Comp448 HW1 - Q2 Report:

Pseudocode Of Design:

Function FindCellLocations(image, foreground_mask, filter_size=3).
Identify contours in refined foreground mask. _ = cv2.findcontours(foreground_mask, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE)
Calculate contour centroids.
Calculate moments of the contour.
If the instant "m00" is not 0:
Calculate centroid coordinates (cX, cY).
Include centroid coordinates in the centroids list.
Create a circle for each centroid.
Draw a circle of radius 5 around the centroid of the regional_maxima_map.
Use majority filtering.
Create a kernel of size filter_size x filter_size, with all elements as one.
Use the morphological closing operation on the regional_maxima_map with the kernel.
Return centroids and filtered mask.
Return centroids with filtered_mask.

List Of Parameters:

1) foreground_mask: This parameter specifies the binary mask used to indicate the image's foreground or regions of interest. Typically, it is a binary image with one foreground pixel and zero background pixels.
2) filter_size: An optional parameter that indicates the size of the kernel used for majority filtering. The default value is 3.

Discussion:

1) Thresholding Parameter: Choosing the right threshold value for the distance transform is critical since it affects whether regions are considered markers for the cells. This value has a direct impact on the accuracy of cell detection.
2) Morphological Operations Kernel Size: The size of the kernel employed in morphological operations has a substantial impact on the smoothing and enhancement applied to the foreground mask. Choosing the right kernel size is critical for keeping significant features while reducing noise.
3) Contours Approximation Method: The method for approximating contour forms influences the fidelity of the contour representation. Using the suitable approximation method guarantees that the contours accurately represent the form of the cells while reducing processing cost.

4) filter_size: Begin with a default value and adjust according to visual assessment and specific requirements. Consider variables such as cell size and computational cost. Overall, aim for a mix of detail and efficiency.

Visual Results (regional maxima map):

Image 1:

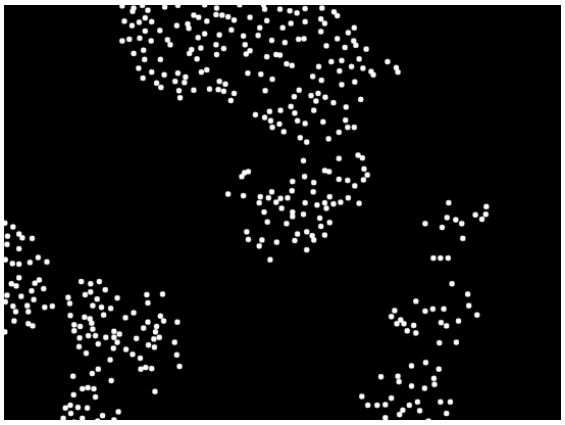

Image 2:

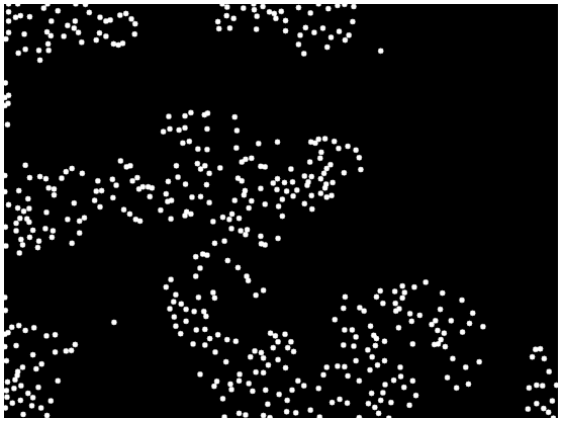

Image 3:

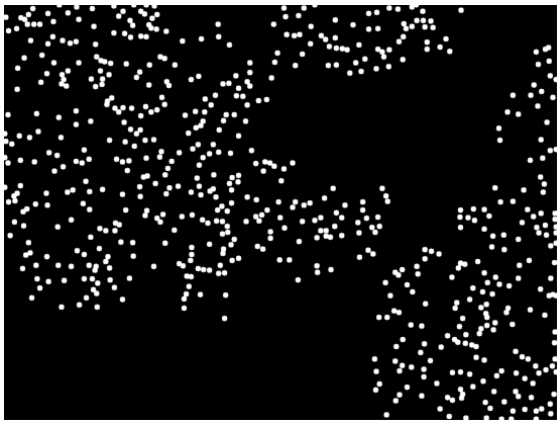

Table Of Quantitative Metrics:

Image	Precision	Recall	F-score
1	0.35	0.44	0.39
2	0.23	0.29	0.26
3	0.44	0.47	0.46