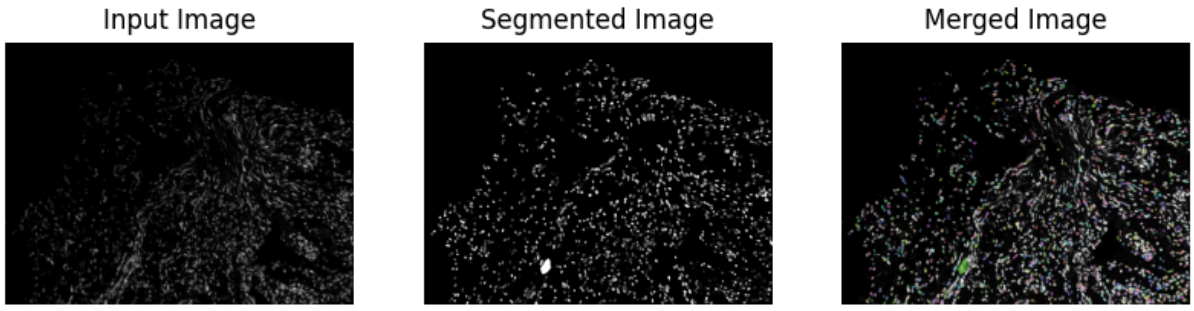
RECRUITMENT TEST

NUCLEI SEGMENTATION
USING STARDIST AND PYTHON IN GOOGLE COLAB



Problem Statement

We are provided with a dataset of cells (nuclei) containing a total of 28 images which are to be segmented, analyzed and finally documented. In this report, I have put in a detailed analysis of the segmentation result and the images (Original, Segmented, Merged) are provided in a zip file.

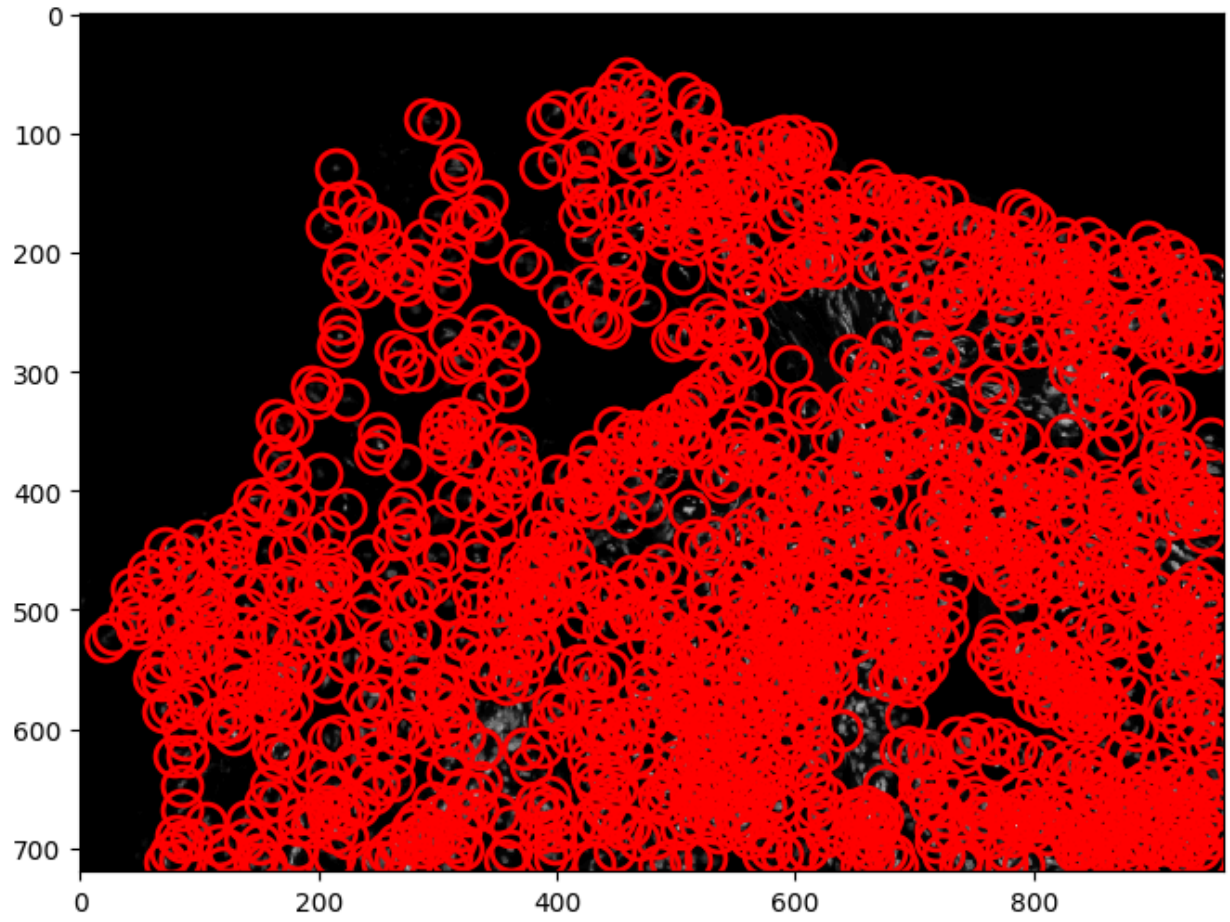
Procedure

Model

We start with aggregating all the images to simplify further processes. Then we use the pre-trained model “Versatile (fluorescent nuclei)” from the stardist package since it’s one of the best for monochromatic images. Using the stardist segmentation function, we store the segmented image per input image. After this step, we proceed to plot one as an example (refer colab notebook).

