Comp448 HW1 - Q1 Report:

Pseudocode Of Design:

Function ObtainForegroundMask(image):
# Convert input image to grayscale
gray_image = ConvertToGrayscale(image)
# Separate foreground and background using adaptive thresholding
mask = AdaptiveThresholding(gray_image).
#To eliminate small black spots and gaps, use
MorphologicalClosing(mask)
#To clean the mask further, use
MorphologicalOpening(mask)
# Remove little white areas from the backdrop by finding contours.
contours = FindContours(mask).
for contour in contours:
        If area is less than 1000, calculate the contour area.
RemoveContour(mask, contour) # Return the final binary mask return mask

List Of Parameters:

1) image: This option specifies the input color picture from which the foreground mask will be obtained.
2) gray_image: This variable stores the grayscale version of the input image, which was created by converting the original color image to grayscale. Converting to grayscale serves to ease subsequent image processing operations.
3) mask: This variable contains the binary foreground mask extracted from the picture. Pixels in the mask can have values of 0 (background) or 255 (foreground).
4) Kernel: This parameter specifies the structural element utilized in morphological procedures. In this scenario, a 5x5 square-shaped kernel with all components set to one is employed

Discussion:
1) Thresholding Parameters: Adaptive thresholding (cv2.ADAPTIVE_THRESH_GAUSSIAN_C) was chosen because to its capacity to tolerate local fluctuations in illumination. The block size (11) and constant (2) are designed to adaptively modify the threshold in response to local image attributes.
2) Morphological Operations: Closing (cv2.MORPH_CLOSE) is used to fill in minor holes and gaps in foreground regions. A 5x5 square-shaped kernel with all components set to one is used to capture medium-sized features while being computationally efficient.
3) Input image: RGB photos are transformed to grayscale to facilitate processing.
4) Post Processing: Morphological closing is used to modify the binary mask

generated by thresholding.

Visual Results (estimated mask):
- The foreground is shown with white color in the estimated mask.
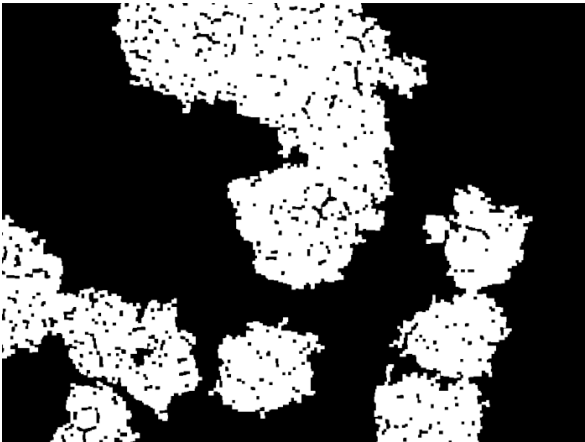
Image 1:
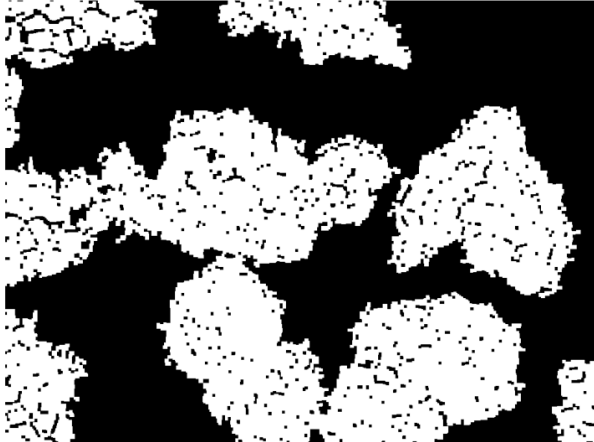

Image 2:

Image 3:

Table Of Quantitative Metrics:

```
(base) mehmetberkadalar@Arda-Air comp448 % python p1.py
Image    Precision          Recall  F-score
1        0.80               0.92    0.85
2        0.84               0.92    0.88
3        0.91               0.94    0.93
```