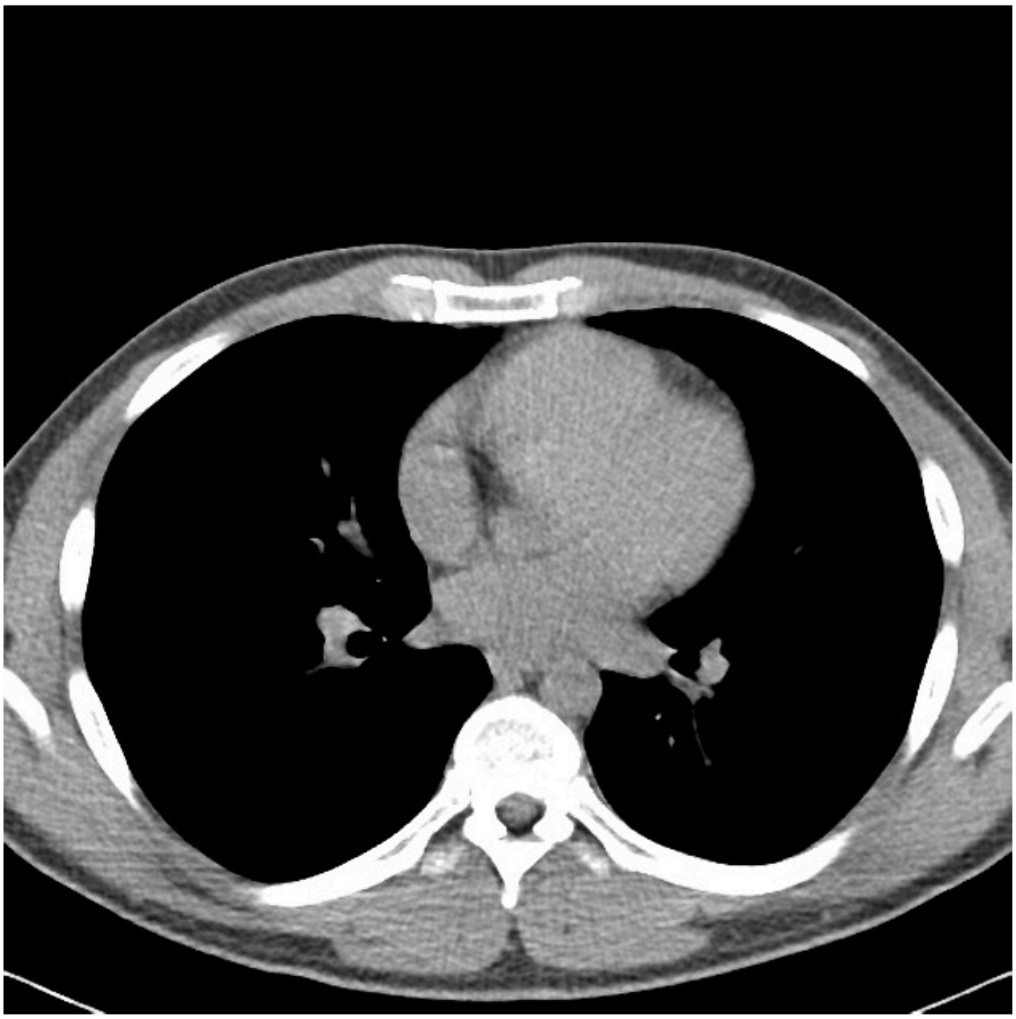
Kmeans segmentation

```
f = imread('CT_CHEST.jpeg');
f = double(f(:,:,1));
f = f/max(max(f));
imshow(f)
```

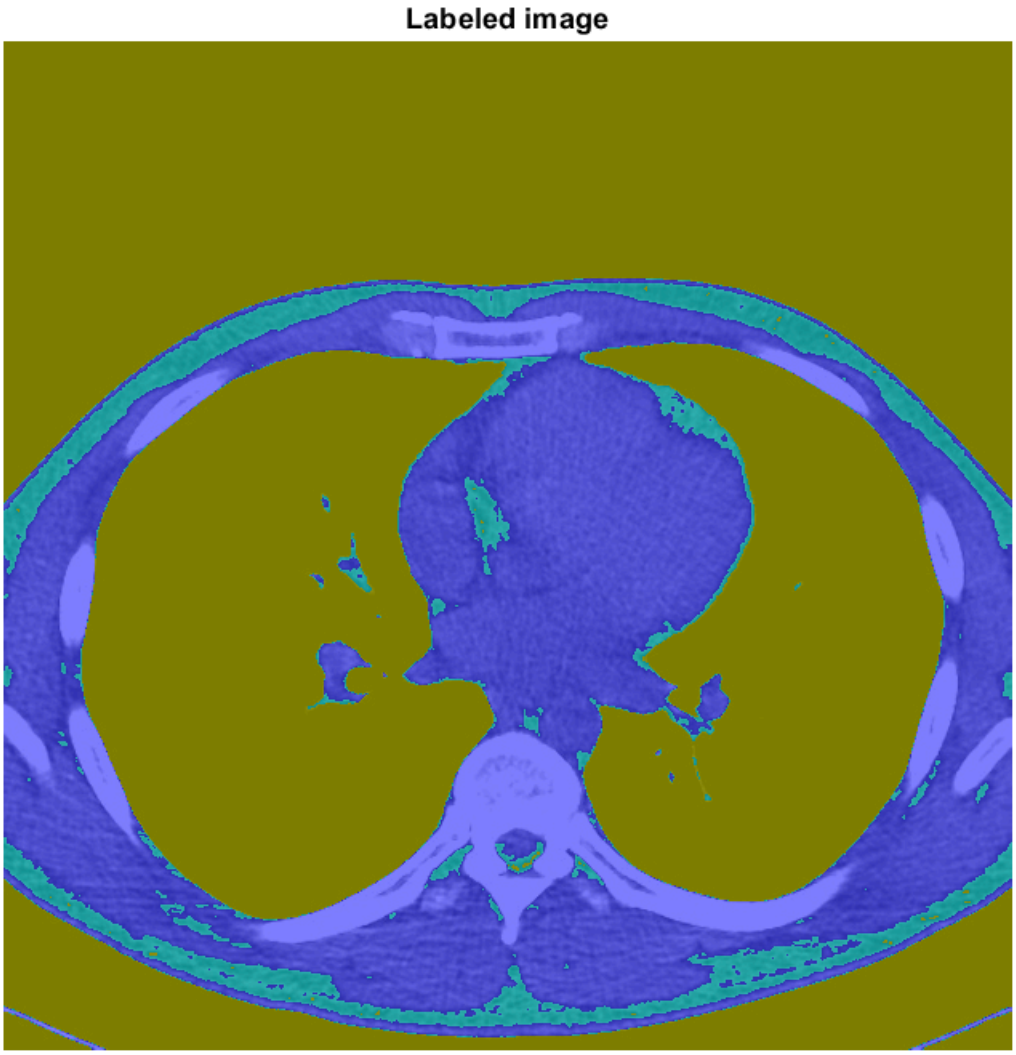


```
% Robets op
dxp = [0,1;-1,0];
dyp = [1,0;0,-1];
```

Kmeans

```
% 4 class
[L,Centers] = imsegkmeans(int8(255*f),3);
B = labeloverlay(f,L);
[L1,centers1] = imsegkmeans(int8(255*f),5);
