2020/3/30

Q1: Determine the corresponding transformation curve in Figure B that generate each of the Rose images in Figures C – F. (Express in the form: curve ? < -- > rose ?)

Ans: curve **c < -- > rose C,** curve **b < -- > rose D,** curve **a < -- > rose E,** curve **e < -- > rose F**

Q2: For the image of a girl, specify whether the subimage enclosed by the red square contains mainly high-frequency or low-frequency components? (p87)

Ans: low-frequency component

Q3: For the image of a girl, specify whether the subimage enclosed by the yellow square contains mainly high-frequency or low-frequency components? (p87)

Ans: high-frequency component

Q4: Why should M of the Gaussian kernel with mask size MxM be an odd number? (p97)

Ans: so that the Gaussian kernel can be isotropic (radially symmetric)

Q5: What kind of distortion on the bar patterns did you find when applying Gaussian kernel with size 43x43 to the test pattern (image in Fig 3.33(a))? (p100)

Ans: The set of smaller bars (just below the large alphabet 'a' are almost glued together so that we can hardly identify the bar patterns (now they turn into a rectangle)

Q6: what is the degree of increment required to make a 2D mask truly isotropic? (hint: there are 8 immediate neighbors surrounding each pixel in the discrete image) (p118)

Ans: 45 degrees

Q7: What is the equivalent impulse response h of two linear, time-invariant systems (given their impulse responses h1 and h2) connected in parallel? Express h in terms of h1 and h2. (p121)

Ans: h = h1 + h2

Q8: Which image of the bird (upper or lower one, on the right) is the output of a high-boost filter designed with A > 1? (p128)

Ans: upper one

2020/3/23

Q1: For the airline image, red curve produces a higher-contrast image. Why?

Ans: Red curve has larger slopes (>1) in the small (black) and large (white) gray-level range that make the dark (bright) pixels darker (brighter), accordingly, increase the contrast.

Q2: (p36) How to modify the slicing scheme in Fig 3.11(a) to obtain the image in Fig3.12(b)?

Ans: shift the ROI (A-B range) to the upper gray-level range.

Q3: Histogram equalization for an image with narrow histogram produces the T(r) curve with very steep slope (>1) (in Figure 3.21). Why?

Ans: T(r) only appear in the small/narrow input gray-level range along horizontal axis. Histogram equalization expands the gray-level range so that T(r) spans a larger vertical range. Overall, the slope of T(r) is very steep.

Q4: When applying histogram equalization to the high-contrast pollen image, the transformation function T(r) approximates the diagonal line. Why?

Ans: The input histogram already spans over the entire gray-level range. Histogram equalization cannot make any further expansion on the gray-level range. Finally T(r) appears to be close to the diagonal line.

Q5: Why the lowest gray level in the histogram of equalized image (of Mars Moon) is so big? Refer to Figure 3.24.

Ans: The original histogram has a big impulse at the smallest gray level that, after histogram equalization by pdf accumulation, generates a 'big' lowest gray level in the output image (Histogram equalization shifts the entire histogram to the upper half).

Q6: For a smooth local area with constant gray level, what should be the local variance?

Ans: 0

Q7: For the image of flower bush, two subimages are enclosed by the blue squares. Which subimage has larger local variance? The lower one or upper one?

Ans: lower one

2020/3/16

1. What is the image model? (f(x,y) can be formulated by two factors)

Ans: $f(x,y)=i(x,y)r(x,y)$

2. What is the advantage of transformation process?

Ans: transformation can reveal those properties that are not clearly shown in the signals/images in the physical domain (time, space)

3. Which rose use threshold m=128?

Ans: the upper rose uses threshold m=128

4. What does the image on screen appear in comparison with the true image?

Ans: darker

5. Which area in the output image becomes unable to discriminate the details?
Ans: darker area

2020/3/9
1. Briefly describe the so-called "Low-level" processing in DIP.
Ans: Low-level processing is the preliminary image processing that both the input and output are images. Low-level processing mainly aims to reduce the noise and improve the quality of images.

2. Where does the major difference appear in comparison of what you perceive and what actually is?
Ans: At the boundaries between 2 rectangles of different grey levels

3. How many KB does an image with size 512x512, 256 different greys occupy?
Ans: 256 KB