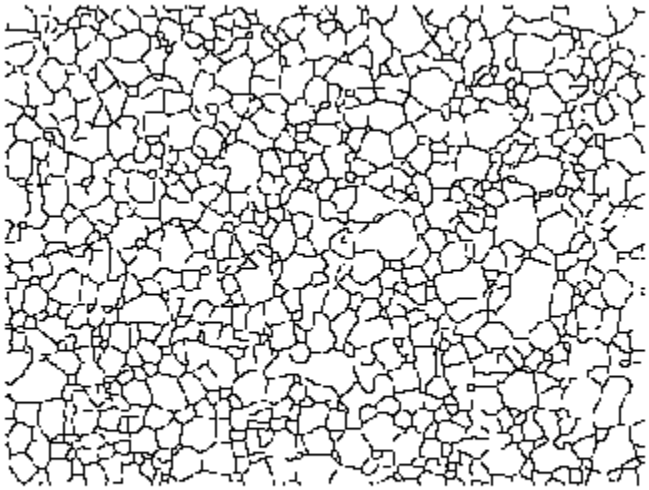
Table of Contents

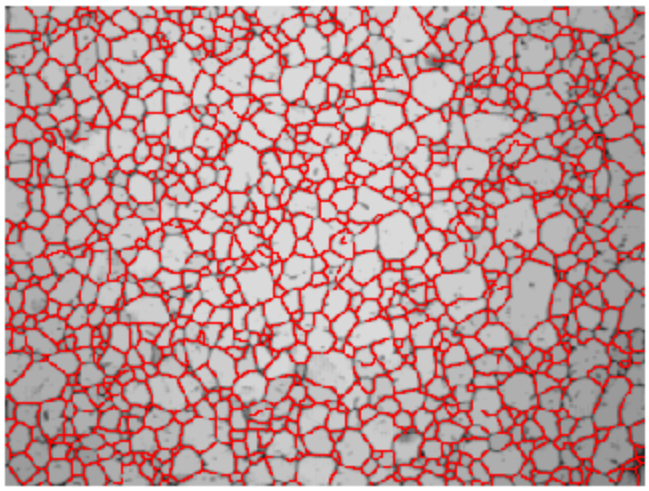
1a)

```
I = imread("grains.jpg");
I = rgb2gray(I);
I = imgaussfilt(I);
I = imcomplement(I);
I = imhmin(I,20);
L = watershed(I);
figure; imshow(L>0,[]);
```



1b)

```
b = zeros(300,400);
b(L == 0) = 1;
I = imcomplement(I);
overlay = imoverlay(I, b, 'r'); % [r g b]
imshow(overlay);
```



1c)

