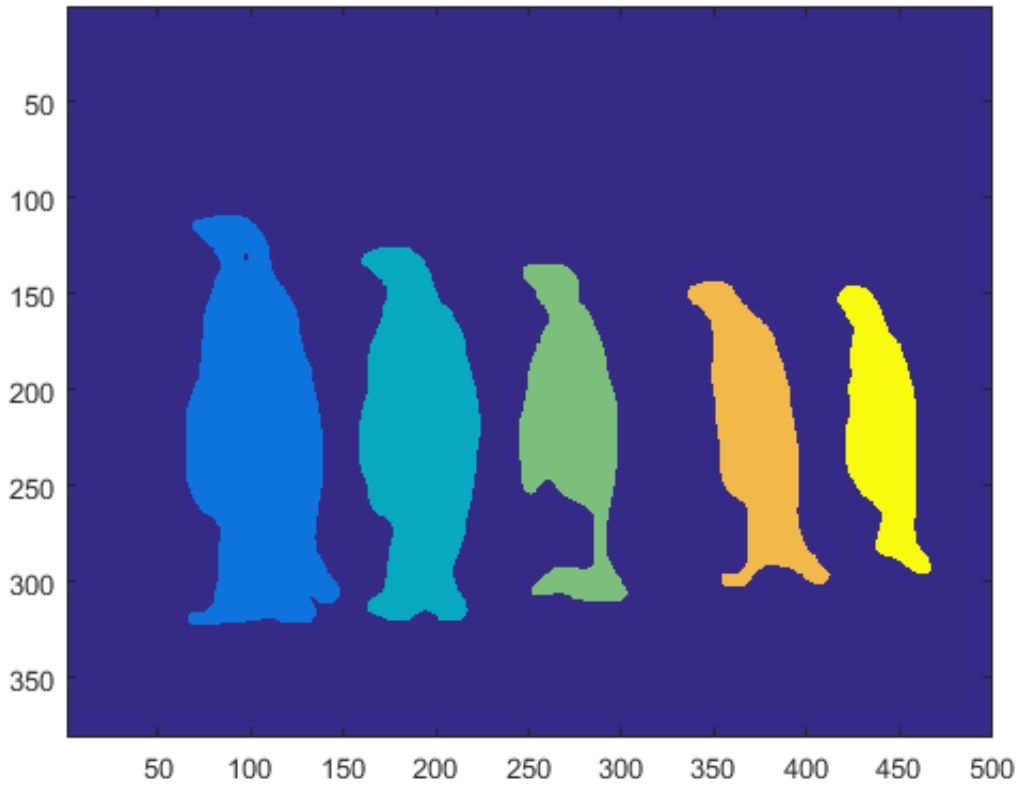
show the segments in grayscale

```
figure
imagesc(seg2)
%relabel the segments so they have a logical order that is sequential
seg3=relabel(seg2);
```



display the final segmented image

```
figure
imagesc(seg3)
```




```
%calculate the segment parameters
segpars=getallseginfo(seg3);
%put them in column form for putting in a table
penguin=segpars(:,1);
area = segpars(:,2);
cx = segpars(:,3);
cy = segpars(:,4);
orientation = segpars(:,5);
table(penguin,area,cx,cy,orientation)
```

```
ans =

    penguin    area      cx       cy      orientation
    _______    _____    ______    ______    ___________

    1          11936    102.87    225.88    -78.323
    2           9228    190.48    225.99     76.527
    3           5910     272.9    219.91     73.261
    4           5495    372.49    223.32    -85.283
    5           4098    441.17    220.47      72.49
```

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