This lab assignment should be done in teams of two. Go through the exercises below and show me your results. If you don’t finish by the end of today’s class, you may show me during the next class.

On the course web page are two binary images, “hearts.bmp” and “plus.bmp”. These are images of hand-drawn shapes of hearts and pluses, respectively.

Extract connected components from these images, and compute feature properties for each image, using the Matlab function `regionprops`.

Plot the feature “Area” vs “Solidity” for each of the two classes (using Matlab’s plot function). You will need to put those features into a 2xN array:

```matlab
for i=1:n1
    X(i,1) = props1(i).Area;
    X(i,2) = props1(i).Solidity;
    y(i,1) = 1; % class label
end
for i=1:n2
    X(i+n1,1) = props2(i).Area;
    X(i+n1,2) = props2(i).Solidity;
    y(i+n1,1) = 2; % class label
end
```

Create a decision tree for these two classes, using the Matlab function `ClassificationTree.fit`. Make sure that you set the input parameter “MinParent” to 1 (the default is 10). Setting `MinParent = 1` will cause the decision tree to split (make a new node) if there are any instances that are still not correctly labeled.

1. Show the resulting decision tree (Matlab function `view`):
   ```matlab
   view(ctree, 'mode', 'graph');
   ```

2. Apply the tree to classify the new shape in the image “test.bmp”. Which class do you assign this shape to?