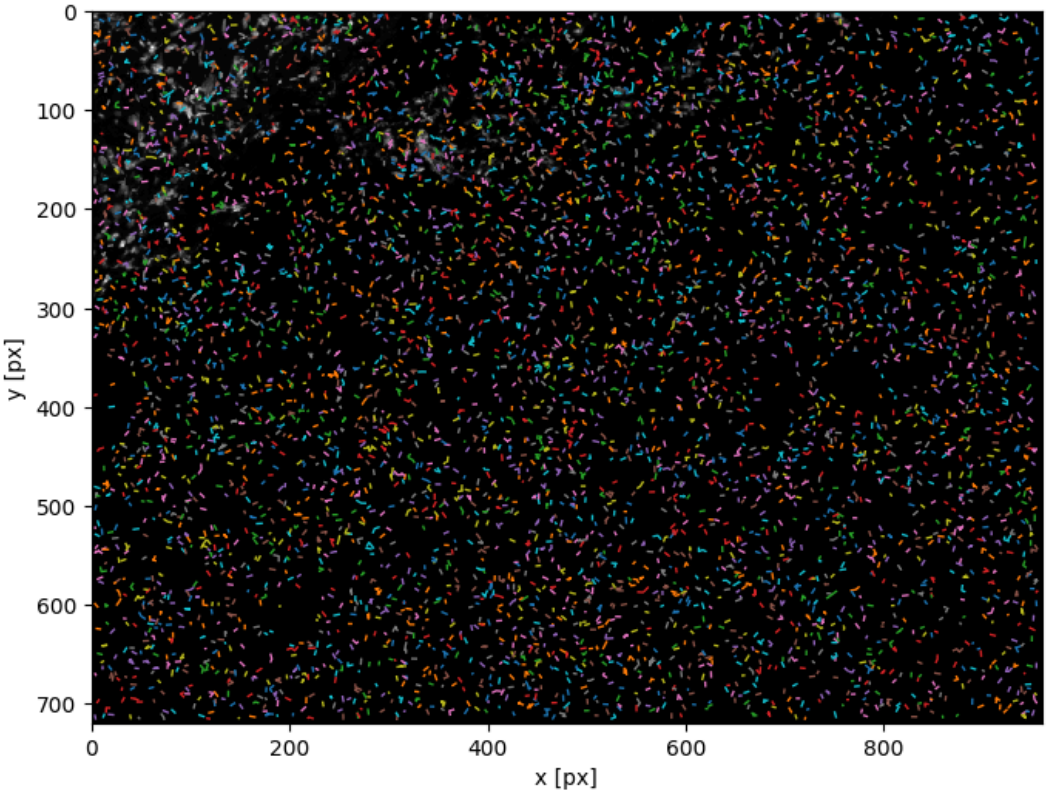
Centroid and Annotation

We then proceed to calculate the centroid coordinates of all the cells and store them in a variable “features” to use in the further steps. Using that, we annotate it graphically as shown.