B1 = labeloverlay(f,L1);
```

```
figure
imshow(B)
title('Labeled image')
```



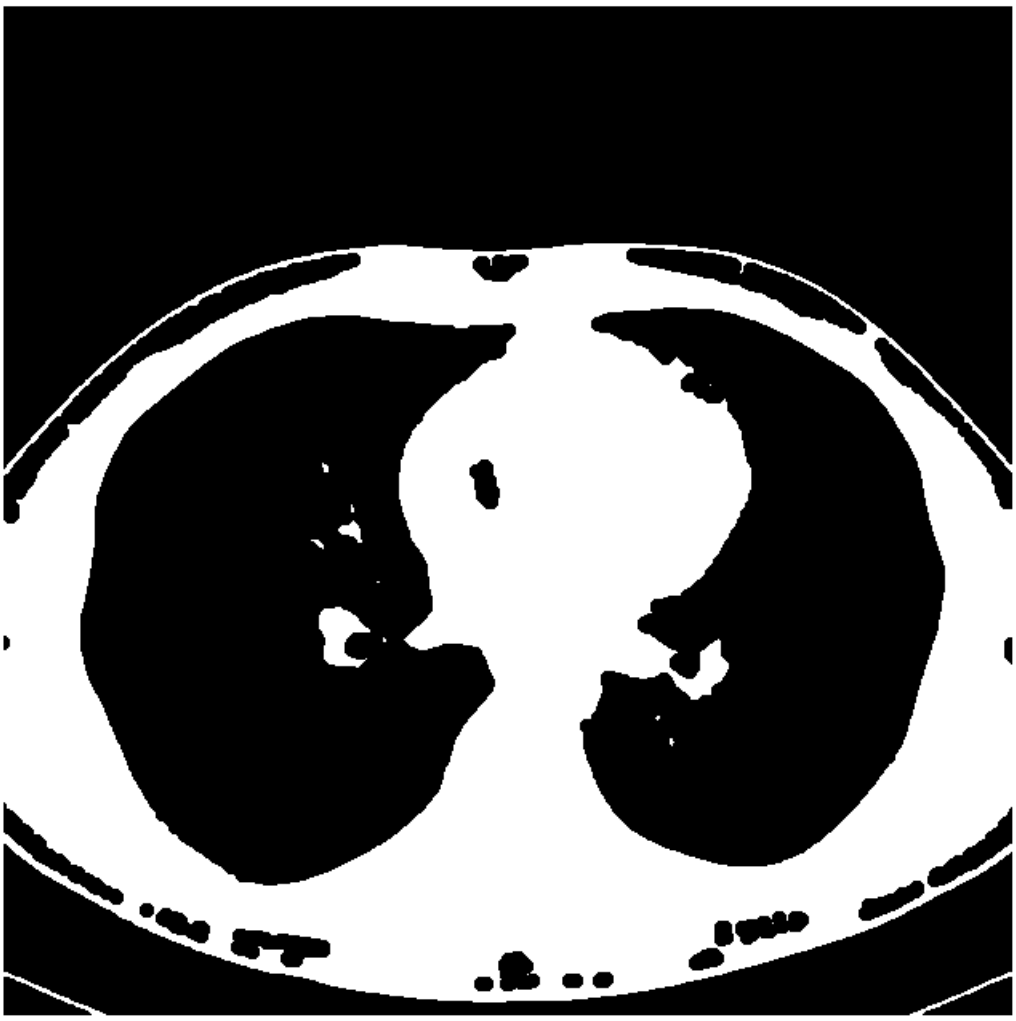
Clean wih morphology each class

```
% First label
subplot(1,1,1)
label_one = L == 1;
imshow(label_one)
```

```
% Remove false positives with imclose
diskse = strel('disk',5);
label_close_one = imclose(label_one,diskse);
imshow(label_close_one)
```

```
% Second label
label_two = L == 2;
