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Homework 1

Medical Image Analysis

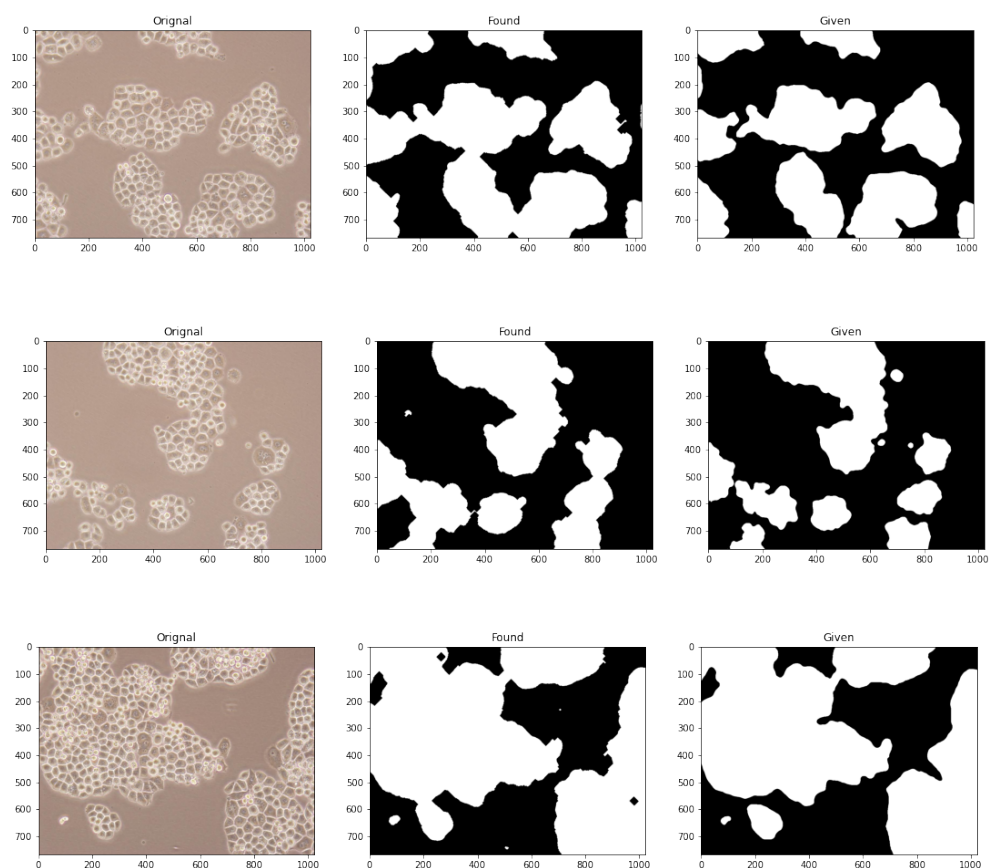
## Part 1 Obtain Foreground Mask

This part only takes the Image and returns Image to a foreground mask.

To achieve that following scenario resulted:

- First contrast Increased to get better distinguish
- Then with the LoG filter In R channel Images are sharpened
- Then to apply binary threshold the mean value of the cells selected which was around 142.5
- Then to fill the holes 3\*3 elliptic kernel selected and as a morphological
- operations opened 4 time and closing 15 time applied

### Part 1 Results:



Images	Pixel-level precision:	Recall:	F-score:
Image 1	0.806757	1.000000	0.893045

Image 2	0.889387	0.993642	0.938628
Image 3	0.957130	0.988212	0.972423

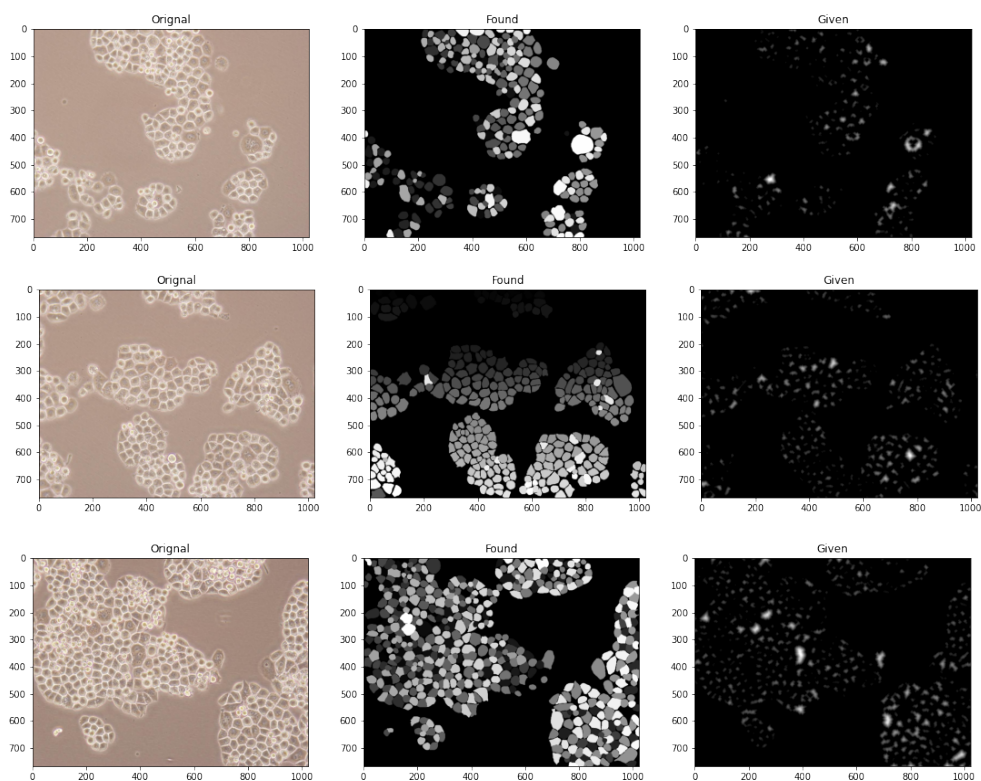
## Part 2 Find Cell Locations

This part additional to Image with using the foreground mask which found in upper try to find cell locations