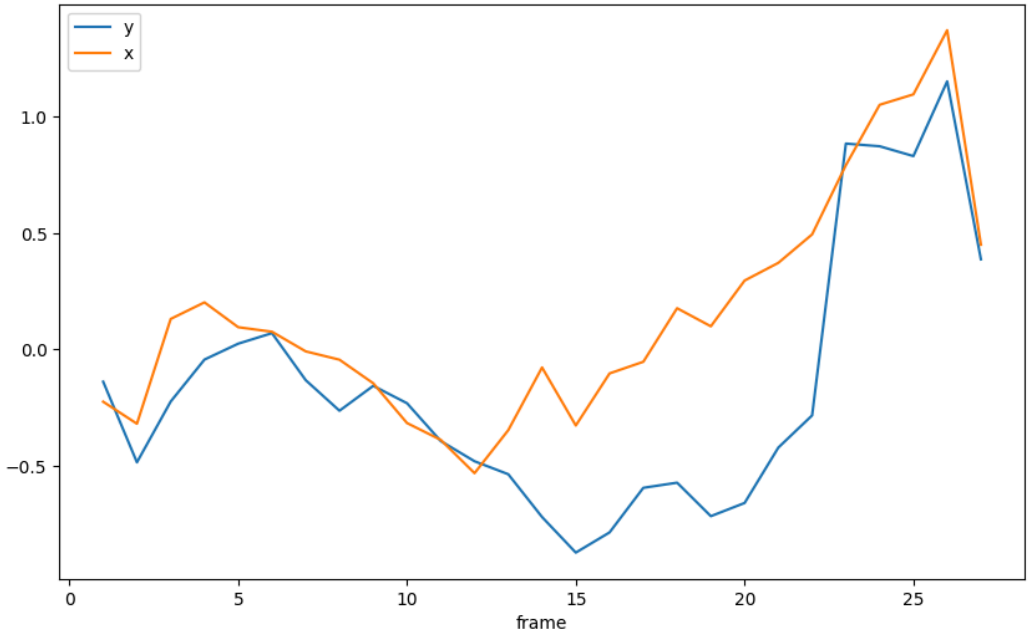


Trajectory and Drift

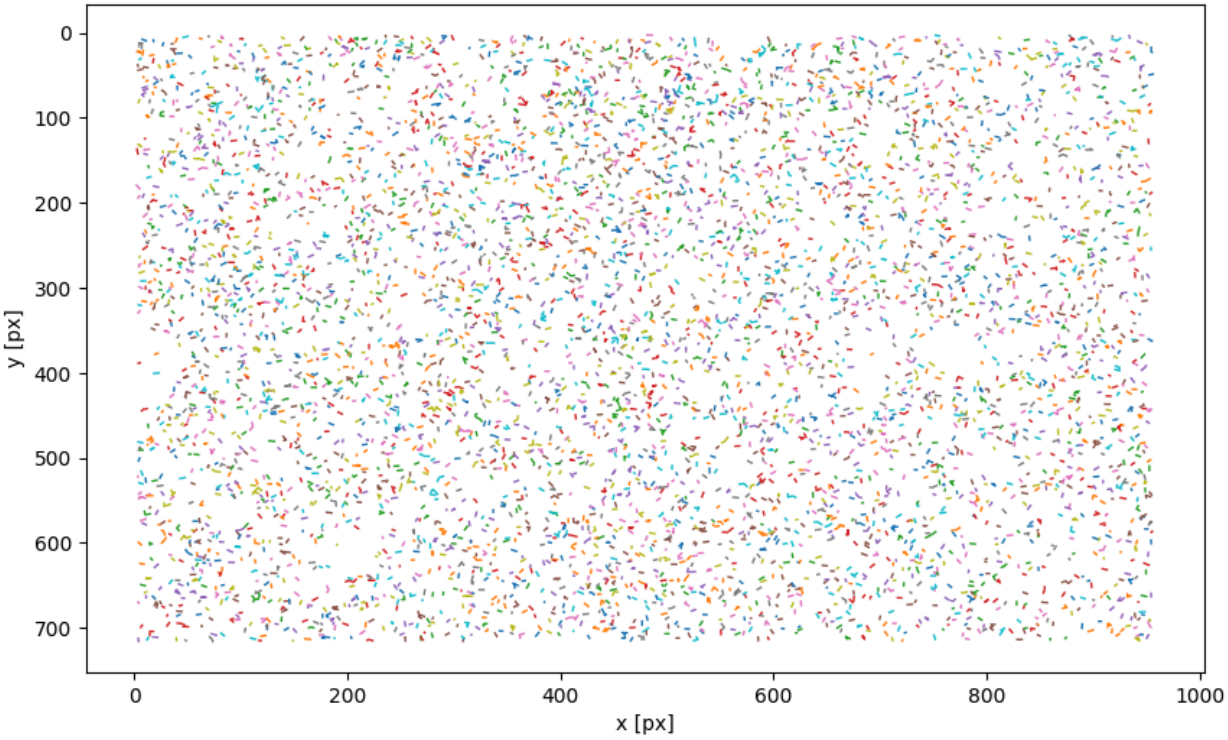
We then use Bubble tracking to plot the trajectories of the nuclei spanning across all the images. We then proceed to calculate the overall drift and using that, plot the corrected trajectories as shown below.



