Homework 7 for **Kun**

Introduce to image process

Q1

a) Sampling

Sampling means when image is zooming, the ways can fill pixels into a new image.

Pro: simple. Con: It will give some mosaics.

App: Enlarge an image

b) Quantization

Quantization means when image is shrinking, the ways can reduce pixels into a new image.

Pro: Simple. Con: It will lose some details

4-neighbors: lost details

8-neighbors: consider all factors but high calculate amount.

App: Shrink an image.

c) Histogram equalization

A method to adjust the contrast and make the histogram equalized.

Pro: It will give the image easy to observe. Con: It will lose the color accuracy.

App: Contrast Strengthen

b) LoG edge detection

To detect edges form objects in an image by applying some spatial filters.

Pro: Easy to get edges. Con: If the edges are not clear, we need try different filters.

Sobel filter: Simple get high contrasted edges, lost some details

Prewitt filter: Consider more surrounding details but may get some edges don't expect.

App: To identify balls in an image by Sobel filter.

e) dilation

Dilation is a process to grow the object by a specific structural element.

Pro: Simple way to fill hole. Con: May enlarge the noise.

App: enhance the old literatures.

f) erosion

Dilation is a process to shrink the object by a specific structural element.

Pro: simple way to reduce noise. Con: May lose some details.

App: identify the object in a noised image.

g) Image Segmentation

A technique to separate object.

Pro: Ease to seg back and front. Con: Hard to seg if Hue or color fields are similar.

App: Background removal

Q2

Histogram segmentation

Extract object by contract.

Gray-Level segmentation

Extract object by a simple gray-scale threshold.

RGB segmentation

Extract object by a RGB channel.

HSI segmentation

Extract object by Hue value.

Relationship:

Gray-level is a simplify RGB, RGB is a high-level of Gray-level.

RGB and HSI are similar but use different channels.

Unlike Histogram use a range to segmentation, Gray-level, RGB and HIS generally use a threshold.

App: I think HIS segmentation can be useful in movie object segmentation, because green background has a highly difference Hue than the object, so it is good for HIS segmentation!

Q3

High pass filter can preserve high-frequency components and sharpen an image, so it should be b

Low pass filter can preserve low-frequency components and smooth an image, so it should be c.

Thus, band pass is d.

Q4

We can use image erosion and dilate to locate the boxes. Or opening first then Closing. Finally, calculate each connected area's center of mass to locate each boxes.