Assignment 2 Writeup

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1 Short answer problems

1. *Compare the effects of 1) Dilation + Erosion against 2) Erosion + Dilation. Do they have the same effects? Why?*

2. *List two examples of regular texture and two examples of near-regular texture.*

3. *What are the cases where optical flow is not well-defined? Please give two concrete examples.*

4. *What are the advantages of RANSAC when compared with Hough Transfrom?*

2 Circle Detection

- *Explain your implementation in concise steps (English, not code).*

- *Demonstrate the functions applied to the provided images 'coins.jpg' and 'planets.jpg' andone image of your choosing. Display the images with detected circle(s), labeling the figure with the radius. Note: you only need to select one reasonable radius and display all detected circles (i.e., those with highest votes) under that radius. You are not required to consider circles with a center off theimage.1*

- *For Hough Transform, explain how your implementation post-processes the accumulator array to determine automatically how many circles are present.*

- *For RANSAC, explain how you implement circle fitting.*

- *For one of the images, display and briefly comment on the Hough space accumulator array.*
- *For one of the images, demonstrate and explain the impact of the vote space quantization (binsize). In other words, alter the bin size and compare and contrast with a brief explanation why whathappened makes sense.*
- *For one of the images, plot the progress of the RANSAC as the number of tries increase. Thex axis of the plot should be the number of tries, and the y axis should be the number of inliers thatthe best model produces.*

3 Image segmentation with k-means

1. *Given an h x w x 3 matrix 'Im', where h and w are the height and width of the image, apply k-means clustering to associate pixels with clusters. Return 'labelIm', an h×w matrix of integers indicating the cluster membership (e.g., from 1 to k) for each pixel. Please use the following form:*

   function [labelIm] = clusterPixels(Im, k)

2. *Detect cluster boundary pixels from 'labelIm'.*

   function [boundaryIm] = boundaryPixels(labelIm)

3. *Please test both functions on the provided images 'gumballs.jpg', 'snake.jpg', and 'twins.jpg' and one other image of your choosing, and then displays the results.*