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.