Trajectory



Overall Drift



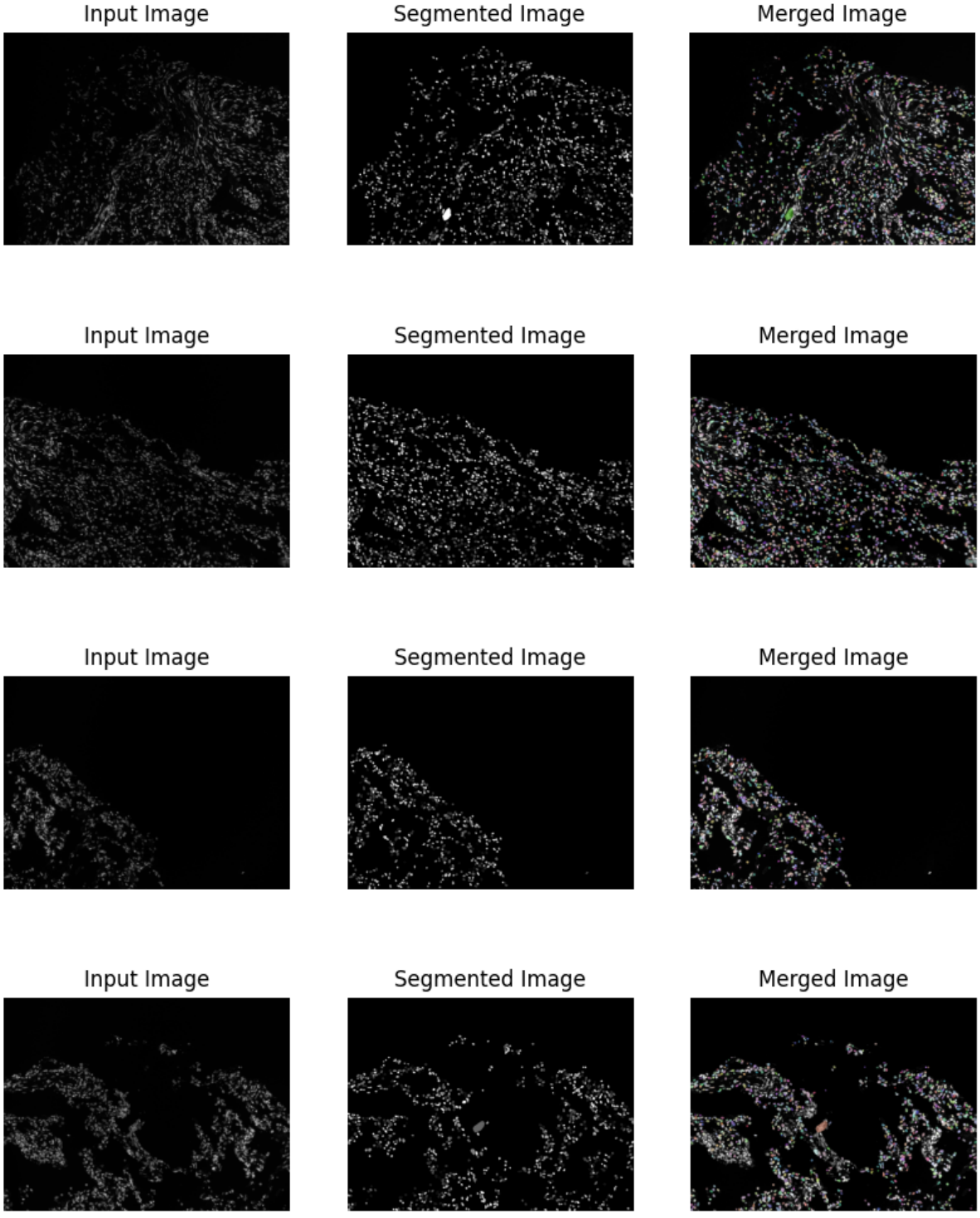
Corrected trajectory

Result

After doing the analysis, we finally plot the results as follows:

The images are present in the zip attached.

