ECE 5397/6397: Intro to Robotics
HW 5, Due Nov 13 Computer vision

This homework may be completed in groups of two. Sign the following promise:

Name 1: *I,* Nick Anderson *and* (opt) Name 2: Sikender Shahid
completed this coding assignment on our own. The code is not copied from anyone else

Part I: All
Given the Matlab code **AutoThreshold.m**, fill in the six TODOs to implement image thresholding. Insert the answers for these TODOs below:

1. TODO #1
2. TODO #2
3. TODO #3
4. TODO #4
5. TODO #5
6. TODO #6
7. Run your code on the file Duplos.png.

See following page

Part II: *Graduate students*

Using the same image, label the connected components using the two-pass algorithm from section 11.4. Call your file **ConnectedComponents.m** with function call
cc = ConnectedComponents(binary_img), where binary_img is a binary image and cc is a matrix the size of binary_img with 0 assigned to background pixels and integers to different connected components.
Show a screenshot of the connected components applied to the thresholded Duplo.png
Attach your code

Part III: *Graduate students*

Compute and label the centroids and orientation of each connected component. Call your code **CentroidAndOrientation.m**, with function call
[centroids, orientations] = CentroidAndOrientation(cc), where cc is the output from part II.
Show an image applied to the output from Part II. Draw the centroids and orientation lines in white.
Attach your code

#1
```
mu=0;
for z = double(1):double(N-1)
    mu= mu + z * P(z);
end
```

#2
```
sigSq = 0;
for z = double(1):double(N-1)
    sigSq = sigSq + ((z-mu)^2 * P(z));
end
sigSq = double(sigSq);
```

#3 $q0(zt+1) = P(zt+1) + q0(zt);$

#4 $mu0(zt+1) = \left((zt+1) * P(zt+1) + q0(zt) * mu0(zt)\right) / q0(zt+1);$

#5 $mu1(zt+1) = \left(mu - q0(zt+1) * mu0(zt+1)\right) / \left(1 - q0(zt+1)\right);$

#6 $sigb2(zt+1) = q0(zt+1) * (1-q0(zt+1)) * (mu0(zt+1) - mu1(zt+1))^2;$