Report of CS101_Project
Cancer Detectors

Link of video:

https://www.youtube.com/watch?v=hux-3G1zstA&feature=youtu.be

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Introduction:

Our program can be used by the Suspected patients of being injured with breast cancer, who don't have any medical background and aren't able to understand the image of X-ray, so they 'll be able to know if they have cancer or not, and also knows how dangerous the cancer is in case of existing!
They just need to insert the name of an image (X-ray) to the program and it will show the message: "No cancer was found" in case of there's no cancer, or will show the message: "Cancer was found", stage of cancer, and radius of cancer in case of cancer existing.

Team work:

- We have made many functions and made a lot of trials, and here it's the final form we reached after we have excluded the useless ones.
- There were alot of alternatives for our functions but we have chosen the most simple, useful, and accurate ones for our project.
- The first function (Input), and the last function (Output) were made by both of us in one meeting, so everyone has the same beginning and the same destination in his path.
- Everyone works on the remaining three functions individually, and finally we met online and discussed our achievements, and recorded which both of us agreed on.

- The second function (prepare): Jihad achieved the first two lines, and I achieved the last two lines.
- In the final code: Jihad got the line 5.
- I got the first two lines from the third function(property), Jihad did the calculations in the last lines to get the radius.
- I got the forth function (stages), and Jihad edited it to help errors disappear.
- The rest which isn't mentioned was done by both of us.

Our program works through the following code explained in details:

The code in functions:

First function: imin

```
function ori=imin
    f=input("insert the imaage's name between '' ");
    ori=imread(f);
end
```

This function gets the image name from the user and then gets the image in Matlab.

```matlab
function edi=prepare(ori)
    s=rgb2gray(ori);
    th=s>200;
    f=strel('disk',5);
    edi=imopen(th,f);
end
```

This function turns the image into a grayscale image, and then detects if there's cancer or not through discovering if s>200, this means that there's an area in the image in the range of cancer's color, if there isn't any area in this range that means there's no cancer!

Third function: property

```matlab
function [A,R]=property(edi)
    q=regionprops(edi,'Area');
    A=q.Area;
    R=sqrt(A/pi);
end
```

This function measures the radius of the cancer in ase of existing.

The forth function: Stage

```matlab
function stage=stages(R)
    if R<=2
        stage='Cancer is in stage 1';
    elseif R>2 && R<=5
        stage='Cancer is in stage 2';
    elseif R>5
        stage='Cancer is in stage 3';
    end
end
```

This function detects if there's cancer, in which stage is it?

The fifth function:outreim

```matlab
function T=outreim(R,stage,d)
    if d==1

        T='Cancer was found';
        disp('Cancer was found');
        disp(stage);
        fprintf('Radius = %f \n ',R);
    elseif d==2
        T='No cancer was found';
        disp('No cancer was found');
    end
end
```

This is the output, showing for the user a message with the result, stage, and radius.

The final code:

```
clc
clear

ori=imin;

edi=prepare(ori);

[a,s]=bwlabel(edi,8);
disp(s);

  if s>0

    [A,R]=property(edi);

    stage=stages(R);
    d=1;
  else
    R=0;
    stage=0;
    d=2;
  end
outreim(R,stage,d);
imshow(edi);
```

PS: In line 5 we turned the image into an image in black-white, as the areas in the image lying in the range of cancer color will have white color, and the rest will have black color.

How to use it:

 All you need to do is just to insert the name of the image "X-ray of the breast" uploaded on your PC, and then wait for the result!