Can also access here - 🗀 Images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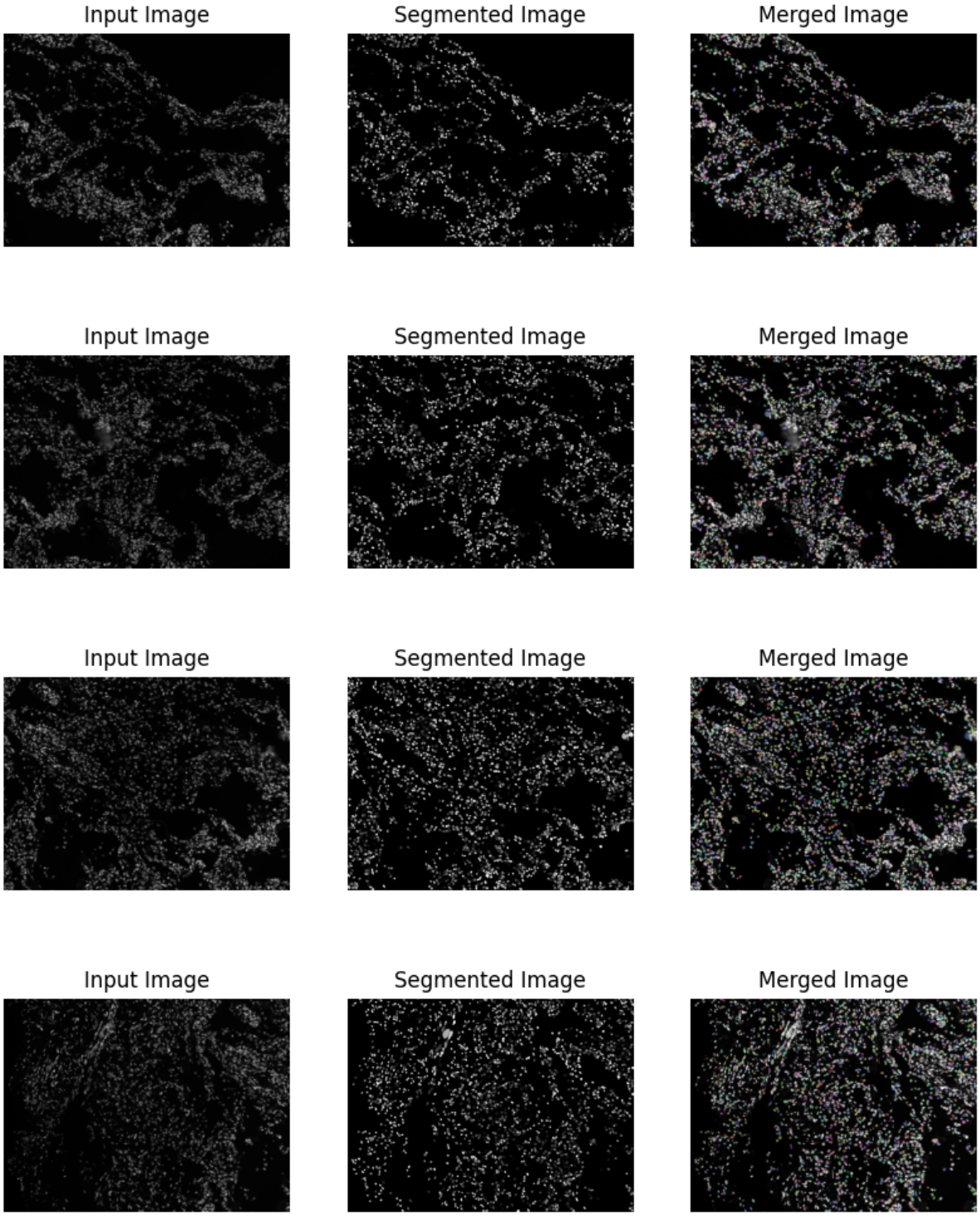
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