Assignment - 4 Report
Image Segmentation using Random Walker Algorithm

Understanding of the algorithm:
- We take an image of dimensions MxNx3 and mark the pixels on the MxN space according the no_of_segments and no_of_puxels we give as input.
- Then, we initialize random walkers from each unlabelled pixel which traverses the MxN space in a semi-randomized manner.
- We compare the intensity of every pixel to its adjacent pixel to identify its probability to traverse to that pixel. If the intensity difference is less, then there is a higher probability to traverse to that pixel.
- Beta parametes, which comes from the image can be tweaked to change the probability distribution of the traversal.
- We compare the cumulative probability of the traversal in a direction to a random number between 0 to 1 to choose the direction of traversal,
- Once we reach a labelled/marked pixel, we assign the unlabelled pixel the segment colour of the labelled pixel.
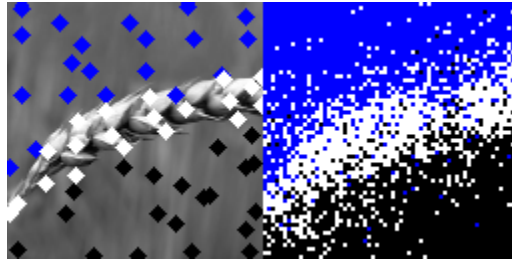
Dataset and Implementation:
- The random walker algorithm for image segmentation is carried out on this dataset, which contains a folder of 10 black-and-white images.
- This algorithm was coded and execued on Pycharm IDE.

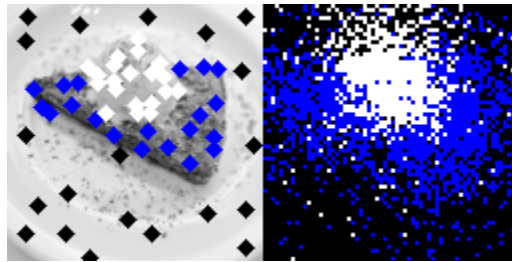**Results of the algorithm on the dataset:**
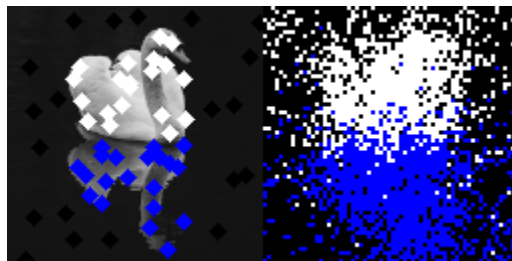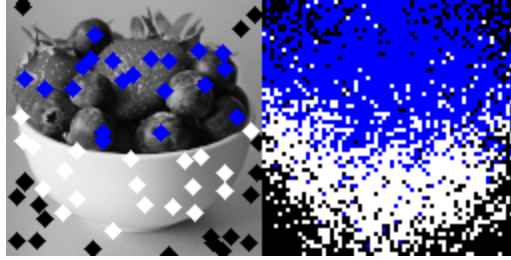
- **0.png**
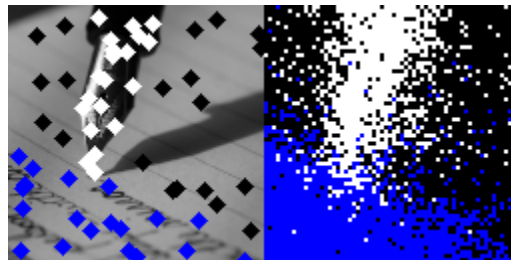
- **1.png**

- **2.png**

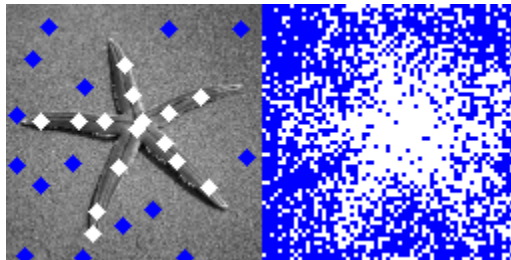- **3.png**

- **4.png**

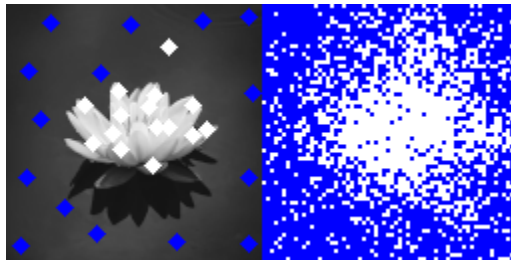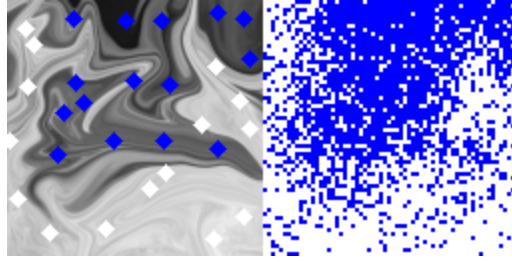- **5.png**

- **6.png**
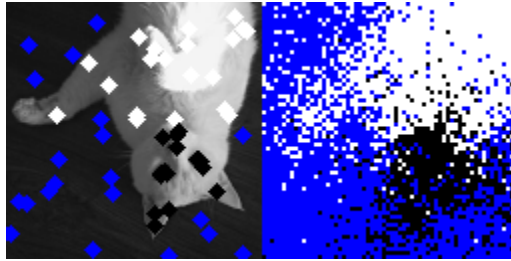
- **7.png**

- **8.png**

- **9.png**

Assumptions:

- The colours used for segmentation are Blue, White, and Black.
- The number of segments and pixels inputted for generating the output images (.png) for 0-6.png are 3, 20 respectively.
- However, the number of segments and pixels inputted for generating the output images (.png) for 7-9.png are 2, 15 respectively.

References:

- https://ieeexplore.ieee.org/document/1704833
- https://github.com/gihanjayatilaka/EM509-image-segmentation-using-random-walks