To achieve that following scenario resulted:

- Like first step First contrast Increased to get better distinguish
- Then with the LoG filter In R channel Images are sharpened
- Then to apply binary threshold the mean value of the cells selected which was around 142.5
- Then to fill the holes 3\*3 elliptic kernel selected and as a morphological operations opened 5 time
- Then to get distinct cell and cell center bitwise negation applied
- Then to get more distinct cell center distance transform applied
- Then using the pre-function OpenCV momentum centers are calculated
- Then each cell distinctly separated from the rest of Image

## Part 2 Results:



Images	Pixel-level precision:	Recall:	F-score:
Image 1	0.914439	0.706612	0.893045
Image 2	0.896907	0.839228	0.740668
Image 3	0.797203	0.867110	0.823144

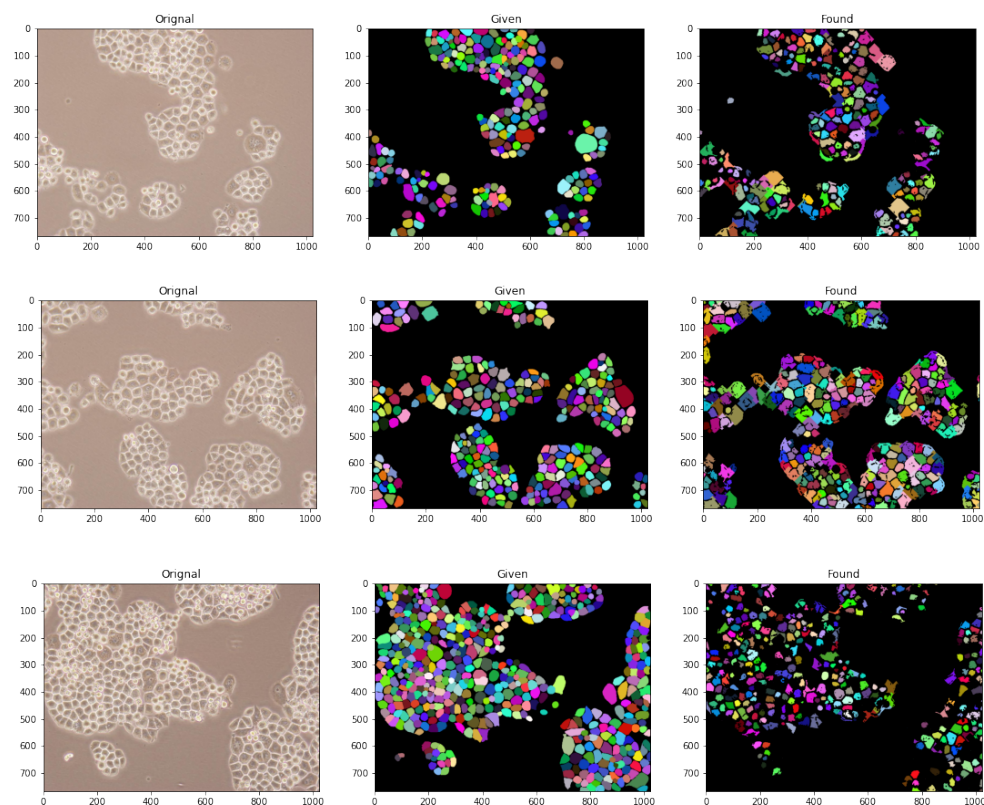
## Part 3 Find Cell Locations

This part additional to part 2 using the Image, foreground mask and the cell locations distinguish (labels) the cell location from 1 to N with colors

To achieve that following scenario resulted:

- The previous steps applied.
- In this time to label the cell, the region defined as from the cell center until the sell region.
- To avoid If the cell boundaries not correctly measured or any mistake region limited from the 41 pixels away from the It's center.
- This time to measure the metrics Dice Index used

## Part 3 Results:



## Dice Index

Image	Dice Index
Image 1	0.6447571169565545
Image 2	0.19092779838438403
Image 3	0.1317501583169083

## Ratio 0.5:

Images	Pixel-level precision:	Recall:	F-score:
Image 1	0.5578512396694215	0.5973451327	0.576923076923077
Image 2	0.5048231511254019	0.5130718954	0.5089141004862235
Image 3	0.3477406679764244	0.5042735042	0.4116279069767442

## Ratio 0.7:

Images	Pixel-level precision:	Recall:	F-score:
Image 1	0.11570247933884298	0.1238938053	0.119658119658119
Image 2	0.17363344051446947	0.1764705882	0.1750405186385737
Image 3	0.025540275049115914	0.0370370370	0.0302325581395348

## Ratio 0.9

Images	Pixel-level precision:	Recall:	F-score:
Image 1	0.008547008547008546	0.0088495575	0.635740312265530
Image 2	0.006430868167202572	0.0065359477	0.006482982171799
Image 3	Assumes 0 so small	Assumes 0 so small	Assumes 0 so small