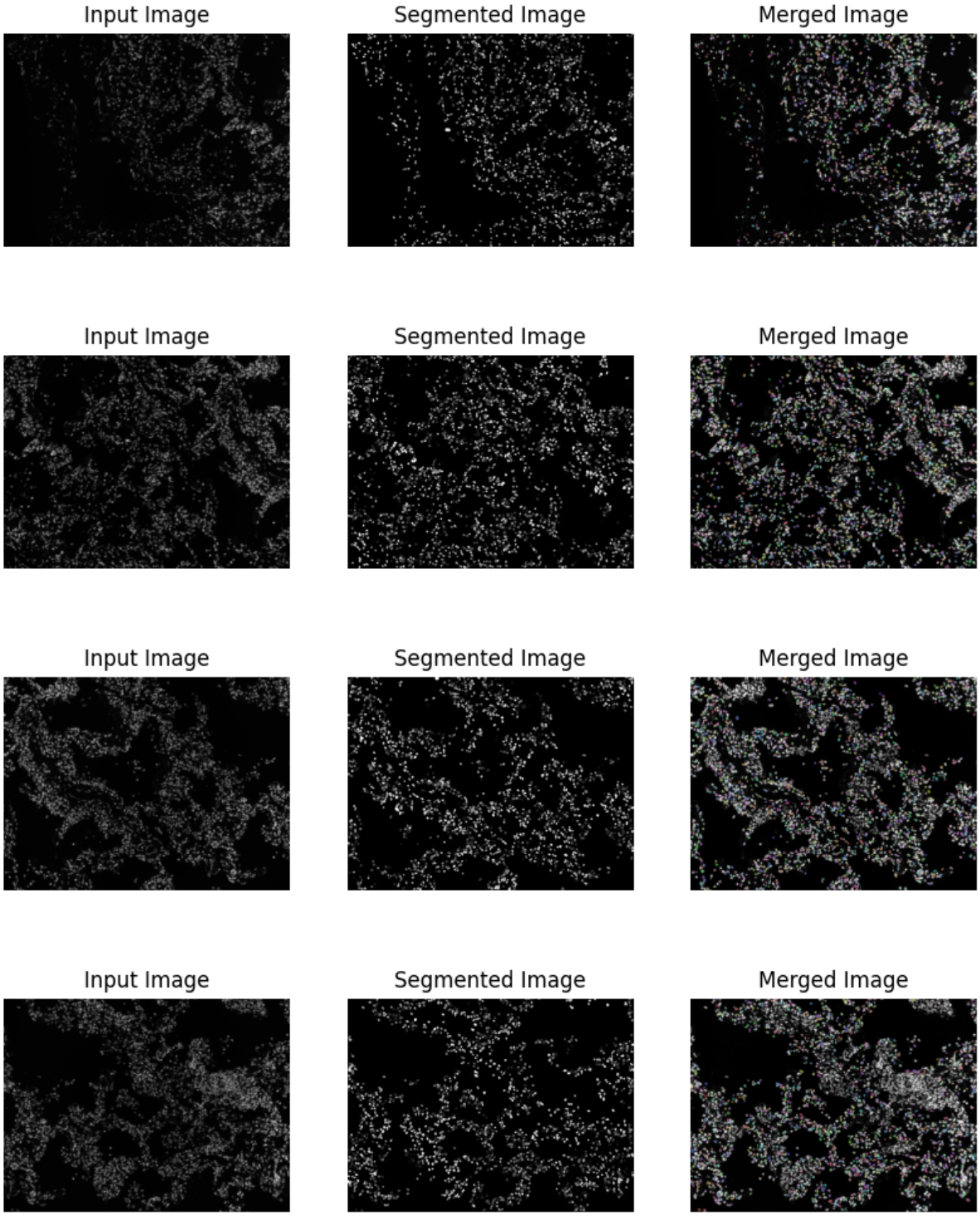
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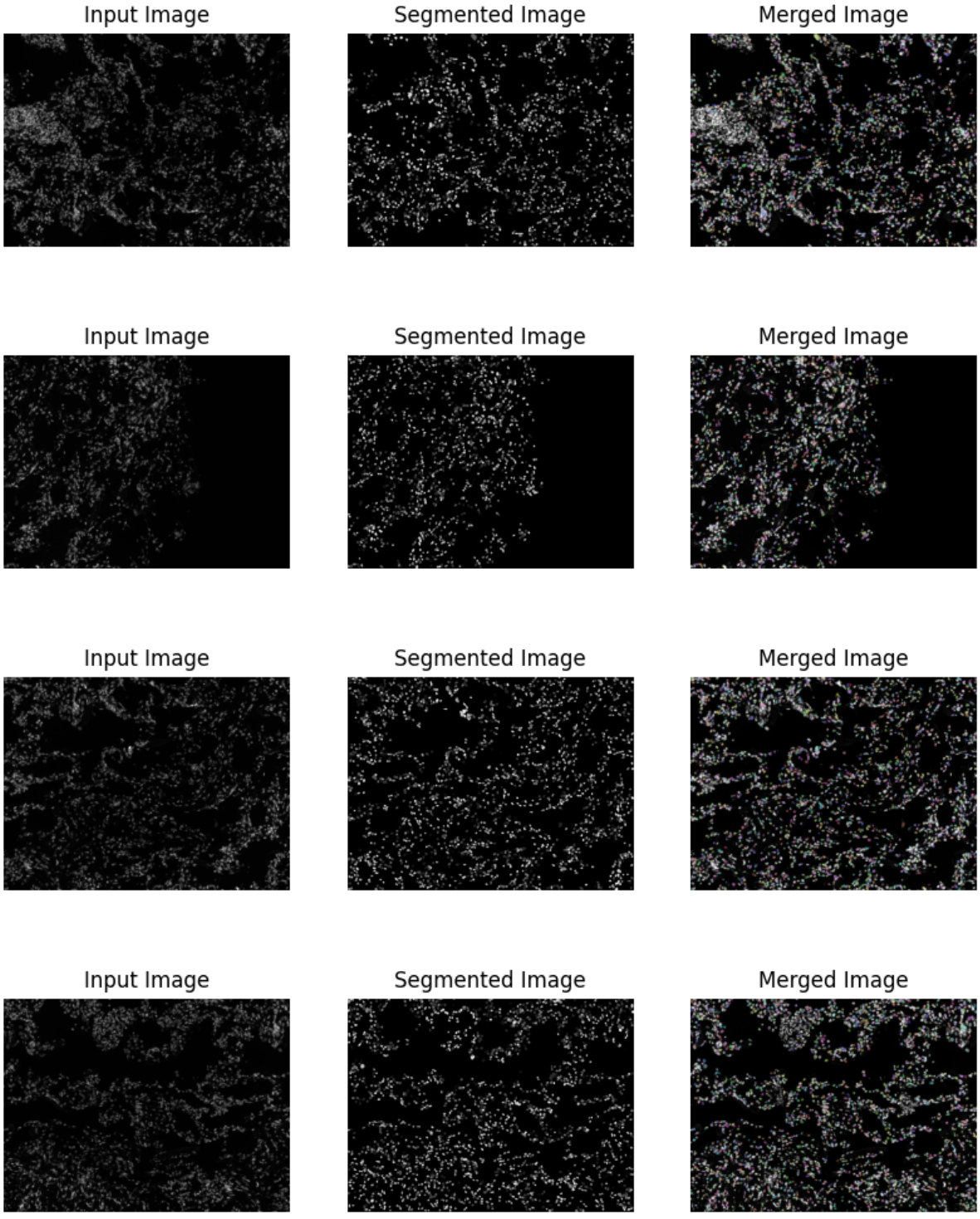