imshow(label_two)
```

```
% Remove false positives with imclose
label_close_two = imclose(label_two,diskse);
imshow(label_close_two)
```

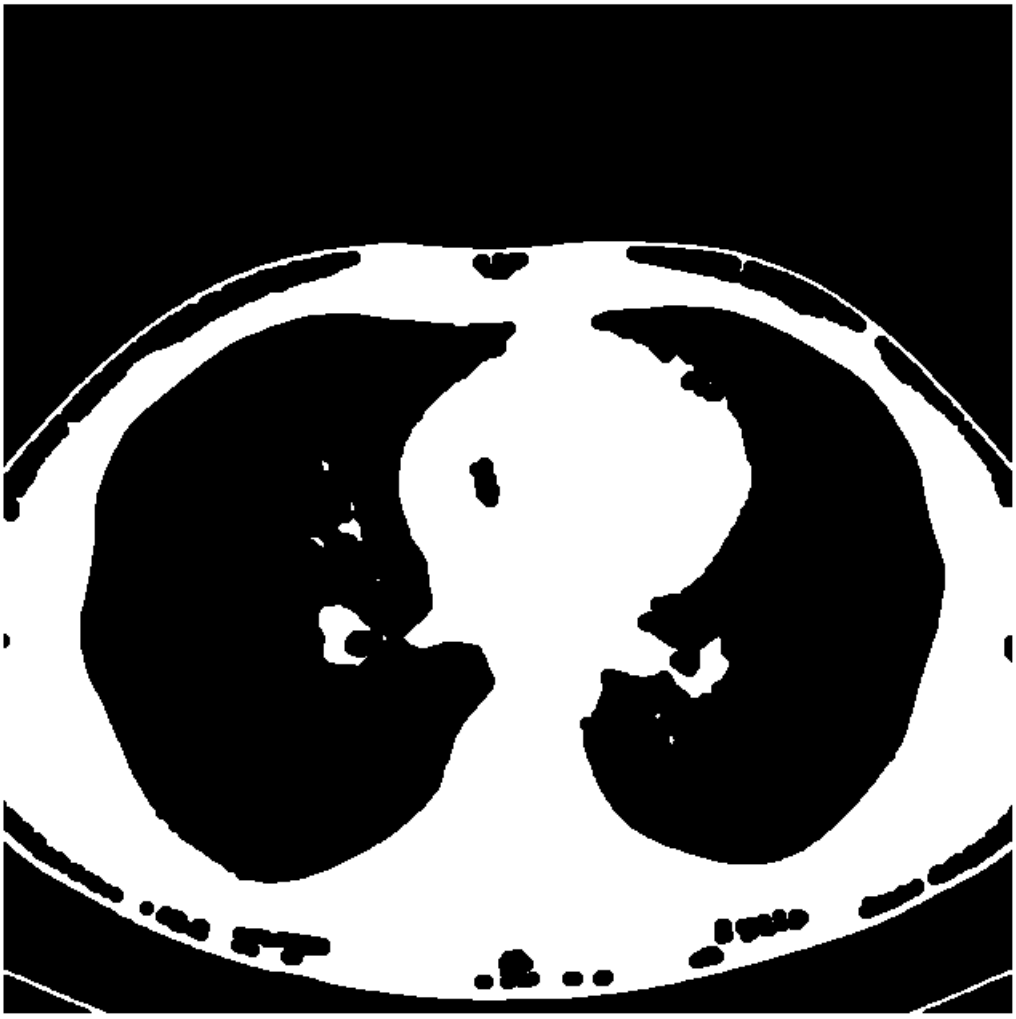


```
% Third label
label_three = L == 3;
imshow(label_three)
```

```
% Remove false positives with imclose
label_close_three = imclose(label_three,diskse);
imshow(label_close_three)
```

```
% Fourth label
