

EE492 Senior Design II - Weekly Report 10

Group Number: May1634	Date: 3/10/16 - 3/17/16
Project Name: Studying cell behaviors in 3D microtissues using a LabChip	
Advisor: Long Que	
Client: Long Que	

The team

Role	Group Member
Group leader	Jonathan Yatekoske
Team Webmaster	Yaxiong Zhang
	Chun-Hao Lo
Team Communication Leader	Yuqian Hu
Team Key Concept Holder	Kaiyu Xu

Attendance (meeting date: Mar. 17th 2015)

Jonathan Yatekoske	In person
Chun-Hao Lo	In person
Yaxiong Zhang	In person
Kaiyu Xu	Absent
Yuqian Hu	In person

Accomplishments of past week

1. Meet with advisor and demo the code to him.
2. Improve the code with better GUI. Add two methods (findDroplets and findCells) for cell tracking for better output.

Plan for coming week

1. Group meeting. Work on the PowerPoint for presentation.
2. Prepare for the second meeting with instructor.

Pending issues

One additional group meeting next week to work on the presentation.

Individual contributions

Jonathan Yatkoske	come up with two methods for better output; perfect celltracking code
Chun-Hao Lo	website maintenance; improve sorting; code testing
Yaxiong Zhang	website maintenance; improve GUI
Kaiyu Xu	Take down meeting notes
Yuqian Hu	work on weekly report

Individual hourly contributions

Name	Week Hours	Cumulative Hours
Jonathan Yatkoske	6	69.5
Chun-Hao Lo	4	57.5
Yaxiong Zhang	3	57
Kaiyu Xu	1	32
Yuqian Hu	2	50.5

Appendix(Code)

1. findDroplets.m:

```

function [ centers, radii ] = findDroplets( image, min_radius, max_radius )
%findDroplets finds chambers with complete droplets on the LabChip device
% Uses the imfindcircles function to find the droplets within a radius
% range. Because imfindcircles sorts output by a metric that is useless
% for our purposes, this function then resorts the circles found by
% position in the image.
[centers_local, radii] = imfindcircles(image, [min_radius max_radius], 'Method', 'TwoStage');

[y_co,y_index] = sort(centers_local(:,2));

temp_i = sort(y_index);

temp = centers_local;

temp(temp_i) = centers_local(y_index); %sorts x-coordinate by ascending order of y-coordinates
temp(temp_i,2) = centers_local(y_index,2);

centers = temp;

end

```

2. findCells.m

```

function [ stats ] = findCells(X, centers, radii, radius, k, i)
%findCells using edge detection and image processing to locate the cells within the frame of the droplets
% final version of the function must iterate through the droplets
% identified by centers array

rect = [centers(i,1)-radius centers(i,2)-radius 2*radius 2*radius];
X2{1} = imresize(imcrop(X, rect),2.9,'bilinear');

[~, threshold] = edge(X2{1}, 'canny');
fudgeFactor = 0.9;
BWs = edge(X2{1}, 'canny', threshold*fudgeFactor);

se90 = strel('line',3,90);
se0 = strel('line',3,0);

BWsdl = imdilate(BWs, [se90,se0]);
Bwdfill = imfill(BWsdl, 'holes');
Bwnobord = imclearborder(Bwdfill, 4);

seD = strel('diamond',1);
BWsmooth = imerode(Bwnobord,seD);
BWsmooth = imerode(BWsmooth,seD);

BW_final = bwareaopen(BWsmooth, 300);
figure(8), subplot(2,2,1), subimage(X), viscircles(centers,radii);
subplot(2,2,2), subimage(X2{1});
subplot(2,2,3), subimage(BW_final);

stats = regionprops(BW_final, 'Centroid');

end

```