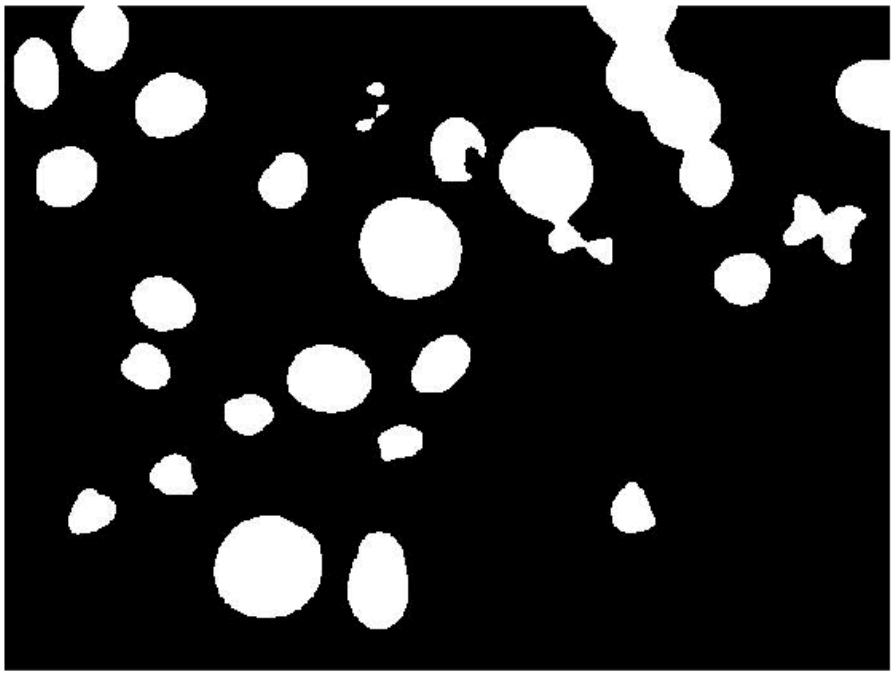
```
segments = max(L, [], 'all')
```

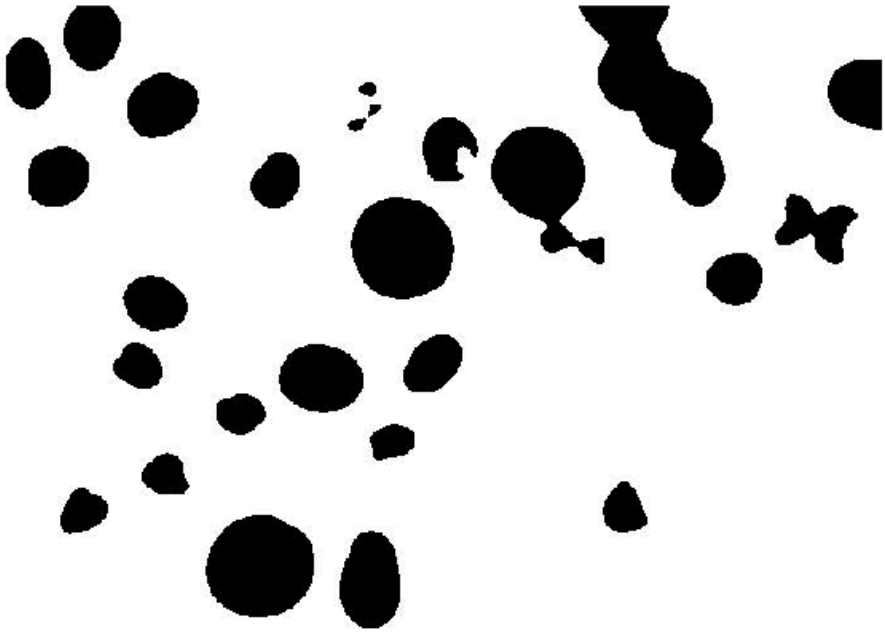
```
segments =

  uint16

   977
```

2

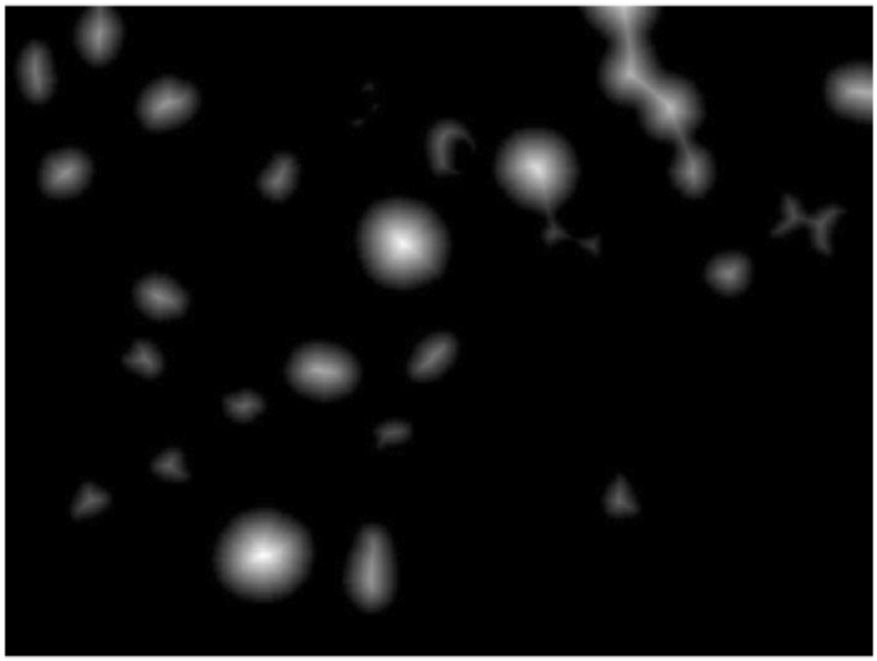
```
ifm = imread('ifm_seg.jpg');
figure; imshow(ifm);
figure; imshow(imcomplement(ifm));
pic(ifm>0) = 1;
D = bwdist(imcomplement(pic));
figure; imshow(D,[],'InitialMagnification','fit');
title('Distance transform of ~bw')
% Complement the distance transform, and force pixels that don't
 belong to the objects to be at Inf .
D = -D;
D(~pic) = Inf;
D = imhmin(D, 1);
L = watershed(D);
L(~pic) = 0;
rgb = label2rgb(L,'jet',[.5 .5 .5]);
figure;
imshow(rgb,'InitialMagnification','fit')
```

```
title('Watershed transform of D')
```

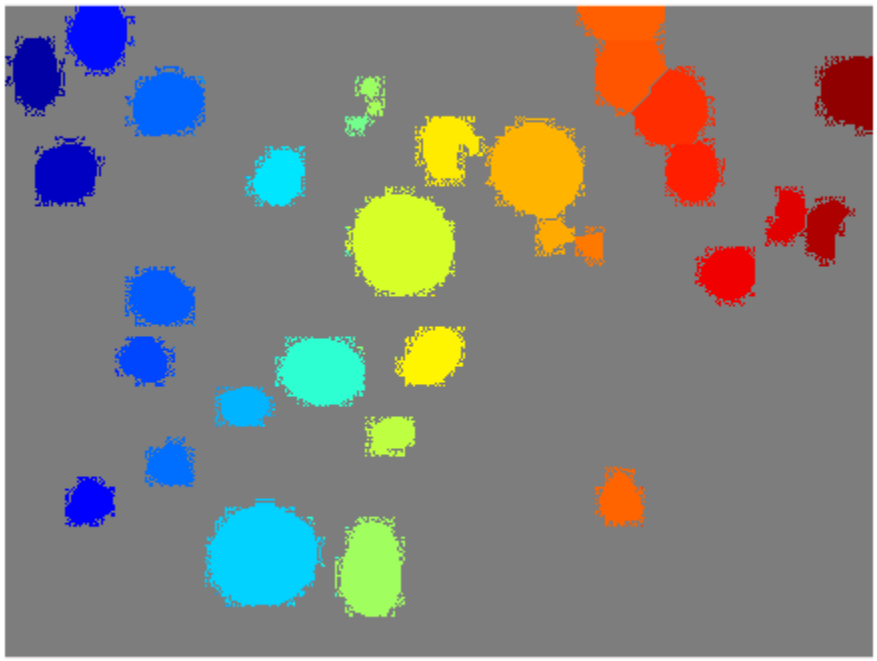




Distance transform of ~bw



Watershed transform of D



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