label_four = L == 2;
imshow(label_four)
```

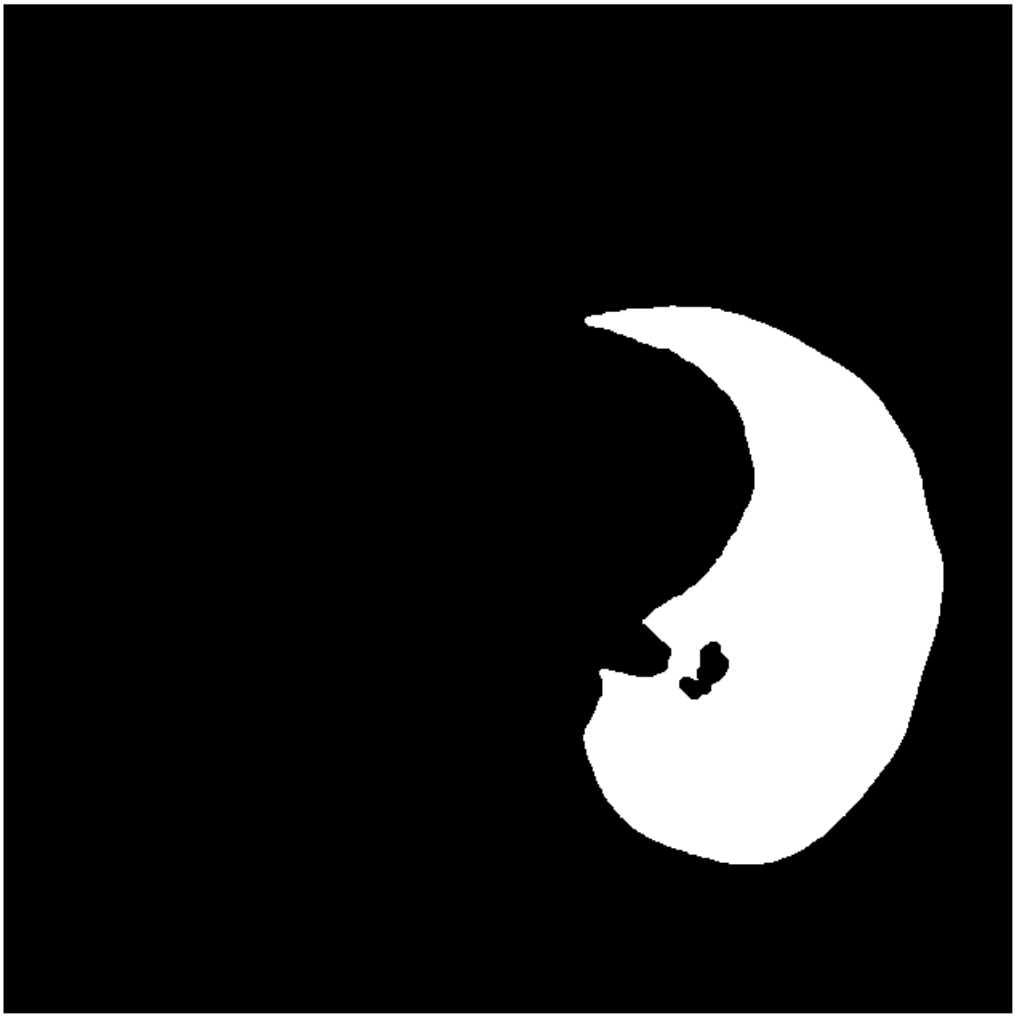
```
% Remove false positives with imclose
label_close_four = imclose(label_four,diskse);
imshow(label_close_four)
```



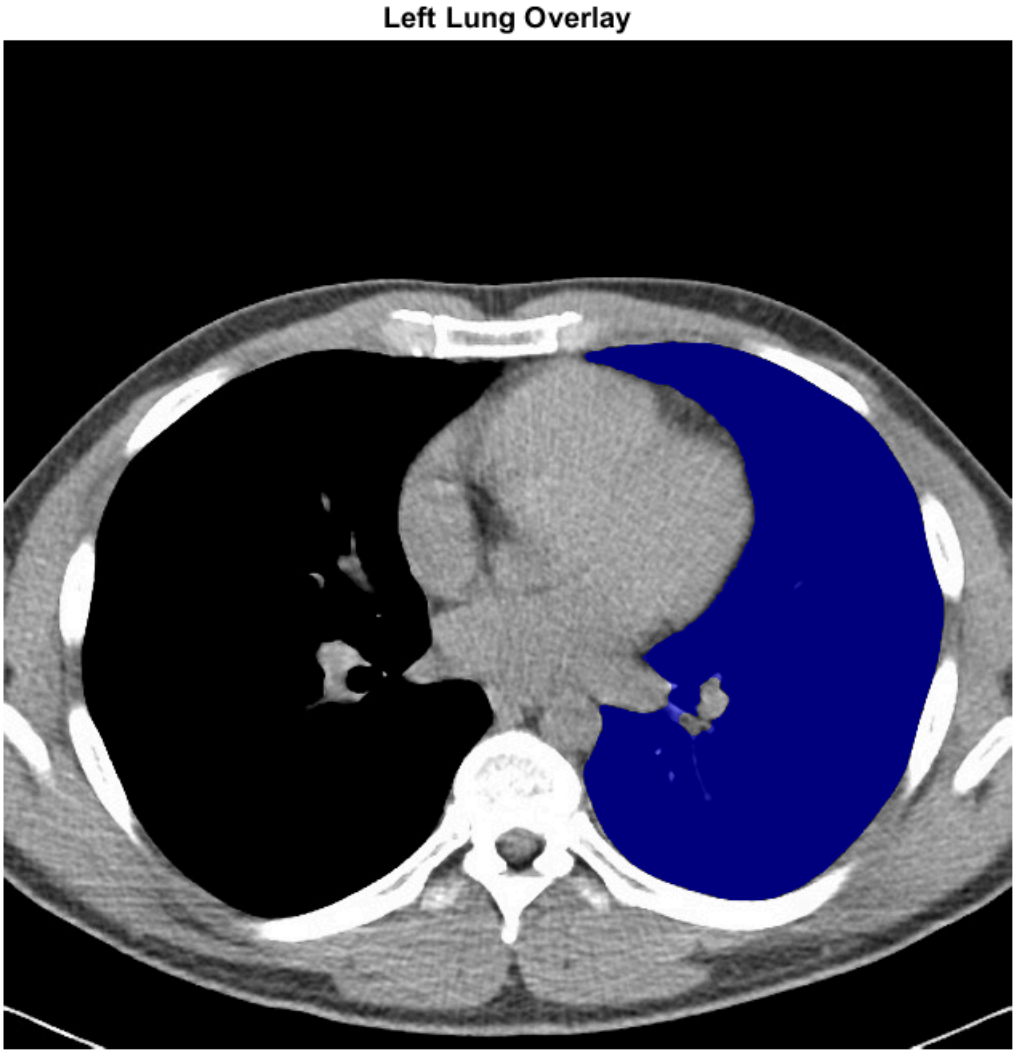
Connected components of Label 1

```
cc = bwconncomp(label_close_one,4);
labeled = labelmatrix(cc);
imshow(labeled,[])
colormap('cool')
