Week 1 answers

Help Center

1. Q: Image and video processing has applications in (you can select more than one correct answer.)

   - Outer-space images
   - Medical images
   - Consumer images

   A: The answer is all the above since, as we have seen in the introductory videos, image processing has applications in consumer images, medical images, outer-space images, and much more.

2. Q: Images exist only in the visual spectrum.

   - True
   - False

   A: The statement that images exist only in the visual spectrum is False, as we have seen in the early videos. Check video 3, Figure 1.5 (around 01:30) and the numerous examples provided there.

3. Q: When you enter a dark room in a bright day, it takes some time before you can see reasonable well in the room. Which visual process explains this phenomena?

   - Dilated pupils
   - Binocular vision (2 eyes)
   - Color vision
   - Brightness adaptation

   A: Brightness adaptation is the visual process that explains that when you enter dark room in a bright day, it takes some time before you can see reasonable well in the room. Check Figure 2.4 in video 4 (around 04:30).

4. Q: Consider an image with 100 lines and 1000 pixels per line. Each pixel can take 256 different values. The total amount of bits needed to store that image is

   - Larger than the hard drive in my computer.
   - 10,000
   - 25,600,000
   - 800,000

   A: We have a total of 100x1000 pixels in the image, and we need 8 bits per pixel to represent 256 different values. The total number of bits is then 8x100x1000.

5. Q: Sampling refers to

   - Inversion of the pixel values
   - Discretization of the spatial image domain.
   - Testing the possible positions of an object in an image
   - Discretization of the values an image pixel can take

   A: Sampling refers to discretization of the spatial image domain. See figures 2.16 (around 03:50) and 2.17 (around 07:17) in video 5.

6. Q: Quantization refers to

   - Discretization of the spatial image domain.
   - Inversion of the pixel values.
   - Testing the possible positions of an object in an image.
   - Discretization of the values an image pixel can take.

   A: Quantization refers to discretization of the values an image pixel can take. See figures 2.16 (around 03:50) and 2.17 (around 07:17) in video 5.

7. Q: Going from a pixel with coordinate (1,1) to a pixel with coordinate (0,0) takes

   - One step for 8 adjacency and 2 steps for 4 adjacency
   - Two steps for 8 adjacency and 2 steps for 4 adjacency.
   - Two steps both for 4 and 8 adjacency neighborhoods.
   - One single step both for 4 and 8 adjacency.

   A: While with 8 adjacency we can travel diagonally (and then a single step), for 4 adjacency we can only move down and then left (a total of 2 steps).

8. Q: The determinant of a scaling matrix is equal to 1.

   - False
   - True

   A: False. The determinant actually represents the scale, see Table 2.2 (around 11:42) in video 6.

9. Q: The determinant of a rotation matrix is...

   A: The determinant of a rotation matrix is equal to 1, see Table 2.2 (around 11:42) in video 6 as well as the excellent and very detailed forum discussion on this question.

10. Q: When we quantize an image, the amount of memory needed to store it

    - Decreases
    - Increases

    A: It decreases. As we will see later, quantization is critical for compression, reducing the amount of storage needed while maintaining important visual characteristics.

11. Q: A video has 30 frames (images) per second. Considering that each images is 1000×1000 pixels. An hour of video will occupy

    - All the memory in my mobile phone.
    - 864000000000 bits
    - We can't know.
    - 864000000 bits

    A: We can't know because the number of gray levels per pixel was not specified.

12. Q: If we quantize an image with double resolution (meaning we use double number of bits per pixel) and sample it with half the resolution in each direction, then

    - The total storage needed remains the same.
    - The total storage needed is reduced by half.
    - The total storage needed is reduced 4 times.
    - The image quality remains the same.

A: Since we are reducing the resolution by 2 in each direction, the total number of pixels is reduced by 4. At the same time we are doubling the number of bits per pixel and therefore the total storage is only reduced by 2.

Created Mon 3 Feb 2014 8:48 PM IST

Last Modified Thu 18 Dec 2014 9:07 PM IST