

## 3.3 图像处理基本任务 - 分割与修复

### 3.3.1 图像分割

#### 常用的分割方法 ¶

- 基于阈值分割
- 基于区域分割
- 基于边缘分割(边缘检测算子)
- 基于图论分割
- 基于能量泛函的分割(需要PDE以及变分的知识, 详见后一讲的例子)

让我们来看个简单例子

#### 例1:视网膜图像血管的提取



导入血管提取子程序 (通过边缘提取获得关心的物体: 血管)

In [1]:

```
%load m/VesselExtract.m
```

In [ ]:

In [ ]:

```
inImg = imread('figs/retinal.bmp');  
dim = ndims(inImg);  
if(dim == 3) % if the Input is a colored image  
    inImg = rgb2gray(inImg); % convert it into grey image  
end  
imshow(inImg)
```

In [ ]:

```
Threshold = 5;  
bloodVessels = VesselExtract(inImg, Threshold);
```

In [ ]:

```
imshow([inImg, 255*ones(size(inImg,1),15), bloodVessels])
```

**练习:** 请针对如下眼前节光学成像寻找边界(读者也可以找其他包含丰富血管信息的医学影像进行实践)



In [ ]:

### 3.3.2 图像修复

Let us show the **inpainting** code in Octave environment, all the necessary material located at folder inpainting. One is referred to the original author's website for further development

#### 例1 FTVD

In [ ]:

```
% show it with octave gui, it does not work here
```

In [ ]:

#### 例2 ExemplarBasedInpainting

In [ ]:

```
% show it with octave gui, it does not work here
```

In [ ]:

**算法调研：** 图像修补的Criminisi算法(Region Filling and Object Removal by Exemplar-Based ImageInpainting)

- 2003微软内部报告版本 (<https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/tr-2003-84.pdf>)
- 2004发表的版本 (<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1323101>) -- IEEE数据库访问权限，需要在ZJU内下载

**算法调研：** 常用的图像修补算法有哪些？请简述并尝试复现算法