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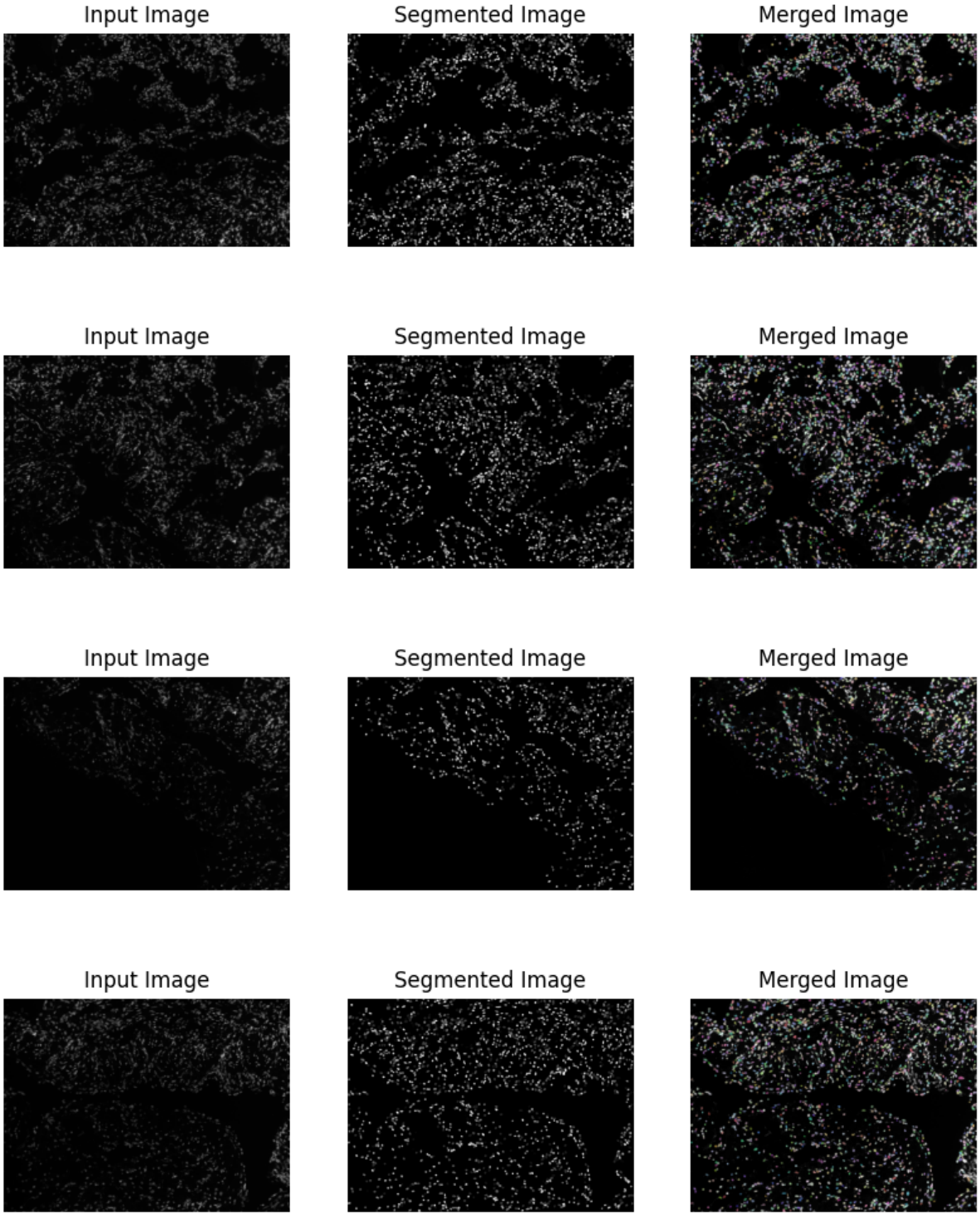
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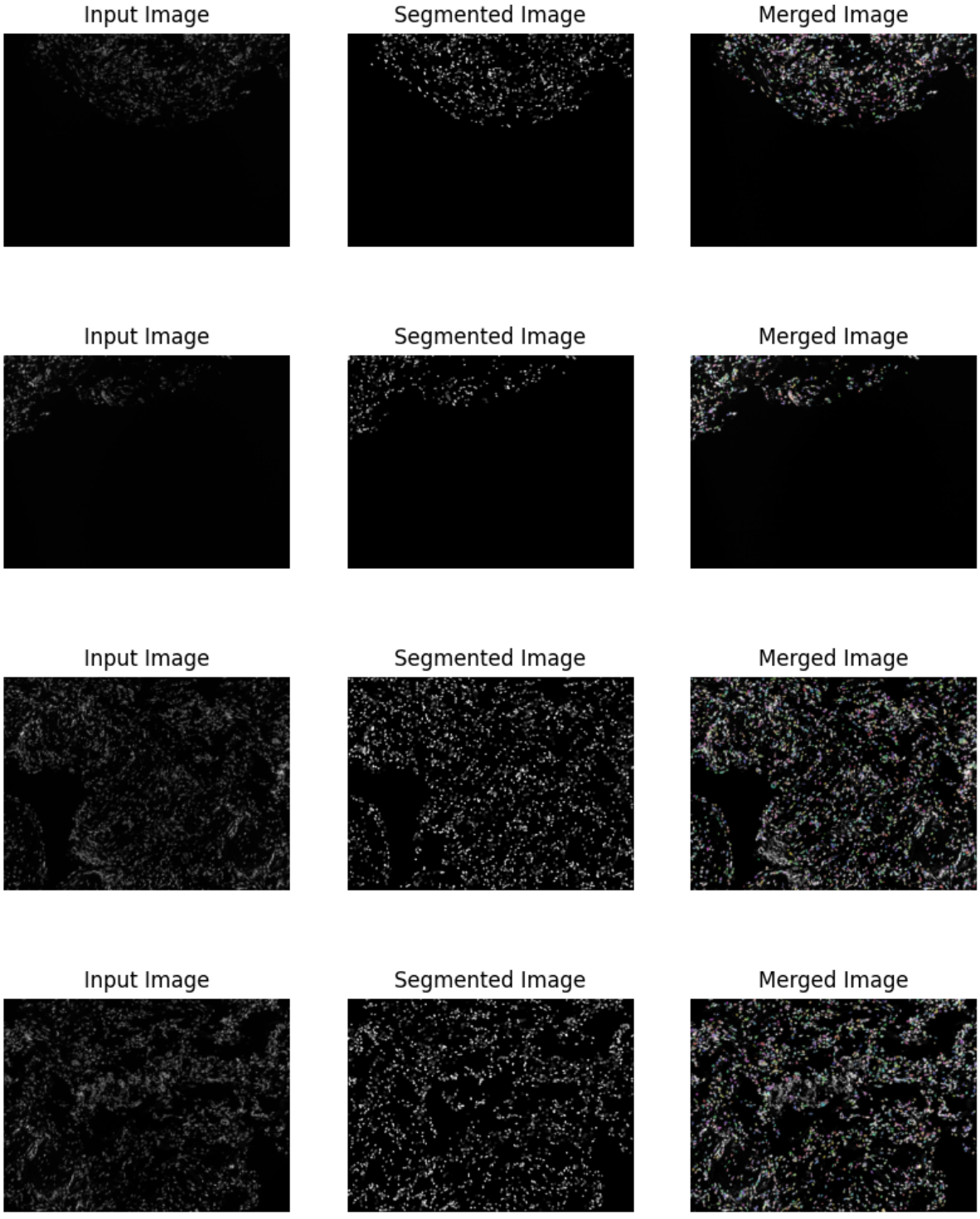