```

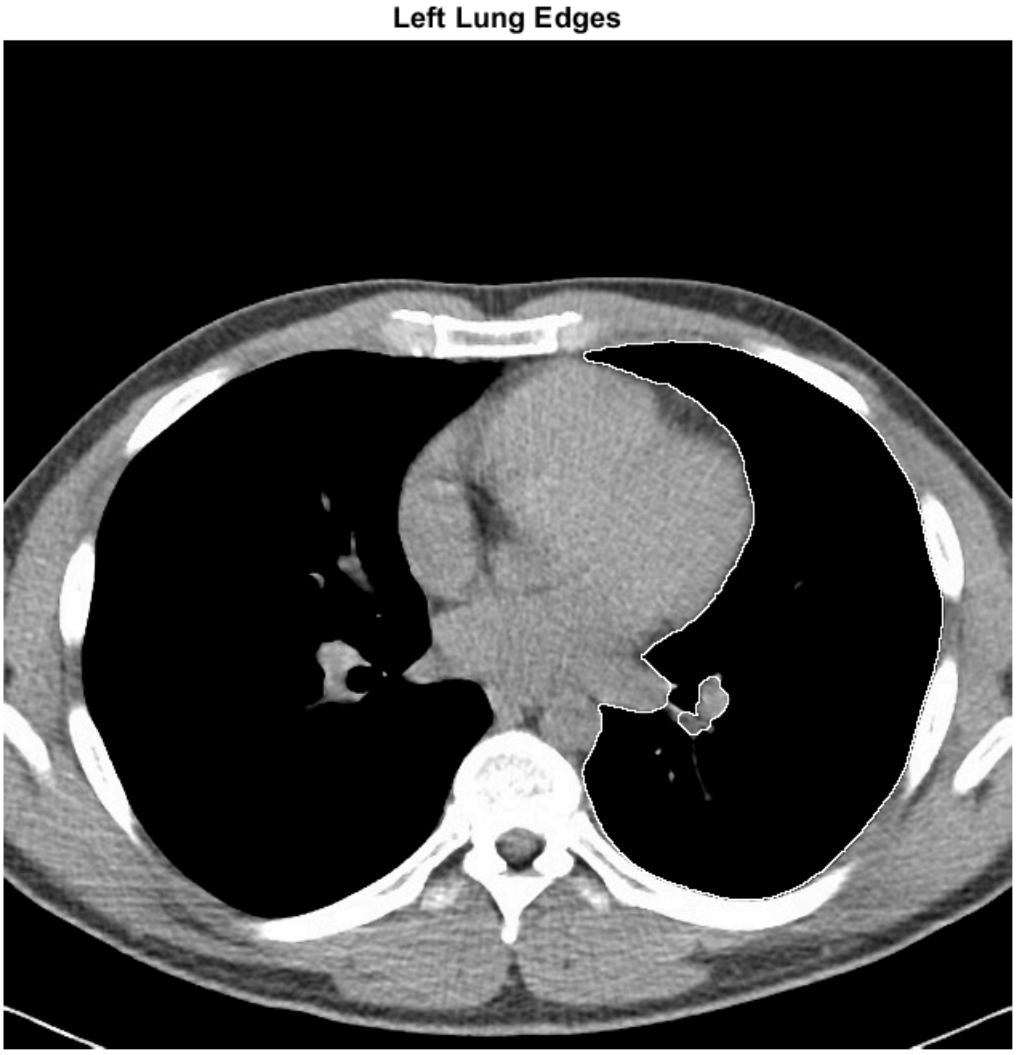
```
% show left lung

% Using the data tips
LungLabel = 19;
imshow(labeled==LungLabel,[]) % Buscar etiqueta (index) en plot anterior (19)
```



```
B2 = labeloverlay(f,labeled==LungLabel);
imshow(B2)
title('Left Lung Overlay')
```



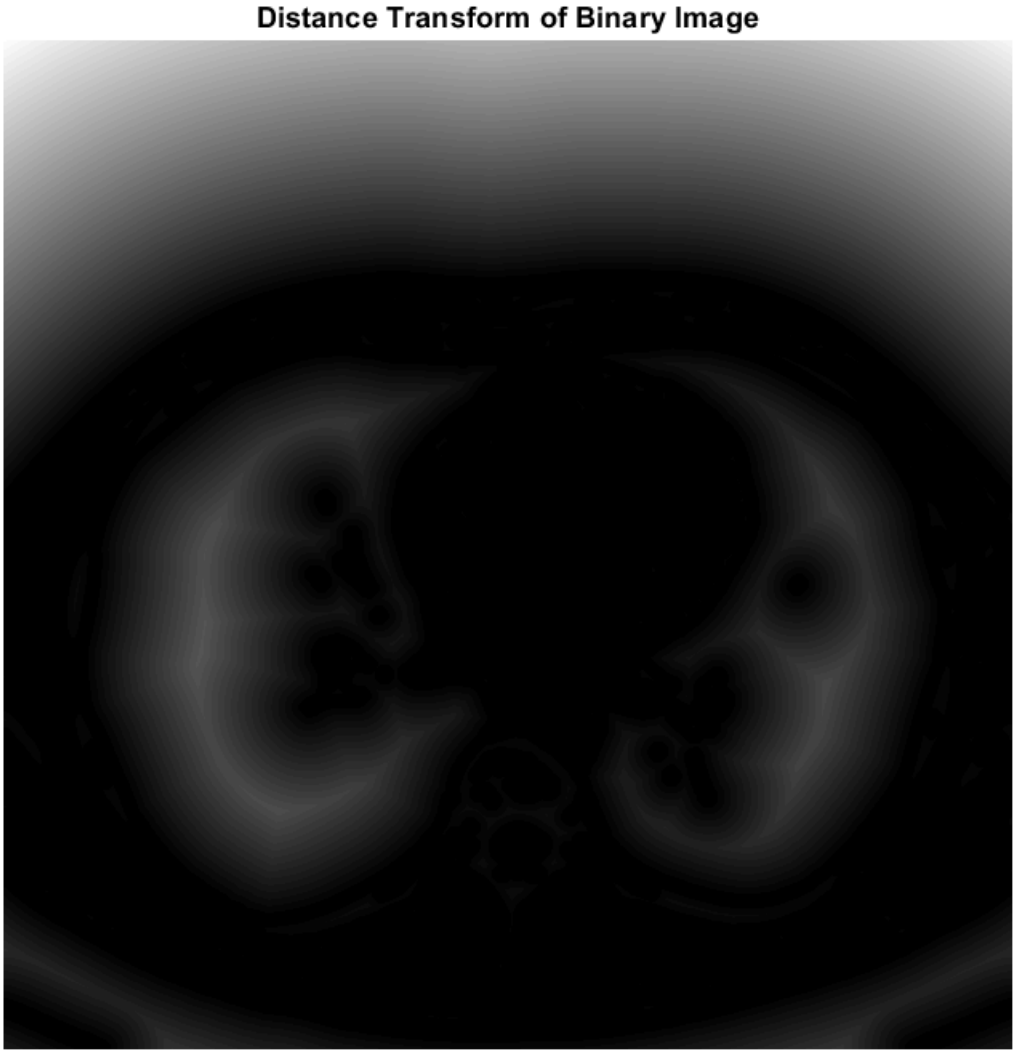

```
seg1 = labeled==LungLabel;
edgemap = abs(conv2(seg1,dxp,'same'))+abs(conv2(seg1,dyp,'same'));
