Feedback — Quiz #1

Help Center

You submitted this quiz on **Sat 17 Jan 2015 12:26 AM IST**. You got a score of **12.00** out of **12.00**.

Question 1

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

Your Answer		Score	Explanation
☑ Outer-space images	✔	0.33	
☑ Medical images	✔	0.33	
☑ Consumer images	✔	0.33	
Total		1.00 / 1.00	

Question Explanation

See video 1 (parts 1 & 2) with examples from all these disciplines and beyond.

Question 2

Images exist only in the visual spectrum.

Your Answer		Score	Explanation
○ True			
◉ False	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

Check video 3, Figure 1.5 (around 01:30) and the numerous examples provided there.

Question 3

When you enter 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?

Your Answer		Score	Explanation
Binocular vision (2 eyes)			
Color vision			
Dilated pupils			
Brightness adaptation	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

Check Figure 2.4 in video 4 (around 04:30).

Question 4

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

Your Answer		Score	Explanation
25,600,000			
10,000			
Larger than the hard drive in my computer.			
800,000	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

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.

Question 5

Sampling refers to

Your Answer		Score	Explanation
(•) Discretization of the spatial image domain.	✔	1.00	
( ) Inversion of the pixel values			
( ) Discretization of the values an image pixel can take			
( ) Testing the possible positions of an object in an image			
Total		1.00 / 1.00	

Question Explanation

See figures 2.16 (around 03:50) and 2.17 (around 07:17) in video 5.

Question 6

Quantization refers to

Your Answer		Score	Explanation
( ) Discretization of the spatial image domain.			
( ) Testing the possible positions of an object in an image.			
( ) Inversion of the pixel values.			
(•) Discretization of the values an image pixel can take.	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

See figures 2.16 (around 03:50) and 2.17 (around 07:17) in video 5.

Question 7

Going from a pixel with coordinate (1,1) to a pixel with coordinate (0,0) takes

Your Answer		Score	Explanation
◉ One step for 8 adjacency and 2 steps for 4 adjacency	✔	1.00	
○ Two steps both for 4 and 8 adjacency neighborhoods.			
○ One single step both for 4 and 8 adjacency.			
○ Two steps for 8 adjacency and 2 steps for 4 adjacency.			
Total		1.00 / 1.00	

Question Explanation

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).

Question 8

The determinant of a scaling matrix is equal to 1.

Your Answer		Score	Explanation
False	✔	1.00	
True			
Total		1.00 / 1.00	

Question Explanation

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

Question 9

The determinant of a rotation matrix is

You entered:

1

Your Answer		Score	Explanation
1	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

See Table 2.2 (around 11:42) in video 6.

Question 10

When we quantize an image, the amount of memory needed to store it

Your Answer		Score	Explanation
Decreases	✔	1.00	
Increases			
Total		1.00 / 1.00	

Question Explanation

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

Question 11

A video has 30 frames (images) per second. Considering that each image has 1000×1000 pixels, an hour of video will occupy

Your Answer		Score	Explanation
864000000000 bits			
We can't know	✔	1.00	
864000000 bits			
All the memory in my mobile phone			
Total		1.00 / 1.00	

Question Explanation

The number of gray levels per pixel was not specified.

Question 12

If we quantize an image with double resolution (meaning we use twice the number of bits per pixel)

and sample it with half the resolution in each direction, then

Your Answer		Score	Explanation
The total storage needed remains the same			
The total storage needed is reduced 4 times			
The total storage needed is reduced by half	✔	1.00	
The image quality remains the same			
Total		1.00 / 1.00	

Question Explanation

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.

Question 13

(Optional)

- If planning on using Matlab (recommended), watch the tutorial videos provided in the corresponding section, and perform “help images” in the Matlab command line for examples of important image related commands.
- Write a computer program capable of reducing the number of intensity levels in an image from 256 to 2, in integer powers of 2. The desired number of intensity levels needs to be a variable input to your program.
- Using any programming language you feel comfortable with (it is though recommended to use the provided free Matlab), load an image and then perform a simple spatial 3x3 average of image pixels. In other words, replace the value of every pixel by the average of the values in its 3x3 neighborhood. If the pixel is located at (0,0), this means averaging the values of the pixels at the positions (-1,1), (0,1), (1,1), (-1,0), (0,0), (1,0), (-1,-1), (0,-1), and (1,-1). Be careful with pixels at the image boundaries. Repeat the process for a 10x10 neighborhood and again for a 20x20 neighborhood. Observe what happens to the image (we will discuss this in more details in the very near future, about week 3).
- Rotate the image by 45 and 90 degrees (Matlab provides simple command lines for doing this).
- For every 3×3 block of the image (without overlapping), replace all corresponding 9 pixels by their average. This operation simulates reducing the image spatial resolution. Repeat this for 5×5 blocks and 7×7 blocks. If you are using Matlab, investigate simple command lines to do this important operation.

Your Answer	Score	Explanation
Total	0.00 / 0.00	