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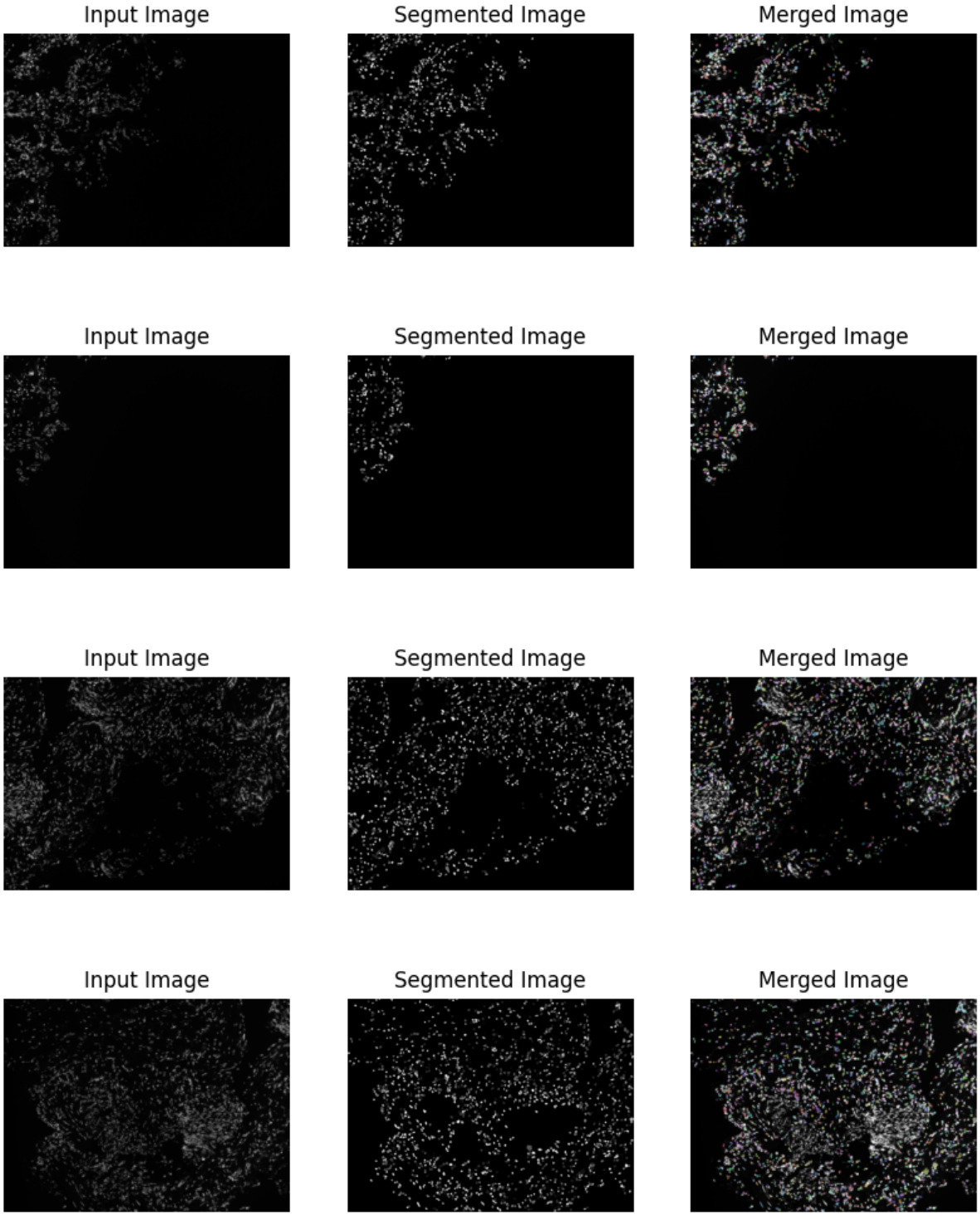
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