imshow(f+edgemap,[0,1]);
title('Left Lung Edges')
```



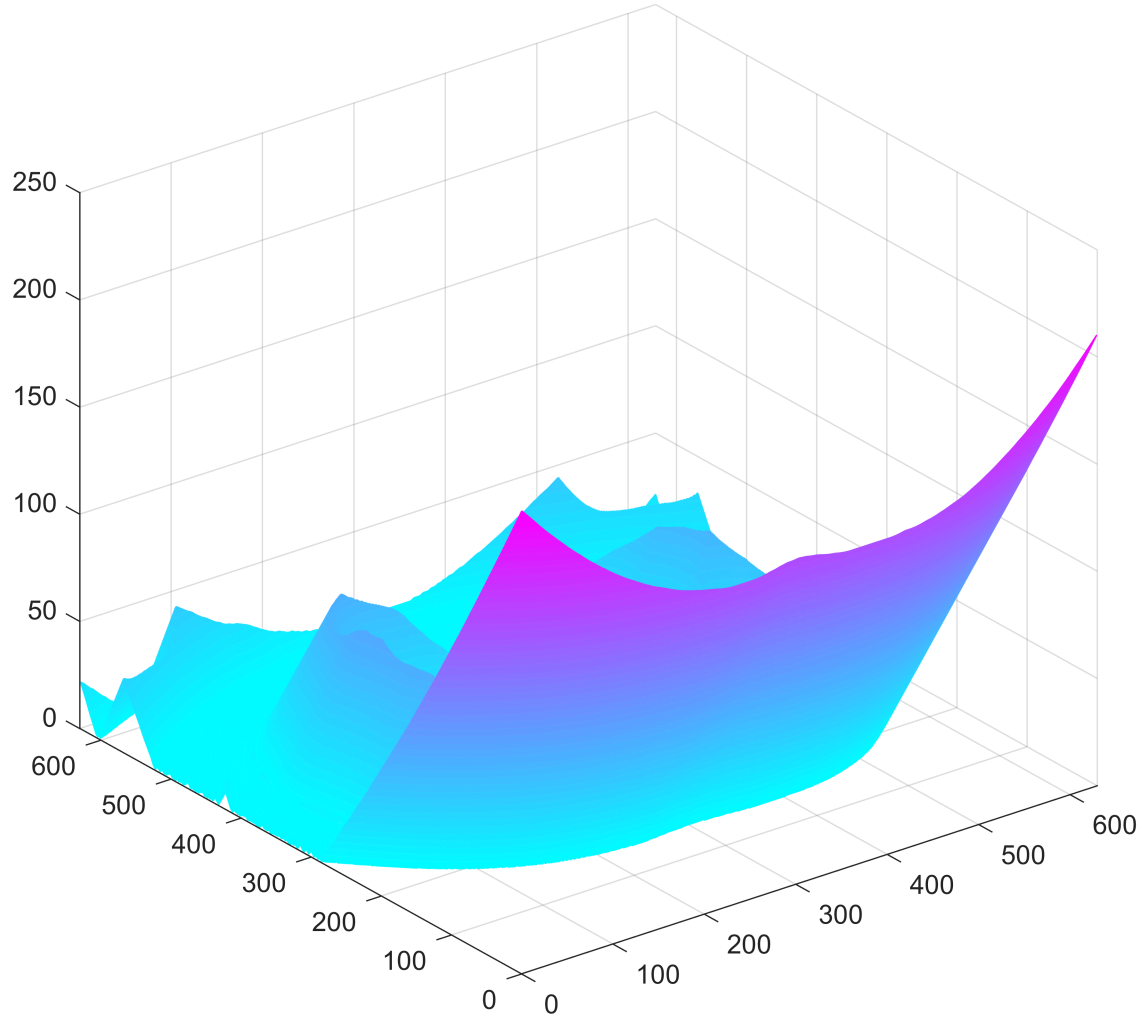
Watershed

```
edgeC = edge(f,'Canny');
imshow(edgeC,[])
```

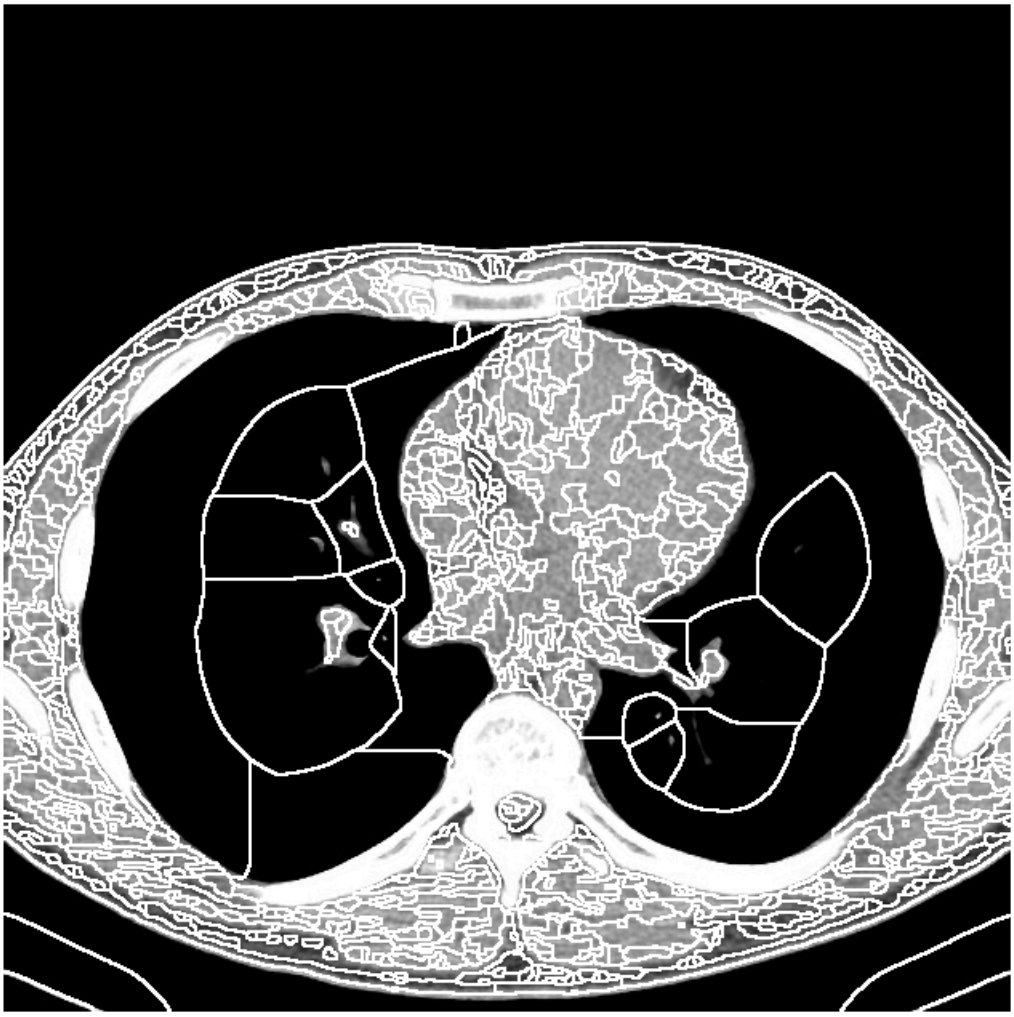
```
D = bwdist(edgeC);
imshow(D,[])
title('Distance Transform of Binary Image')
```



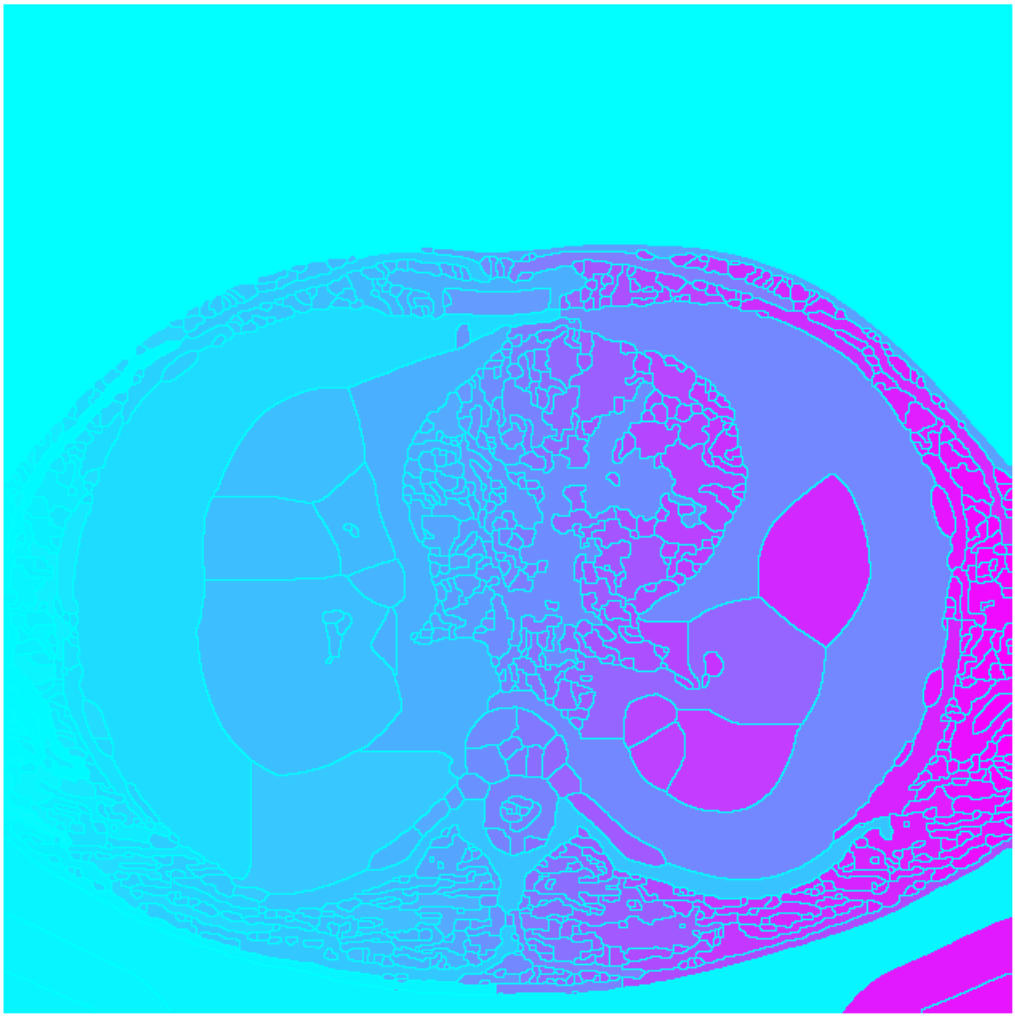

```
mesh(D)
```



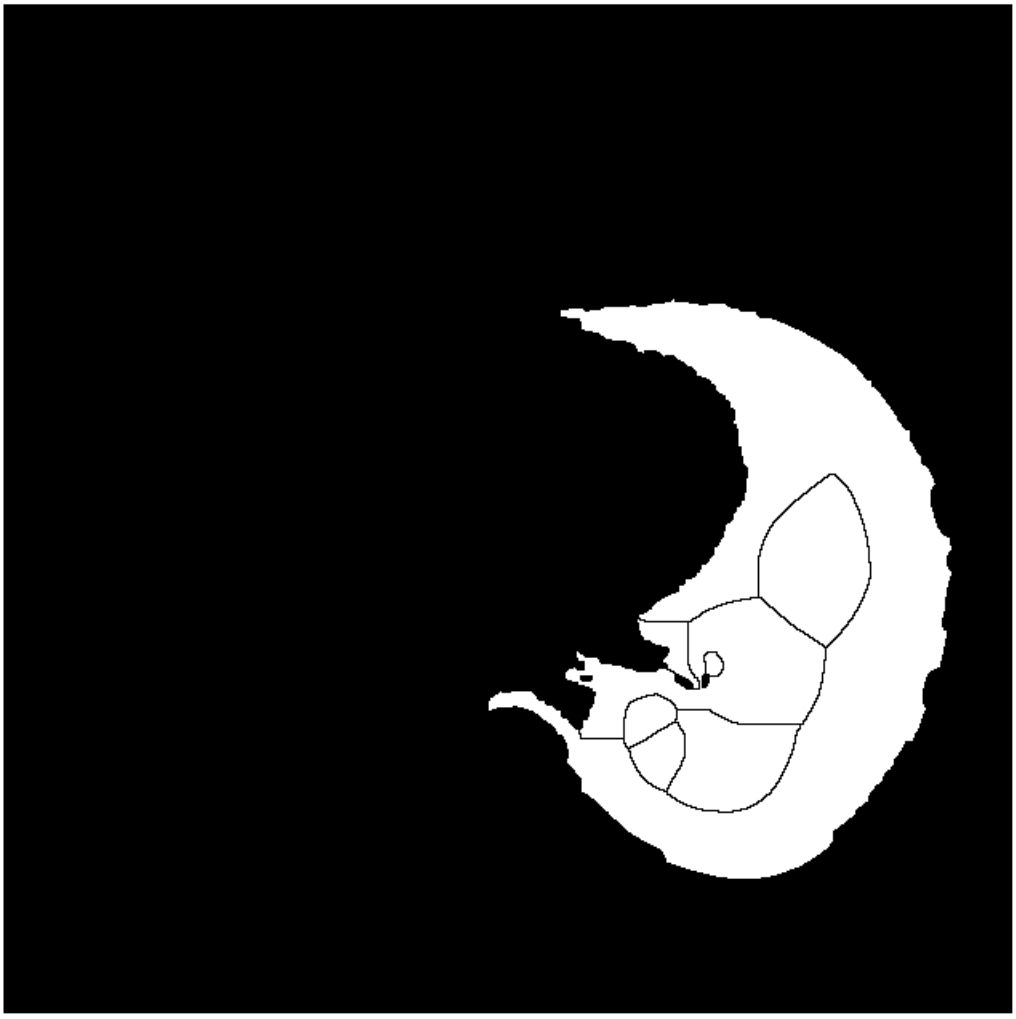

```
L = watershed(D);

edgemap = abs(conv2(L,dxp,'same'))+abs(conv2(L,dyp,'same'));
imshow(f+edgemap,[0,1]);
```



```
imshow(L,[])
colormap('cool')
```

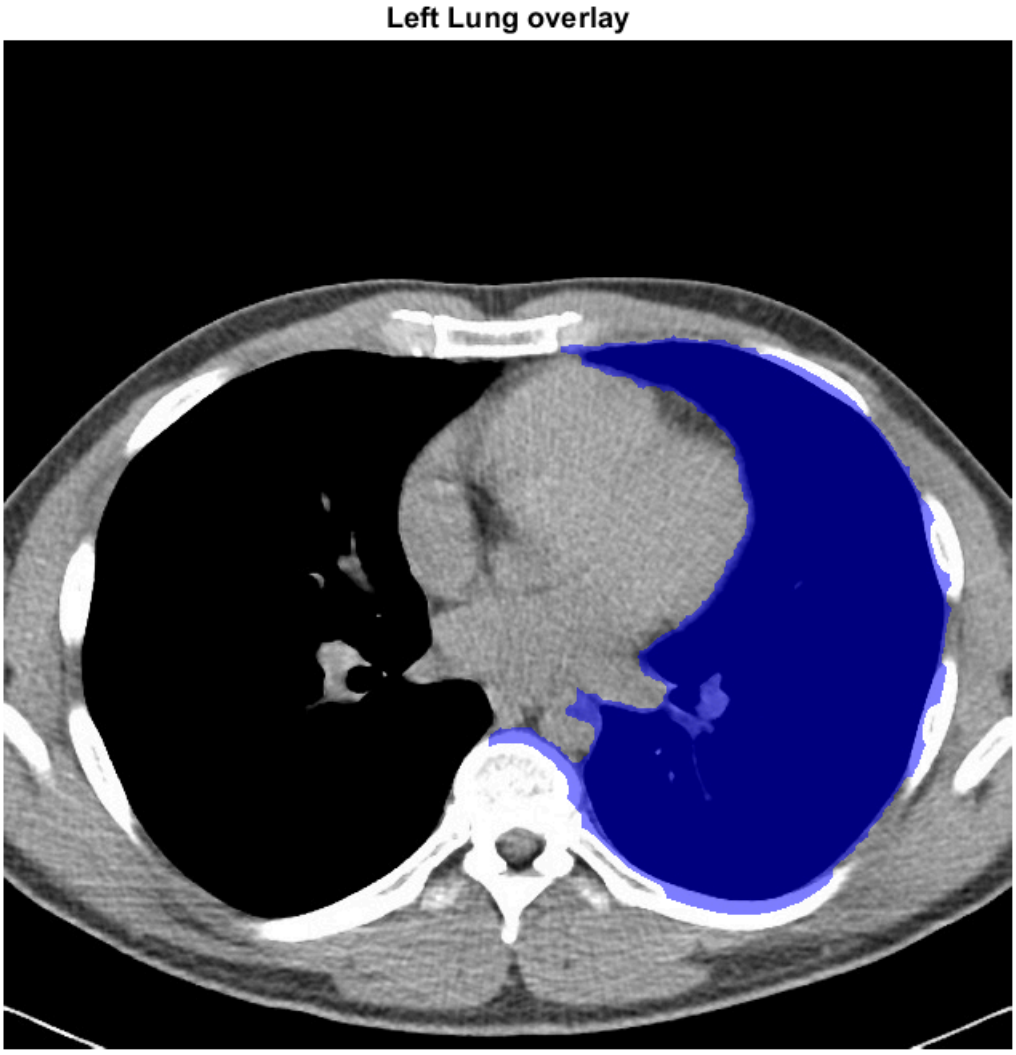


```
% The lung is made of several components, We must merge the labels
LeftLung = L==441 | L==795 | L==578 | L==729 | L==710 | L==683 | L==751 | L==694;
imshow(LeftLung,[])
```



```
LeftLung_close = imclose(LeftLung,diskse);
imshow(LeftLung_close)
```

```
B3 = labeloverlay(f,LeftLung_close);
imshow(B3)
title('Left Lung overlay')
```




```
% Remove false positives with imopen
label_lung = imopen(LeftLung_close,diskse);
imshow(label_lung)
```

```
B3 = labeloverlay(f,label_lung);

imshow(B3)
title('Final Left Lung Overlay')
```

Final Left Lung Overlay